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**P1 2013-10-01 The uncertain location of electrons - George Zaidan and Charles Morto**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=1)

You probably know that all stuff is made up of atoms and that an atom is a really, really, really, really tiny particle. Every atom has a core, which is made up of at least one positively charged particle called a proton, and in most cases, some number of neutral particles called neutrons. That core is surrounded by negatively charged particles called electrons. The identity of an atom is determined only by the number of protons in its nucleus. Hydrogen is hydrogen because it has just one proton, carbon is carbon because it has six, gold is gold because it has 79, and so on. Indulge me in a momentary tangent. How do we know about atomic structure? We can't see protons, neutrons, or electrons. So, we do a bunch of experiments and develop a model for what we think is there. Then we do some more experiments and see if they agree with the model. If they do, great. If they don't, it might be time for a new model. We've had lots of very different models for atoms since Democritus in 400 BC, and there will almost certainly be many more to come. Okay, tangent over. The cores of atoms tend to stick together, but electrons are free to move, and this is why chemists love electrons. If we could marry them, we probably would. But electrons are weird. They appear to behave either as particles, like little baseballs, or as waves, like water waves, depending on the experiment that we perform. One of the weirdest things about electrons is that we can't exactly say where they are. It's not that we don't have the equipment, it's that this uncertainty is part of our model of the electron. So, we can't pinpoint them, fine. But we can say there's a certain probability of finding an electron in a given space around the nucleus. And that means that we can ask the following question: If we drew a shape around the nucleus such that we would be 95% sure of finding a given electron within that shape, what would it look like? Here are a few of these shapes. Chemists call them orbitals, and what each one looks like depends on, among other things, how much energy it has. The more energy an orbital has, the farther most of its density is from the nucleus. By they way, why did we pick 95% and not 100%? Well, that's another quirk of our model of the electron. Past a certain distance from the nucleus, the probability of finding an electron starts to decrease more or less exponentially, which means that while it will approach zero, it'll never actually hit zero. So, in every atom, there is some small, but non-zero, probability that for a very, very short period of time, one of its electrons is at the other end of the known universe. But mostly electrons stay close to their nucleus as clouds of negative charged density that shift and move with time. How electrons from one atom interact with electrons from another determines almost everything. Atoms can give up their electrons, surrendering them to other atoms, or they can share electrons. And the dynamics of this social network are what make chemistry interesting. From plain old rocks to the beautiful complexity of life, the nature of everything we see, hear, smell, taste, touch, and even feel is determined at the atomic level.

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翻译人员: xuanyu shi 校对人员: Qingqing Mao你或许知道所有东西都是由原子组成的。而原子本身是一个非常非常非常小的粒子。每个原子都有一个核，由至少一个带正电的粒子组成，这个正电粒子叫做质子，大多数情况下，还有一些中性粒子叫中子。原子核被称为电子的负电粒子包围。一个原子的特性仅由原子核中质子的数量来确定。氢就是氢，因为它只有一个质子，碳之所以是碳是因为它有6个质子，金之所以是金是因为它有79个质子，诸如此类的还有很多。请允许我讲会儿题外话。我们是如何知道原子的结构的呢？我们又看不见质子、中子或电子。所以，我们做了一堆实验，然后构造一个我们认为是对的模型。然后我们做更多的实验来看看实际情况是否符合模型。如果是，那最好了。如果不是， 那就是时候来建一个新模型了。自公元前400年的德谟克利特以来，我们有很多不同的原子模型，而且将来肯定会有更多的模型出现。好了，题外话结束。原子的核心往往是粘在一起的，但电子可以自由移动，这就是化学家爱电子的原因了。如果我们可以和它们结婚，我想我们会的。但是电子很奇怪。它们的表现既像是粒子，像是小棒球，也像是波浪，水的波浪。它们在不同的实验中有着不同的表现。关于电子最奇怪的事情是我们无法知道它们的确切位置。这并不是说我们没有合适的设备，而是这种不确定性也是我们的电子模型的一部分。所以，好吧，我们不能精确定位它们。但我们可以说，在原子核周围的一个给定区域中找到一个电子的几率是多少。这就意味着我们可以问以下的问题：如果我们绕原子核画一个形状，使得我们将有95％的把握在这个形状中找到一个给定的电子，它会是什么样的？这里有几个形状，化学家们称之为轨道。决定每个轨道的形状的因素之一是它们所拥有能量的多少。一个轨道拥有的能量越多，那么它的主要部分就离原子核越远。顺便提一下，为什么我们选择95%的把握而不是100%？好吧，那是我们电子模型另一个比较特殊的地方。从离开原子核的一定距离开始，发现电子的几率开始随着距离下降，差不多呈现指数衰减，这就意味着几率会越来越接近零，但事实上永远不会达到零。所以，每一个原子中，总有一些很小，但是非零的可能性，在很短很短的一段时间里其中一个电子正位于宇宙的另一端。但是大部分时间电子都距离原子核很近，呈现为带负电的电子云，电子云会随着时间改变位置。一个原子的电子如何和另一个原子的电子互相作用几乎决定了一切。原子可以放弃自己的电子，把它们给其他原子，或者与其他原子共享电子。而这个社交网络的动态使化学变得有趣。从普通的旧石头到美好而复杂的生命，自然界中一切我们可以看到的，听到的，闻到的品尝到的，触摸到的，都是在原子层面决定的。

**P2 2013-10-03 Why extremophiles bode well for life beyond Earth - Louisa Preston**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=2)

We've all seen movies about terrible insects from outer space or stories of abduction by little green men, but the study of life in the universe, including the possibility of extraterrestrial life, is also a serious, scientific pursuit. Astrobiology draws on diverse fields, such as physics, biology, astronomy, and geology, to study how life was formed on Earth, how it could form elsewhere, and how we might detect it. Many ancient religions described other worlds inhabited by known human beings, but these are more like mythical realms or parallel universes than other planets existing in the same physical world. It is only within the last century that scientists have been able to seriously undertake the search for extraterrestrial life. We know that at the most basic level organisms on Earth need three things: liquid water, a source of energy, and organic, carbon-based material. We also know that the Earth is just the right distance from the Sun, so as not to be either frozen or molten. So, planets within such a habitable range from their own stars may be able to support life. But while we used to think that life could only exist in such Earth-like environments, one of the most amazing discoveries of astrobiology has been just how versatile life is. We now know that life can thrive in some of the most extreme environments that'd be fatal for most known organisms. Life is found everywhere, from black smoke of hydrothermal vents in the dark depths of Earth's oceans, to bubbling, hot, acidic springs on the flanks of volcanoes, to high up in the atmosphere. Organisms that live in these challenging environments are called extremophiles, and they can survive at extremes of temperature, pressure, and radiation, as well as salinity, acidity, and limited availability of sunlight, water, or oxygen. What is most remarkable about these extremophiles is that they are found thriving in environments that mimic those on alien worlds. One of the most important of these worlds is our red and dusty neighbor, Mars. Today, astrobiologists are exploring places where life might once have existed on Mars using NASA's Curiosity rover. One of these is Gale Crater, an impact crater created when a meteor hit the surface of Mars nearly 3.8 billions years ago. Evidence from orbit suggest past traces of water, which means the crater might once have supported life. Planets are not the only places astrobiologists are looking at. For example, Europa, one of the moons of Jupiter, and Enceladus and Titan, two of Saturn's moons, are all exciting possibilities. Although these moons are extremely cold and two are covered in thick ice, there is evidence of liquid oceans beneath the shell. Could life be floating around in these oceans, or could it be living around black smoker vents at the bottom? Titan is particularly promising as it has an atmosphere and Earth-like lakes, seas, and rivers flowing across the surface. It is very cold, however, too cold for liquid water, so these rivers may instead be flowing with liquid hydrocarbons such as methane and ethane. These are composed of hydrogen, and, more importantly, carbon, which is the basic building block of all life as we know it. So, could life be found in these lakes? Although instruments are being designed to study these distant worlds, it takes many years to build them and even longer to get them where they need to be. In the meantime, astrobiologists work in our own natural laboratory, the Earth, to learn about all the weird and wonderful forms of life that can exist and to help us one day answer one of humanity's oldest questions: Are we alone?

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翻译人员: Ying Minako Zhao 校对人员: Zhiting Chen我们时常在电影里看到从外太空来的可怕的昆虫或者地球人被小绿人绑架的故事但是有关宇宙生物的研究包括外星生物存在的可能性却是一门严肃的科学研究天体生物学集合了物理学生物学天文学以及地质学的知识来研究生命是怎样在地球上形成的它如何能在地球以外的地方形成以及我们怎样才能探知地外生命很多古老的宗教都描述过人类居住的另外的世界但这些都属于神话，或者是平行宇宙的范围与其它存在于我们这个物理世界的行星无关从上个世纪开始科学家们才有能力真正地着手有关地外生命的研究我知道地球上最基本的生物需要三种物质：我知道地球上最基本的生物需要三种物质：液态水能量源以及有机碳化物我们也知道地球与太阳之间的距离刚好以至于我们不会被冰封，也不会被融化所以，与恒星保持适当距离的行星所以，与恒星保持适当距离的行星应该有孕育生命的可能性我们曾经以为生命只能存在于类似地球的环境下但是，天体生物学的最惊人的发现之一让我们知道了生命形式的多样性我们现在知道生命可以在一些极其严酷的环境中成长而这些环境对大多数已知生物来说都是致命的到处都可以找到生命的迹象从地球深海热泉的黑烟到火山侧翼滚烫的酸性温泉再到大气的高层生长于这些环境中的生物被叫做嗜极生物它们可以存活于极端的温度压力辐射盐度酸度以及有限的阳光水分或氧气这些嗜极生物最引人注目的是适合它们生长的环境往往与外星环境相似最重要的地外行星之一是我们布满尘土的邻居，火星目前，天体生物学家们 正在利用美国宇航局（NASA）的好奇号（Curiosity）火星探测器来勘探火星上可能存在过生命的地方其中一处便是盖尔撞击坑它是于将近38亿年前彗星撞击火星表面造成的彗星撞击火星表面造成的我们从彗星轨道上发现有少量水分的迹象说明撞击坑可能曾经有过生命存在而天体生物学家们不仅仅关注地外行星它们也关注其它有可能存在生命的地方，包括木星的卫星之一，木卫二以及土星的两个卫星土卫二和土卫六虽然这些卫星都极其寒冷其中两个还被厚冰覆盖有证据表明它们的外壳下面存在液态海洋生命有可能浮游在这些海洋中吗？或是生存于深海热泉的黑烟中？或是生存于深海热泉的黑烟中？土卫六是很有希望的因为它拥有大气层并且其表面上分布着类似地球的湖泊，海洋，河流但是，它非常寒冷以至没有液态水存在所以土卫六的河流中流动的应该是液态的碳氢化合物例如，甲烷和乙烷这些物质由氢和碳构成而碳元素则是所有已知生命的基础组成部分那么，我们有可能在这些湖泊中发现生命吗？虽然科学家们已经着手设计用于探测遥远星球的仪器但是制造这些仪器需要许多年而把它们送到外星则需要更长时间在此期间，天体生物学家们将利用我们的天然实验室，地球来了解可能存在的各种奇特的生命形式从而帮助我们回答人类有史以来最古老的问题之一我们是孤独的吗？

**P3 2013-10-08 The operating system of life - George Zaidan and Charles Morton**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=3)

Every chicken was once an egg, every oak tree an acorn, every frog a tadpole. The patch of mold on that old piece of bread in the back of your fridge, not so long ago that was one, solitary cell. Even you were once but a gleam in your parents' eyes. All these organisms share the same basic goal: to perpetuate their own existence. All lifeforms that we've discovered so far stay alive by using basically the same rules, materials, and machinery. Imagine a factory full of robots. These robots have two missions: one, keep the factory running, and two, when the time is right, set up an entirely new factory. To do those things, they need assembly instructions, raw materials, plenty of energy, a few rules about when to work normally, when to work quickly, or when to stop, and some exchange currencies because even robots need to get paid. Each factory has a high security office with blueprints for all the possible factory configurations and complete sets of instructions to make all the different types of robots a factory could ever need. Special robots photocopy these instructions and send them off to help make the building blocks of more robots. Their colleagues assemble those parts into still more robots, which are transported to the right location in the factory and given the tools they need to start working. Every robot draws energy from the central power plant, a giant furnace that can burn regular fuel but also scrap materials if not enough regular fuel is available. Certain zones in the factory have harsher working conditions, so these areas are walled off. But the robots inside can at least communicate with the rest of the factory through specialized portals embedded directly into the walls. And as you've probably figured out, what we're describing here is a cell. The high security office is the nucleus. It stores the blueprints and instructions as deoxyribonucleic acid, or DNA. The photocopied instructions are RNA. The robots themselves are mostly proteins built from amino acids, but they'll often use special tools that are, or are derived from, vitamins and minerals. The walls between factory zones and around the factory itself are mostly made up of lipids, a.k.a. fats. In most organisms, the primary fuel source are sugars, but in a pinch, fats and proteins can be broken down and burned in the furnace as well. The portals are membrane proteins which allow very specific materials and information to pass through the walls at the right times. Many interactions between robot proteins require some kind of push, think robot minimum wage. A few small but crucial forms of money are transferred between proteins to provide this push. Electrons, protons, oxygen, and phosphate groups are the main chemical currencies, and they're kept in small molecular wallets or larger tote bags to keep them safe. This is biochemistry, the study of how every part of the factory interacts to keep your life running smoothly in the face of extreme challenges. Maybe there's too much fuel; your body will store the excess as glycogen or fat. Maybe there's not enough; your body will use up those energy reserves. Maybe a virus or bacteria tries to invade; your body will mobilize the immune system. Maybe you touched something hot or sharp; your nerves will let you know so you can stop. Maybe it's time to create a new cell or a new person. Amazingly, oak trees, chickens, frogs, and, yes, even you share so many of the same basic robot and factory designs that biochemists can learn a lot about all of them all at the same time.

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翻译人员: jie chen 校对人员: Xuwen Zhu小鸡的前身是蛋，橡树的前身是橡子，青蛙前身是蝌蚪。你家冰箱深处那片放了很久的面包上的霉菌所有这些的前身，都曾是一个单细胞。就连你自己，最初也不过是你父母投向彼此的一个深情注视。所有一切有机物都有一个共同的目标：让自己长存下去。一切已知的生命体，其存在方式从本质上说，都采用同样的规则，原料和运行机制。请想象一个全是机器人的工厂。这些机器人有两种使命：第一个是保持工厂运作第二个则是在时机成熟时，建立一个全新的工厂。为了达成这样的目标，他们需要把指令,原材料，大量的能量，还有一些规则结合起来，这些规则是：何时正常工作，何时快速工作，或者何时停止工作，以及，如何获得一些奖励货币，因为，即使是机器人，也应该有报酬。每间工厂里都有绝密办公室，里面藏着各种蓝图，描绘所有工厂结构以及整套整套的指令，其目标是制造工厂所需的各类机器人。特种机器人复制并发出这些指令，用于建立更多的机器人原件。他们的同事则组装起这些元件，制造出更多的机器人，这些机器人被运送到工厂里相应的部门，然后他们拿起工具，开始工作。每一个机器人都会从中央供电单元获取能量，那是一个巨型熔炉，不但消耗常规燃料，还可能在常规燃料不足的情况下，燃烧废旧原料。工厂的某些部门工作条件更艰辛，因此这些区块都会筑墙防护。但这些墙内机器人至少可以和工厂的其他部门沟通，他们采用直接嵌入墙体的特别接口。现在，你也许意识到了，我们向你描述的，正是一个细胞。绝密办公室是细胞核。细胞核存放设计规划蓝图和指令集，譬如脱氧核糖核酸也就是俗称的DNA。被复制下来的指令是RNA。这些机器人本身来说，多数就是氨基酸组成的蛋白质，但他们往往采用特殊工具，可以说，这些工具是或者源于维生素和矿物质。工厂各部门之间的高墙，还有包围工厂的围墙，多数由脂类组成，也就是俗称的脂肪。在大多数有机物体内，主要燃料是糖类，但在必要时，身体的熔炉也会分解掉脂肪和蛋白质将其化为燃料。接口则是膜蛋白，它们使那些特殊原材料和信息得以适时通过高墙创造便利。许多在机器人蛋白质之间发生的互动活动，都需要某种动机，就像要付给机器人最低工资一样。一笔数量虽小但极为关键的货币在蛋白质之间转手用以推动机器人工作。电子，质子，氧气以及各种磷酸盐就是主要化学货币，它们要么被存放在小小的分子钱包里要么是大手袋，总之很安全。这就是生物化学，这门学问研究工厂里每个元件如何互动从而让你的生命运行无碍，无论面临何种极端的挑战。有时候会有过多的燃料；你的身体就会把多余的燃料作为糖元或脂肪储存起来。有时候燃料不足；你的身体就会动用能量储备。有时候某种病毒或者细菌正在门外蠢蠢欲动；你的身体则调动起免疫系统。有时候你不小心碰到了滚烫或者尖锐的东西；你的神经系统会通知你立即停下。哟时候则是分化出新细胞或者新的人类的时候了。多么神奇：橡树，鸡，青蛙，对了还有你，都有那么多共同点它们的基础机器人和工厂设计就是生物化学家的知识源头，通过它们，我们可以在同一时间了解到这一切知识。

**P4 2013-10-08 What is the shape of a molecule - George Zaidan and Charles Morton**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=4)

What is the shape of a molecule? Well, a molecule is mostly empty space. Almost all of its mass is concentrated in the extremely dense nuclei of its atoms. And its electrons, which determine how the atoms are bonded to each other, are more like clouds of negative charge than individual, discrete particles. So, a molecule doesn't have a shape in the same way that, for example, a statue has a shape. But for every molecule, there's at least one way to arrange the nuclei and electrons so as to maximize the attraction of opposite charges and minimize the repulsion of like charges. Now, let's assume that the only electrons that matter to a molecule's shape are the outermost ones from each participating atom. And let's also assume that the electron clouds in between atoms, in other words, a molecule's bonds, are shaped kind of like sausages. Remember that nuclei are positively charged and electrons are negatively charged, and if all of a molecule's nuclei were bunched up together or all of its electrons were bunched up together, they would just repel each other and fly apart, and that doesn't help anyone. In 1776, Alessandro Volta, decades before he would eventually invent batteries, discovered methane. Now, the chemical formula of methane is CH4. And this formula tells us that every molecule of methane is made up of one carbon and four hydrogen atoms, but it doesn't tell us what's bonded to what or how they atoms are arranged in 3D space. From their electron configurations, we know that carbon can bond with up to four other atoms and that each hydrogen can only bond with one other atom. So, we can guess that the carbon should be the central atom bonded to all the hydrogens. Now, each bond represents the sharing of two electrons and we draw each shared pair of electrons as a line. So, now we have a flat representation of this molecule, but how would it look in three dimensions? We can reasonably say that because each of these bonds is a region of negative electric charge and like charges repel each other, the most favorable configuration of atoms would maximize the distance between bonds. And to get all the bonds as far away from each other as possible, the optimal shape is this. This is called a tetrahedron. Now, depending on the different atoms involved, you can actually get lots of different shapes. Ammonia, or NH3, is shaped like a pyramid. Carbon dioxide, or CO2, is a straight line. Water, H2O, is bent like your elbow would be bent. And chlorine trifluoride, or ClF3, is shaped like the letter T. Remember that what we've been doing here is expanding on our model of atoms and electrons to build up to 3D shapes. We'd have to do experiments to figure out if these molecules actually do have the shapes we predict. Spoiler alert: most of the do, but some of them don't. Now, shapes get more complicated as you increase the number of atoms. All the examples we just talked about had one obviously central atom, but most molecules, from relatively small pharmaceuticals all the way up to long polymers like DNA or proteins, don't. The key thing to remember is that bonded atoms will arrange themselves to maximize the attraction between opposite charges and minimize the repulsion between like charges. Some molecules even have two or more stable arrangements of atoms, and we can actually get really cool chemistry from the switches between those configurations, even when the composition of that molecule, that's to say the number and identity of its atoms, has not changed at all.

**P4 2013-10-08 What is the shape of a molecule - George Zaidan and Charles Morton**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=4)

翻译人员: Gabriella Hu 校对人员: Claire Zhang分子是什么形状？分子内部大部分都是空的。几乎所有的质量都集中在原子极其致密的核上。而它的电子，则决定原子之间如何相互结合，它们比较像带负电荷的云，而不是一颗颗单独的粒子。因此，分子并不像雕塑一样有着特定的形状。但是对于每一个分子至少存在一种方式排列原子核和电子，使得相异电荷之间的吸引力最大化，相同电荷之间的排斥力最小化。现在我们假设唯一与分子形状有关的电子是每个原子最外层上的电子。同时我们也假设在原子之间的电子云，也就是分子键，形状像一根香肠。记住原子核是带有正电荷的，而电子是带负电的，而且如果所有分子的核都堆积到了一起，或者它所有的电子都堆积到了一起，它们会相互排斥并且飞散，那就没什么用了。1776年，亚历山德罗·伏打在他发明电池数十年前发现了甲烷。甲烷的化学式是CH4。这个化学式告诉我们每个甲烷分子都是由一个碳原子和四个氢原子构成的，但是它并没有告诉我们 哪个原子与哪个原子连在一起，或者在三维空间中这些原子是如何排列的。从它们的电子排布中我们知道碳原子能与其他四个原子相连，而且每个氢原子只能与一个原子相连。因此我们能够猜测碳原子应该是中心原子，与所有的氢原子相连。现在，每个键代表共用两个电子，我们用一条线表示一对共用电子。于是，我们现在得到了这个原子的平面示意图，但是在三维空间中它看起来是什么样的？我们能够合理地说因为每个键都是一个带负电的区域，同性互斥，最可能的原子构型应该使得键与键之间的距离最大。而要使得所有的键之间的距离尽可能地远，最合适的形状是这样子的。这叫做四面体。根据不同的原子，你可以得到很多种不同的形状。氨，NH3，是金字塔形。二氧化碳，CO2，是直线形。水，H2O，像弯折的手臂。而三氟化氯，ClF3，形状像字母T。记住，我们现在做的是根据我们的原子和电子模型建立分子的三维形状。我们必须通过做实验来确认这些分子的形状是否和我们预测的一样。剧透一下：很多是符合的，但是也有一些与预测不符。因为随着原子数目的增加，分子的形状变得越来越复杂。我们前面提到的所有例子只有一个明显的中心原子。但是大部分的分子并没有，小到药物小分子，大到很长的多聚体，比如DNA，都没有中心原子。最关键的是参与连结的原子会自动排列，使得异种电荷之间的吸引力达到最大，同种电荷之间的排斥力达到最小。有些分子甚至有两种或者更多的稳定的原子排列方式，在不同的构型之间转换，我们会看到化学是多么酷炫，即使分子的构成，即其中原子的数量和种类根本没有改变。

**P5 2013-10-09 Why don't oil and water mix - John Pollard**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=5)

Why does salt dissolve in water but oil doesn't? Well, in a word, chemistry, but that's not very satisfying, is it? Well, the reason salt dissolves and oil does not comes down to the two big reasons why anything happens at all: energetics and entropy. Energetics deals primarily with the attractive forces between things. When we look at oil or salt in water, we focus on the forces between particles on a very, very, very small scale, the molecular level. To give you a sense of this scale, in one glass of water, there are more molecules than known stars in the universe. Now, all of these molecules are in constant motion, moving, vibrating, and rotating. What prevents almost all of those molecules from just flying out of the glass are the attractive interactions between molecules. The strength of the interactions between water, itself, and other substances is what we mean when we say energetics. You can think of the water molecules engaging in a constant dance, sort of like a square dance where they constantly and randomly exchange partners. Put simply, the ability for substances to interact with water, balanced with how they disrupt how water interacts with itself, plays an important role in explaining why certain things mix well into water and others don't. Entropy basically describes the way things and energy can be arranged based on random motion. For example, think of the air in a room. Imagine all the different possible arrangements in space for the trillions of particles that make up the air. Some of those arrangments might have all the oxygen molecules over here and all the nitrogen molecules over there, separated. But far more of the possible arrangements have those molecules mixed up with one another. So, entropy favors mixing. Energetics deals with attractive forces. And so, if attractive forces are present, the probability of some arrangements can be enhanced, the ones where things are attracted to each other. So, it is always the balance of these two things that determines what happens. On the molecular level, water is comprised of water molecules, made up of two hydrogen atoms and an oxygen atom. As liquid water, these molecules are engaged in a constant and random square dance that is called the hydrogen bonding network. Entropy favors keeping the square dance going at all times. There are always more ways that all the water molecules can arrange in a square dance, as compared to if the water molecules did a line dance. So, the square dance constantly goes on. So, what happens when you put salt in the water? Well, on the molecular level, salt is actually made up of two different ions, chlorine and sodium, that are organized like a brick wall. They show up to the dance as a big group in formation and sit on the side at first, shy and a bit reluctant to break apart into individual ions to join the dance. But secretly, those shy dancers just want someone to ask them to join. So, when a water randomly bumps into one of them and pulls them into the dance away from their group, they go. And once they go into the dance, they don't come back out. And in fact, the addition of the salt ions adds more possible dance positions in the square dance, so it is favored for them to stay dancing with water. Now, let's take oil. With oil, the molecules are sort of interested in dancing with water, so entropy favors them joining the dance. The problem is that oil molecules are wearing gigantic ballgowns, and they're way bigger than water molecules. So, when an oil molecule gets pulled in, their size is really disruptive to the dance and the random exchange of partners that the waters engage in, a very important part of the dance. In addition, they are not great dancers. The water molecules try to engage the oil molecules in the dance, but they just keep bumping into their dresses and taking up all the room on the dance floor. There are way more ways the waters can dance when the oil gets off the floor, so the waters squeeze out the oil, pushing it back to the bench with the others. Pretty soon, when a large number of oils have been squeezed over to the side, they band together to commiserate about how unfair the waters are being and stick together as a group. So, it is this combination of the interactions between molecules and the configurations available to them when they're moving randomly that dictates whether they mix. In other words, water and oil don't mix because they just don't make great dance partners.

**P5 2013-10-09 Why don't oil and water mix - John Pollard**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=5)

翻译人员: Jingwei Gu 校对人员: Ryan Miao为什么盐可溶于水而油却不行呢？嗯，从一种角度来说，是化学作用，但是这并不很令人信服，不是吗？其实，盐可溶于水而油不能的原因可归结为一切事物与现象发生的两个根本原因：力能学和熵。力能学主要讨论物体之间的引力。当我们观察水中的盐或油时，我们会在一个非常微小的尺度内关注粒子之间的作用力，分子层级。这个尺度究竟有多微小呢？在一杯水里，分子的数量比宇宙中已知的星星数量还要大。现在，所有这些分子都在做匀速运动，移动、振动并且旋转。阻止了几乎所有的这些分子从杯子里面飞出去的是分子之间相吸引的相互作用力。在水与它自己之间，以及与其他物质之间相互作用力的力度就是我们所说的力能学的含义。你可以想象水分子在始终如一地舞蹈着，有点像那种经常且随机更换舞伴的方块舞。简言之，物质与水之间，那种平衡于它们破坏水分子之间的相互作用的程度的相互作用的能力，在解释为什么有些物质可溶于水，而另一些却不能时扮演着重要的角色。熵基本描述了建立在无规则运动基础上的物质与能量被组合的方式。例如，想象一个房间里的空气。想象一个空间里万亿个组成空气的分子所有可能的组合方式。其中一些组合方式可能会将所有的氧分子置放在这一边而将所有氮分子置放在那一边，使二者分离开来。然而，更多可能的方式是使这些分子彼此混合起来。因此，熵倾向于讨论“混合”。力能学则讨论引力。故而，如果引力存在，一部分组合方式的可能性便会被提高，也就是那些物体彼此吸引的方式。所以，决定所发生的现象的通常是这二者的平衡。在分子层级上，水是由水分子组成的，水分子由两个氢原子和一个氧原子构成。作为液态水，这些分子从事着恒定而随机的被称为“氢键网络”的“方块舞”。熵倾向保持这种“方块舞”一直进行。所有水分子被组合成“方块舞”的方式总是会更多，如果和水分子被组合成“排舞”的方式比较的话。因此，“方块舞”永恒地进行着。那么，当你把盐放进水里时会发生什么呢？嗯，在分子层级上，盐其实是由两种不同的离子构成的，氯离子和钠离子，它们就像砖墙一样被组合起来。它们以编队的形式作为一个大团体出现在舞会上并首先坐在了一边，害羞，并且有些不情愿去分离成单独的离子来加入这场舞会。但是这些腼腆的舞者暗地里却希望有人让它们加入。所以，当一个水分子偶然地碰到它们中的一个并且将它们推向舞会，远离它们的团体时，它们就会去。而且，只要它们加入了舞会，就不会再回来了。事实上，盐的加入使得“方块舞”的组合有了更多可能的形式，所以对它们来说与水共“舞”有好处。现在，我们来说说油。油分子对与水共“舞”还是有点感兴趣的，所以熵偏向于让它们加入舞会。而问题在于油分子都穿着巨大的长礼服，而且它们比水分子大得多。所以，当一个油分子加入舞会时，它的身量简直对舞会具有破坏性而且，水所从事的随机更换舞伴的行为，是舞会的一个重要部分。此外，它们也不是杰出的舞者。水分子试图让油分子参与到舞会当中来，但是它们总是碰到它们的礼服并且占掉了舞池里所有的空间。当油离开舞池时水跳舞的方式就多了许多，所以水把油挤了出去，把它推回了其他油分子一起坐着的长凳子上。不一会儿，当一大群油分子都被挤到一边时，它们就会聚到一起，并且遗憾地叹息水是多么的不公平然后粘在一起成为一个团体。因此，就是这种当分子在无规则运动时，它们之间的相互作用的结合以及对它们来说可能实现的构造决定了它们是否能够混合。换一句话说，油和水不能混合的原因就是因为它们组不成完美的舞伴。

**P6 2013-10-14 Mysteries of vernacular - Lady - Jessica Oreck and Rachael Teel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=6)

Mysteries of vernacular: Lady, woman. Lady is tied to a number of words that seem at first glance etymologically unrelated. She traces her roots back to the Old English words hlaf, which referred to a loaf of bread and is the direct ancestor of our modern word loaf, and daege, which meant maid and is the root of our word dairy, the place where the dairymaid works. Together, hlaf and daege became hlafdige, literally loaf maid, or, more figuratively, kneader of bread. As early as the ninth century, hlafdige was the name for a mistress of servants, or the female head of the household. The Old English word for a male head of household was hlafweard, a compound of hlaf, loaf, and weard, which meant keeper and is the word of modern words like ward and warden. Both hlafweard, the breadwinner, and hlafdige, the bread kneader, came to be titles of respect, referring to citizens of higher social standing. Through a process known as syncopation, both words lost their internal sounds to become lord and lady, respectively. Though still an expression of courtesy, lady has since moved down the ladder of social standing and is now often used to mean simply a woman.

**P6 2013-10-14 Mysteries of vernacular - Lady - Jessica Oreck and Rachael Teel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=6)

翻译人员: Shinemoos Gong 校对人员: Bighead Ge俗语的奥秘"女士""女人""女士"这个词跟好几个乍一看与其语源毫无关系的词语相关她的本源要追溯到古英文的"hlaf"一词也就是指"一条面包"该词还演化成现代英语中"loaf"一条面包和"daege"一词后者意为"女仆"即为"dairy"一词的根源也就是挤奶女仆工作的地方"hlaf"和"daege"合并成为"hlafdige"字面意义为面包女仆而象征性地讲，就是女面包师早在9世纪"hlafdige"就是女管家或者是家中女主人的称呼古英语中表达"家中男主人"的词是"hlafweard"由"hlaf"，即"loaf"和"weard"即"管理者"组成它是现代词语如"ward"——监护 和"warden"——监管人的根源"hlafweard"——挣面包钱的人和"hlafdige"——做面包的人两词成为了表尊称的头衔指代有着较高社会地位的市民后又经过(语言学上的)中音省去两词都省去了中间的一些音节而成为了"Lord"——大人 和"Lady"——夫人虽然仍是有礼貌的称谓"lady"一词已经从社会地位的阶梯上走下而现在通常仅仅代指"女性"

**P7 2013-10-14 Mysteries of vernacular - Yankee - Jessica Oreck and Rachael Teel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=7)

Mysteries of vernacular: Yankee, a New England resident or, more generally, a person who lives in or is from the United States. Though the origin of Yankee is uncertain, this all-American word most likely descended from the Dutch moniker Janke, a diminutive meaning little Jan, or little John. In the 17th century, Janke was the common nickname of Dutch sailors, pirates in particular. A Dutch pirate ship operating in the West Indies was even called the Yankee. Over the years, Yankee transformed from a pirate's nickname into a general term of contempt. In 1758, British general James Wolfe used Yankee as a pejorative term for the colonists under his supervision. But the insult wasn't limited to soldiers. Yankee quickly came to mean New Englander, and by the 1780s, it was used to look down upon any American. During the Revolution, colonists co-opted Yankee and transformed it into a mark of national honor. The Civil War, however, intensified the derisive definition when it was used by Southerners to mock members of the Union. Today, it carries much less emotion, unless, of course, we're talking about baseball.

**P7 2013-10-14 Mysteries of vernacular - Yankee - Jessica Oreck and Rachael Teel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=7)

翻译人员: Zheng Zhai 校对人员: Bighead Ge未解之谜的白话：洋基，一个新英格兰的居民或更一般地说，一个生活在或者是来自美国的人。虽然洋基的起源不确定，这个很美国的词最有可能来源于荷兰语中的绰号詹克，一个意思是小詹或小约翰的爱称。在 17 世纪，詹克是荷兰水手的常见昵称，特别是海盗。在西印度经营的一艘荷兰海盗船甚至还被称为洋基。多年来，洋基从一个海盗的昵称转变为一种表示蔑视的一般用语。1758 年，英国将军詹姆斯 · 沃尔夫把洋基用作一个贬义的词指在他管理下的殖民者。但这种侮辱并不限于士兵。洋基很快指代新英格兰地区的人，并且从1780年开始，它被使用来歧视任何美国人。大革命期间，殖民者新增了扬基一词并把它转变为一种国家荣誉的标志。然而，美国内战增强了它嘲弄的意思被南方人用作嘲笑联军的成员。今天，它所蕴含的感情色彩少了，当然，除非是我们在谈论棒球。

**P8 2013-10-15 How atoms bond - George Zaidan and Charles Morton**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=8)

Most atoms don't ride solo, instead they bond with other atoms. And bonds can form between atoms of the same element or atoms of different elements. You've probably imagined bonding as a tug of war. If one atom is really strong, it can pull one or more electrons off another atom. Then you end up with one negatively charged ion and one positively charged ion. And the attraction between these opposite charges is called an ionic bond. This is the kind of sharing where you just give away your toy to someone else and then never get it back. Table salt, sodium chloride, is held together by ionic bonds. Every atom of sodium gives up one electron to every atom of chlorine, ions are formed, and those ions arrange themselves in a 3D grid called a lattice, in which every sodium ion is bonded to six chloride ions, and every chloride ion is bonded to six sodium ions. The chlorine atoms never give the sodium atoms their electrons back. Now, these transactions aren't always so cut-and-dried. If one atom doesn't completely overwhelm the other, they can actually share each other's electrons. This is like a pot luck where you and a friend each bring a dish and then both of you share both dishes. Each atom is attracted to the shared electrons in between them, and this attraction is called a covalent bond. The proteins and DNA in our bodies, for example, are held together largely by these covalent bonds. Some atoms can covalently bond with just one other atom, others with many more. The number of other atoms one atom can bond with depends on how its electrons are arranged. So, how are electrons arranged? Every atom of a pure, unbonded element is electrically neutral because it contains the same number of protons in the nucleus as it does electrons around the nucleus. And not all of those electrons are available for bonding. Only the outermost electrons, the ones in orbitals furthest from the nucleus, the ones with the most energy, only those participate in bonding. By the way, this applies to ionic bonding too. Remember sodium chloride? Well, the electron that sodium loses is the one furthest from its nucleus, and the orbital that electron occupies when it goes over to chlorine is also the one furthest from its nucleus. But back to covalent bonding. Carbon has four electrons that are free to bond, nitrogen has three, oxygen two. So, carbon is likely to form four bonds, nitrogen three, and oxygen two. Hydrogen only has one electron, so it can only form one bond. In some special cases, atoms can form more bonds than you'd expect, but they better have a really good reason to do so, or things tend to fly apart. Groups of atoms that share electrons covalently with each other are called molecules. They can be small. For example, every molecule of oxygen gas is made up of just two oxygen atoms bonded to each other. Or they could be really, really big. Human chromosome 13 is just two molecules, but each one has over 37 billion atoms. And this neighborhood, this city of atoms, is held together by the humble chemical bond.

**P8 2013-10-15 How atoms bond - George Zaidan and Charles Morton**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=8)

翻译人员: Yolanda Zhang 校对人员: Xiaoou Chen大部分的原子不单独行动，它们会跟其他原子发生键合。相同的原子间可以成键，不同的原子也可以成键。你可能会把成键的过程想象成拔河。如果一个原子很强大，它就可以从另一个原子那里拉拢来一个或者多个电子。这就能够得到一个带负点荷的离子和一个带正电荷的离子。这种相反电荷间的吸引作用就叫做离子键。这种分配就类似于你把你的玩具给了别人，就再也拿不回来了。食盐，也就是氯化钠，就是通过离子键形成的。每一个钠原子将一个电子提供给一个氯原子，就形成了离子，这些离子排列形成了一个三维的格子，叫做晶格，其中每一个钠离子跟6个氯离子成键，每个氯离子又会跟6个钠离子成键。氯原子永远不会将电子送返给钠原子。不过事实上，这种交易不总是这么清晰明朗。如果一个原子的吸电子能力并不是完全 凌驾于另一个原子之上，它们彼此之间就可以共用电子。这就像在家请客吃饭，你和朋友都准备了各自的菜肴，这样你们就可以分享彼此的美食了。每个原子都被共用的电子吸引，这种吸引作用就叫做共价键。打个比方，我们身体里的蛋白质和DNA就是被共价键强力结合起来的。一些原子只能与单独另一个原子形成共价键，而有很多原子可以形成多个共价键。一个原子可以与多少其他原子发生共价结合作用取决于这些电子是如何排布的。那么，这些电子到底是怎么排布的呢？一种单纯的，未发生键合的元素的原子都是不带电荷的，因为这种原子的原子核携带了与核外电子数目相同的质子。不过不是所有的电子都可以成键。只有在最外层，在相距原子核最远的轨道上的电子，携带的能量最多，只有它们才能成键。不仅如此，离子键也是这种情况。还记得氯化钠吗？钠原子失掉的电子也是离核最远的电子，电子移向氯原子时所占据的轨道也是离核最远的。不过再回头来看共价键。碳原子有4个电子可以自由成键，氮原子有3个电子，氧原子有2个。所以，碳原子可以形成4个键，氮原子可以形成3个，氧原子能形成2个。氢原子只有1个电子，所以只能形成1个键。在某些特殊情况下，原子可以违反常态的形成更多的键，不过通常都有些特殊的原因，或者物质发生了分解。彼此间共用电子的一组原子被称作分子。分子可以很小。比方说，每一个氧气分子都是通过2个氧原子键合形成的。分子也可以非常，非常大。人类基因组13号只含有2个分子，不过每个分子都含有370亿个原子。这种聚合体，庞大的原子群，就是由不起眼儿的化学键连接形成的。

**P9 2013-10-17 How we conquered the deadly smallpox virus - Simona Zompi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=9)

10,000 years ago, a deadly virus arose in northeastern Africa. The virus spread through the air, attacking the skin cells, bone marrow, spleen, and lymph nodes of its victims. The unlucky infected developed fevers, vomiting, and rashes. 30% of infected people died during the second week of infection. Survivors bore scars and scabs for the rest of their lives. Smallpox had arrived. In 1350 B.C., the first smallpox epidemics hit during the Egypt-Hittite war. Egyptian prisoners spread smallpox to the Hittites, which killed their king and devastated his civilization. Insidiously, smallpox made its way around the world via Egyptian merchants, then through the Arab world with the Crusades, and all the way to the Americas with the Spanish and Portuguese conquests. Since then, it has killed billions of people with an estimated 300 to 500 million people killed in the 20th century alone. But smallpox is not unbeatable. In fact, the fall of smallpox started long before modern medicine. It began all the way back in 1022 A.D. According to a small book, called "The Correct Treatment of Small Pox," a Buddhist nun living in a famous mountain named O Mei Shan in the southern providence of Sichuan would grind up smallpox scabs and blow the powder into nostrils of healthy people. She did this after noticing that those who managed to survive smallpox never got it again, and her odd treatment worked. The procedure, called variolation, slowly evolved and by the 1700's, doctors were taking material from sores and putting them into healthy people through four or five scratches on the arm. This worked pretty well as inoculated people would not get reinfected, but it wasn't foolproof. Up to three percent of people would still die after being exposed to the puss. It wasn't until English physician Edward Jenner noticed something interesting about dairy maids that we got our modern solution. At age 13, while Jenner was apprentice to a country surgeon and apothecary in Sodbury, near Bristol, he heard a dairy maid say, "I shall never have smallpox, for I have had cowpox. I shall never have an ugly, pockmarked face." Cowpox is a skin disease that resembles smallpox and infects cows. Later on, as a physician, he realized that she was right, women who got cowpox didn't develop the deadly smallpox. Smallpox and cowpox viruses are from the same family. But when a virus infects an unfamiliar host, in this case cowpox infecting a human, it is less virulent, so Jenner decided to test whether the cowpox virus could be used to protect against smallpox. In May 1796, Jenner found a young dairy maid, Sarah Nelmes, who had fresh cowpox lesions on her hand and arm caught from the utters of a cow named Blossom. Using matter from her pustules, he inoculated James Phipps, the eight-year-old son of his gardener. After a few days of fever and discomfort, the boy seemed to recover. Two months later, Jenner inoculated the boy again, this time with matter from a fresh smallpox lesion. No disease developed, and Jenner concluded that protection was complete. His plan had worked. Jenner later used the cowpox virus in several other people and challenged them repeatedly with smallpox, proving that they were immune to the disease. With this procedure, Jenner invented the smallpox vaccination. Unlike variolation, which used actual smallpox virus to try to protect people, vaccination used the far less dangerous cowpox virus. The medical establishment, cautious then as now, deliberated at length over his findings before accepting them. But eventually vaccination was gradually accepted and variolation became prohibited in England in 1840. After large vaccination campaigns throughout the 19th and 20th centuries, the World Health Organization certified smallpox's eradication in 1979. Jenner is forever remembered as the father of immunology, but let's not forget the Buddhist nun, dairy maid Sarah Nelmes, and James Phipps, all heroes in this great adventure of vaccination who helped eradicate smallpox.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=9)

翻译人员: Yuyang Zhao 校对人员: Marini Qian一万年前，在非洲东北部出现了一种致命的病毒。这种病毒通过空气传播感染皮肤细胞，骨髓，脾脏，以及淋巴系统。不幸的感染者会高烧，呕吐，和皮疹。百分之三十的感染者死亡在感染二周内。幸存者会留下伤疤和结痂这些伴随其以后的生活。天花的出现。公元前1350年，第一例天花感染病例出现在埃及赫梯战争中。埃及的囚犯将天花病毒传播到赫梯地区，赫梯国王也感染天花而亡赫梯文明遭到毁灭性破坏。更严重的是，天花传播到全世界，由埃及的商人，穿过阿拉伯地区的东征十字军，以及通往美洲的沿路随着西班牙和葡萄牙征服者。从此开始，天花造成几十亿人死亡估计有三亿到五亿人因天花病毒而死，仅仅二十世纪。然而，天花并不是无法医治的。事实上，天花的出现远远早于现代医学。它的出现要追溯到公元1022年根据一本小册子，称为《天花的正确治疗方法》一位隐居在一座名山的尼姑删名为峨眉山在四川省南部里将天花所结的痂碾碎然后将粉末吹入健康人的鼻孔里。她之后发现那些幸存于天花病毒的人不会再被传染，而且她奇特的疗法起了作用。这个过程，称为人痘接种慢慢发展演化并且到1700年代医生们从伤口中提取物质然后接种给健康人通过在胳膊上划出四到五条划痕。这个方法很有效被接种的人不会再感染天花，但这并不是完全安全的。最多有3%的接种人群在接种后死亡。直到英国医师爱德华 詹纳发现关于奶场女工的有趣事情使得我们有了现代的方法。在13岁时，詹纳是一位学徒一个乡村医生和药房在布里斯托附近的索德伯里 （布里斯托是英国西部的一个港口）他听到一个奶场女工说，“得过牛痘之后，就再也感染天花我永远不会有一张丑陋的麻痘脸。“牛痘是一种皮肤病和天花相似 但是感染牛群。之后，作为医生他意识到她是对的得过牛痘的女人都没有感染致命的天花天花病毒和牛痘病毒属于同样的病毒种类。但当病毒感染一个陌生宿主时，在这种情况下，牛痘感染人类就不会那么致命，于是，詹纳决定验证牛痘病毒是否能用来防治天花。在1796年5月，詹纳找到一位年轻的奶场女工，萨拉 奈尔姆斯，她手和胳膊上有感染牛痘产生的伤疤一种叫开花的牛传染的。用从她的脓包里提取物质，他接种给力詹姆斯 菲普斯，他园丁的八岁的儿子。发烧和不适几天后，小男孩康复了。两个月后，詹纳再给小男孩接种这次是从天花伤口中取出的物质。没有任何症状出现，于是詹纳认为接种是有效的。他的计划成功了。詹纳之后将牛痘病毒接种在另外几个人之后，又反复感染天花病毒，证明了他们对天花已经免疫。有了这个方法，詹纳发明了天花疫苗。不像人痘接种， 直接使用天花病毒试图来保护人类，疫苗使用了有害性极低的牛痘病毒。这样的医学成就像现在一样，他的发现有很长时间的仔细思考被认可以前。但是，最终疫苗被渐渐接受并且人痘接种被禁止1840年在英国大型的疫苗倡议后从19和20世纪世界健康组织确认了天花疫苗在1979年。詹纳名留青史作为免疫学之父，但是，我们也不要忘了奶厂女工萨拉 奈尔米斯叫开花的牛，和詹姆斯 菲普斯，所有的英雄，在这场疫苗冒险行动中帮助消灭天花的人。

**P10 2013-10-18 Is time travel possible - Colin Stuart**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=10)

Have you ever daydreamed about traveling through time, perhaps fast forward in the centuries and seeing the distant future? Well, time travel is possible, and what's more, it's already been done. Meet Sergei Krikalev, the greatest time traveler in human history. This Russian cosmonaut holds the record for the most amount of time spent orbiting our planet, a total of 803 days, 9 hours, and 39 minutes. During his stay in space, he time traveled into his own future by 0.02 seconds. Traveling at 17,500 miles an hour, he experienced an effect known as time dilation, and one day the same effect might make significant time travel to the future commonplace. To see why moving faster through space affects passage of time, we need to go back to the 1880s, when two American scientists, Albert Michelson and Edward Morley, were trying to measure the effect of the Earth's movement around the Sun on the speed of light. When a beam of light was moving in the same direction as the Earth, they expected the light to travel faster. And when the Earth was moving in the opposite direction, they expected it to go slower. But they found something very curious. The speed of light remained the same no matter what the Earth was doing. Two decades later, Albert Einstein was thinking about the consequences of that never-changing speed of light. And it was his conclusions, formulated in the theory of special relativity, that opened the door into the world of time travel. Imagine a man named Jack, standing in the middle of a train carriage, traveling at a steady speed. Jack's bored and starts bouncing a ball up and down. What would Jill, standing on the platform, see through the window as the train whistles through? Well, between Jack dropping the ball and catching it again, Jill would have seen him move slightly further down the track, resulting in her seeing the ball follow a triangular path. This means Jill sees the ball travel further than Jack does in the same time period. And because speed is distance divided by time, Jill actually sees the ball move faster. But what if Jack's bouncing ball is replaced with two mirrors which bounce a beam of light between them? Jack still sees the beam dropping down and Jill still sees the light beam travel a longer distance, except this time Jack and Jill cannot disagree on the speed because the speed of light remains the same no matter what. And if the speed is the same while the distance is different, this means the time taken will be different as well. Thus, time must tick at different rates for people moving relative to each other. Imagine that Jack and Jill have highly accurate watches that they synchronize before Jack boards the train. During the experiment, Jack and Jill would each see their own watch ticking normally. But if they meet up again later to compare watches, less time would have elapsed on Jack's watch, balancing the fact that Jill saw the light move further. This idea may sound crazy, but like any good scientific theory, it can be tested. In the 1970s, scientists boarded a plane with some super-accurate atomic clocks that were synchronized with some others left on the ground. After the plane had flown around the world, the clocks on board showed a different time from those left behind. Of course, at the speed of trains and planes, the effect is minuscule. But the faster you go, the more time dilates. For astronauts orbiting the Earth for 800 days, it starts to add up. But what affects humans also affects machines. Satellites of the global positioning system are also hurdling around the Earth at thousands of miles an hour. So, time dilation kicks in here, too. In fact, their speed causes the atomic clocks on board to disagree with clocks on the ground by seven millionths of a second daily. Left uncorrected, this would cause GPS to lose accuracy by a few kilometers each day. So, what does all this have to do with time travel to the far, distant future? Well, the faster you go, the greater the effect of time dilation. If you could travel really close to the speed of light, say 99.9999%, on a round-trip through space for what seemed to you like ten years, you'd actually return to Earth around the year 9000. Who knows what you'd see when you returned?! Humanity merged with machines, extinct due to climate change or asteroid impact, or inhabiting a permanent colony on Mars. But the trouble is, getting heavy things like people, not to mention space ships, up to such speeds requires unimaginable amounts of energy. It already takes enormous particle accelerators like the Large Hadron Collider to accelerate tiny subatomic particles to close to light speed. But one day, if we can develop the tools to accelerate ourselves to similar speeds, then we may regularly send time travelers into the future, bringing with them tales of a long, forgotten past.

**P10 2013-10-18 Is time travel possible - Colin Stuart**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=10)

翻译人员: Alice Yu 校对人员: Hada Fong Ha Ieong你曾白日梦过穿越时空吗？或者穿越到几百年之后及看到遥远未来？让我告诉你，穿越时空是有可能的。而且，还有的是它已经被实现了。谢尔盖.克里卡列夫是人类历史上最伟大的穿越时空者。这位俄罗斯宇航员创了记录。他是环绕地球时间最久的人，总共803天9小时39分钟。当他在太空的时候，他时空穿越到自己的未来，且用了0.02秒。当时，他在太空时的行驶速度为每小时17500英里。他体验了一种名为"时间膨胀"的效应。而且，終一天 这种效应将会让穿越时空之时间更持久也变以家常便饭的事。如果想了解为什么加快在空间里的行驶速度会影响时间流逝的速度,我们得回到1880年,当时 两个美国科学家阿尔伯特·迈克尔逊 和 爱德华·莫雷尝试衡量地球绕太阳对光速有什么影响。他们以为， 当一束光和地球往同一个方向移动时,光的速度会更快。而且，当地球与光束作反方向移动时，光的速度会减慢。但是结果并非如此，有趣的是不管地球往哪个方向移动光的速度并没有改变。20年之后，爱因斯坦回到这个问题的結果上：光速不变。他的结论是：他所創的“相对论”开启了穿越时空的大门。试想 一個名為杰克的人站在一辆火车卡中間在稳定状态下移动，杰克覺无聊开始在地上上下拍球這个时候站在月台上的吉尔会透过窗口所看到是什么？在杰克扔下球和接著球之间吉尔会看到杰克和火车一起向前移动，結果她看到的球是以三角形的路线移动的。意思是，吉尔看到的球比杰克所看到的 移动得更远在同一个时间段里。因为速度等于距离除以时间，事實上 吉尔所看到球比杰克所看到的移动得更快。但是，如果我们把杰克的球用两面镜子作代替而在镜子之间有一束光來回反弹。杰克依然会看到光束反弹吉尔还是会看到该光束移动得更远，例外的是，这次杰克和吉尔却会对光的速度有分歧。這是因为光的速度无论如何 還是 保留不变。如果速度是一样的话，而距离却不一样，那花的时间将也不一样。所以 当人们对他人相对地移动时，时间一定以不一样的速率流逝。试想如果杰克和吉尔都有非常精确的手表。他们在杰克上火车前校对好时间。当这个实验中，杰克和吉尔会看到自己的手表正常的走。但是如果他们在实验结束后相遇比对彼此手表时，他们会发现杰克的手表会走慢一些，因此解释了这事实：吉尔看到的光移动得更远。这听上去很诡异，但是，像任何一个完好的科学理论，它是可以被测试的。在1970年左右，科学家们 校对了一些超级准确的原子钟一起带到飞机上去，而数个原子钟则留在陆地上，当飞机环球飞行之后，他们发现飞机上的原子钟和地球上的原子钟上显示的时间是不一样的。当然，以火车与飞机的速度，对时间膨胀的影响是很微小的。但是行驶的速度越快，时间的膨胀越多。如果宇航员们环绕地球800天，其影响就会明显。言而，影响人类的也会影响机器。GPS的卫星同時也环绕著地球行驶，且速度为每小时数千英里。因此，时间在这情況也显见膨胀的。事實上，GPS卫星的行驶速度导致飞行著的原子钟与地上的原子钟之間产生每天7百万分之一秒之差。如果再不做校对的话，这将会令GPS失去准确性且产生每天几公里差異 。那么，这些和穿越时空和去遥远的未来有什么关系呢？当行驶的速度越快，时间膨胀的效应越大。如果你行驶的速度真的能夠接近光速的話，比方说，百分之99.9999,绕太空來回一圈，对你来说可能像过了10年，但是当你回到地球时，将会是9000那年左右。到那时候，谁知道你回来后会看到什么？人类与机器分不开，灭绝原於全球暖化或行星之間撞击，又或是人类在火星定居了。但问题是，要把像人一样那么重的东西，莫说太空飞船了，移动到达接近光速般，是需要不能想象的巨大能量。龐大量的粒子加速器如大型粒子对撞机已被需要来把微小的亚原子粒子加速到达接近光速了。但是终有一天，如果我们能够发明一些工具可以让我们加速到如光速度般，到那时候，我们可能隨時可以把穿越时空者送到遥远的未来，还有带著我们 古老，被遺忘的故事去。

**P11 2013-10-22 The strengths and weaknesses of acids and bases - George Zaidan and C**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=11)

Acids and bases are everywhere. They're used to make foods, soaps and detergents, fertilizers, explosives, dyes, plastics, pesticides, even paper. Our stomachs are very acidic. Our blood is slightly basic. Our proteins are made up of amino acids, and the letters in our genetic code, those As, Ts, Cs, and Gs, are all bases. You were probably taught how acids and bases behave on the molecular level. You were probably never taught that a long time ago, like ancient Greek ago, before anyone knew about atoms or molecules, acids and bases were defined by how they behaved. Acids tasted sour and corroded metal. Bases felt slippery and could somehow counteract acids. When molecules dissolved in water interact, they are exchanging two main currencies with their surroundings: protons, also known as hydrogen ions, and electrons. Depending on how a molecule is composed or shaped, it may be willing to donate or accept either protons or electrons with some other community member. And some molecules are far more aggressive than others when it comes to donating or accepting either currency. Remember that protons are positively charged and electrons are negatively charged. So, if a molecule is willing to give up a proton, that's not too different from it being willing to accept an electron -- either way it's becoming more negatively charged. Other molecules are willing to accept a proton or give up an electron. These are becoming more positively charged. Some substances are so aggressive about donating their protons that when they get a chance, all of the molecules in a sample will dump a proton, sometimes more than one, to the surrounding water molecules. We call these strong acids. Meanwhile, some compounds are so ready to accept a proton that they won't wait around, they'll just rip one off water, which usually has two protons but is generous enough to hang out with just one. We call these strong bases. Other acids and bases are not so strong. They may donate just a few of their protons to water or accept just a few protons from water, but most of their molecules stay exactly the same. If left alone in water, they'll reach some equilibrium point where maybe only one out of a hundred or one out of ten thousand of their molecules has exchanged currency with water. As you might guess, we label these acids and bases weak, but in the common sense of the word, they're not weak. The vinegar in your salad dressing that you can smell from across the room, that is a weak acid. The ammonia you spray on glass for a streak-free shine, that is a weak base. So, it doesn't take much to be an active player in the chemical economy. Most acid-base chemistry takes place in water, which can act as either an acid or a base, accepting deposits and enabling withdrawals like a 24-hour molecular ATM. And when a proton-deposit customer, that's an acid, and a proton-withdrawal customer, the base, shop at the same time, their net effect on water's account may cancel out, and we call this neutralization. Now, certain molecules can behave as acids or bases without water, but that's another story. Let's end by saluting water as the resilient and fair banker for acids and bases. It's always open for business, doesn't charge interest, and will never foreclose on your molecules, which is more than I can say for [bleep]. Waah-waah.

**P11 2013-10-22 The strengths and weaknesses of acids and bases - George Zaidan and C**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=11)

翻译人员: XIN YUE 校对人员: Shi Tan酸与碱与我们的生活密切相关。它们被用来制造食物，香皂，清洁剂，化肥，炸药染料，塑料，农药，甚至纸张。我们的胃里是强酸性的。血液是弱碱性的。蛋白质是由氨基酸组成的，那些在我们基因密码中的字母，诸如A,T,C和G，都是碱性的。可能你已经学过酸分子和碱分子如何反应。但是，你可能从不知道在比古希腊时代还久远的时候，在还没有人知道原子或者分子之前，酸和碱的定义已经因他们的反应特点确定了。酸的味道酸，腐蚀金属。碱触感滑并且能神奇的中和酸。当分子溶于水中相互作用时，他们会交换两种主要流通物质和其周围的物质：质子，也叫做氢离子，和电子。在与其它的成员交换过程中，分子是给出质子或电子还是接受，取决于它们的分子结构是如何组成和形成的。有一些分子不论是给出或是接受时都比其他的分子强势许多。质子带正电荷电子是带负电荷的。所以，要是一个分子愿意放弃一个质子就和这个分子愿意接收一个电子是一样的效果--不论哪个方式，都使分子带更多负电。其它的分子要接收一个质子或放弃一个电子。那它们就会变成正电。一些物质十分强势地给出质子。一旦得到机会，采样中所有的分子都会向周围的水分子中扔掉一个质子，有时候扔掉的还不止一个。我们称这种分子强酸。同时，一些混合物迫不及待的需要接收一个质子它们不会温和等待，反而会从有两个质子的水中掠夺一个，不过，水很大方，只有一个质子也可以。我们叫这种分子为强碱。其余的酸和碱没有那么强。它们只往水中给出，或接受几个质子，但是大多数分子都保持不变。如果他们被单独置于水中，当百分之一或万分之一的分子在水中交换了流通物，它们就会达到一个交换平衡点。而你可能会认为我们把这种酸和碱定为弱酸，弱碱，但是，常识是，它们不属于弱酸。沙拉中的调味醋，味道大得在房间的另一边都能闻到，它是弱酸。你为了让玻璃干净明亮喷上去的氨水，是弱碱。所以，在化学界的经济里，活跃分子并不难当。大多数的酸碱化学反应都在水中发生，像24小时的分子柜员机一样，酸提供存款，碱提取存款。当质子提供客户酸，和质子提取客户，碱，同时消费，它们在水的账户收支相互抵消了，我们称之为中和作用。现在，一些分子在没有水的情况下也可以发生酸、碱反应，这另当别论。让我们以向对于酸、碱来说，好比公平又恒久的银行家一样的水致敬来结束本次内容。因为它总是开放服务，不收利息，更好的是永远不会将分子法拍。哇-哇。

**P12 2013-10-29 Vampires - Folklore, fantasy and fact - Michael Molina**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=12)

Good evening! What's the matter? Are you afraid of vampires? He he, no need to worry, I'm not staying for dinner. (Laughter) I'm here to guide you through a brief history of vampires, illustrating how our image has changed from a shambling corpse to the dapper gentleman you see before you. Vampires are nearly as old as you humans. Stories about us, revenants, appear in cultures extending as far back as prehistoric times. But we weren't called vampires back then and most of us did not look the way we imagine vampires today. Ha, far from it! For example, the Mesopotamian Lamashtu was a creature with the head of a lion and the body of the donkey, and the ancient Greek striges were simply described as bloodthirsty birds. Others were even stranger. The Philippine manananggal would sever her upper torso and sprout huge, bat-like wings to fly. The Malaysian penanggalan was a flying female head with dangling entrails. (Laughter) And the Australian Yara-ma-yha-who was a little red guy with a big head, a large mouth, and bloodsuckers on his hands and feet. Oh, and let's not forget the Caribbean's soucouyant, the West African obayifo, and the Mexican Tlahuelpuchi. (Laughter) Charming, aren't they? Though they may look vastly different, all of these beings have one common characteristic: They sustain themselves by consuming the life force of a living creature. This shared trait is what defines a vampire -- all the other attributes change with the tides. So, how do we arrive at the reanimated fellow you see before you? Our modern ideal emerges in 18th-century Eastern Europe. With the dramatic increase of vampire superstitions, stories of bloodsucking, shadowy creatures become nightly bedside terrors. And popular folklore, like the moroi among the Romani people and the lugat in Albania, provide the most common vampire traits known today, such as vampires being undead and nocturnal and shape-shifting. You see, Eastern Europe in the 18th century was a pretty grim place with many deaths occurring from unknown diseases and plagues. Without medical explanations, people searched for supernatural causes and found what looked like evidence in the corpses of the victims. When villagers dug up bodies to discern the cause of the mysterious deaths, they would often find the cadavers looking very much alive -- longer hair and fingernails, bloated bellies, and blood at the corners of mouths. (Laughter) Clearly, these people were not really dead. Heh, they were vampires! And they had been leaving their graves to feast on the living. (Grunt) The terrified villagers would quickly enact a ritual to kill the undead. The practices varied across the region, but usually included beheadings, burnings, and staking the body to the coffin to prevent it from getting up. (Laughter) Grizzly stuff! But what the villagers interpreted as unholy reanimation were actually normal symptoms of death. When a body decomposes, the skin dehydrates, causing the hair and fingernails to extend. Bacteria in the stomach creates gases that fill the belly, which force out blood and matter through the mouth. Unfortunately, this science was not yet known, so the villagers kept digging. In fact, so many bodies were dug up that the Empress of Austria sent her physician around to disprove the vampire stories, and she even established a law prohibiting grave tampering. Still, even after the vampire hunts had died down, the stories of legends survived in local superstition. This led to works of literature, such as Polidori's "The Vampyre," the Gothic novel "Carmilla," and, most famously, Bram Stoker's "Dracula." Although Stoker incorporated historical material, like Elizabeth Báthory's virgin blood baths and the brutal executions of Vlad Dracul, it was these local myths that inspired the main elements of his story: the Transylvanian setting, using garlic to defend oneself, and the staking of the heart. While these attributes are certainly familiar to us, elements he invented himself have also lasted over the years: fear of crucifixes, weakness in sunlight, and the vampire's inability to see their reflection. By inventing new traits, Stoker perfectly enacted the age-old tradition of elaborating upon and expanding the myth of vampires. As we saw, maybe you met my relatives, a huge of variety of creatures stalked the night before Dracula, and many more will continue to creep through our nightmares. Yet, so long as they subsist off a living being's life force, they are part of my tribe. Even sparkling vampires can be included. After all, it's the continued storytelling and reimagining of the vampire legend that allows us to truly live forever. (Ominous laughter)

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翻译人员: Xuwen Zhu 校对人员: Zhiting Chen晚上好！怎么了？你害怕吸血鬼吗？呵呵，不用担心，我来这不是为了吸血。啊哈哈哈。我来这里是为了引导你简单了解一下吸血鬼的历史，向你解释下我们的形象是如何从一个步履蹒跚的死尸变成现在你面前这样一位翩翩君子。吸血鬼几乎跟你们人类历史一样久远关于我们存在的故事，甚至能追溯到史前文明。但那时候我们还不叫“吸血鬼”并且我们中的大多数看上去并不像我们今天所想象的吸血鬼一样，差远了！比如说，美索不达米亚的拉马什图就是一个长着狮子头跟驴子身体的怪物，再比如古老希腊的史特雷姬斯人们简单描述为嗜血的鸟类。其他的就更加奇怪了。菲利宾的曼杜哥会撕裂自己的上半身并从中长出巨大的，蝙蝠般的翅膀来飞行。马来西亚的潘那贾拉是个飞在空中的女人头下面还挂着内脏。嘿 嘿 嘿 嘿。澳洲的亚拉马亚胡全身红色，小身板却长着个大脑袋，一张血盆大口，用双手双脚来吸血。噢，对了，让我们不要忘了加勒比海的斯库样，西非的奥巴伊弗，还有墨西哥的特拉海尔普契。嘿嘿，它们是不是很迷人？尽管它们彼此看上去有很大不同，它们却有着一个共同特征：它们靠吸食生灵的血来生存。这个它们共有的特质决定了它们是吸血鬼而其他的特征会随着时间改变。所以，我们是怎样最终转变成你所看到的像我这样的形象呢？我们的现代形态出现于18世纪的东欧。随着对吸血鬼迷信的急剧增强，吸血鬼这种虚无的生物变成了人们睡前的恐怖故事。还有流传甚广的民间传说，比如罗马尼人口中的莫罗伊以及阿尔巴尼亚地区的鲁噶，提供了我们今天所熟知的吸血鬼的特征，比如吸血鬼不死之身以及夜行性还有可以变身。你看，18世纪的东欧是一个十分糟糕的地方很多人死于不知名的疾病和瘟疫。由于没有医学方面的解释，人们便开始寻找非自然的原因进而在死者尸体里发现了似是而非的证据。当村民们挖出尸体想要辨别这些离奇死亡的原因时，他们通常发现这些尸体看上去就跟活着一样--头发跟指甲都变长了，肚子变得浮肿，嘴角边还有血迹。嘿嘿，显然，这些人并没有真正死亡。嘿，他们是吸血鬼！他们会离开自己的坟墓去寻找活人为食。惊恐万分的村民们迅速举行仪式来杀死这些吸血鬼们。不同的地区方式也不同，但通常包含了斩首，火烧，以及将尸体钉在棺材里来防止它从里面跑出来。真疯狂！然而，这些村民眼中所谓的邪恶复活，实际上都是正常的死亡症状。当尸体分解时，皮肤会脱水，从而引起头发跟指甲外露。胃中的细菌会产生气体使腹部鼓起，并且压迫血和体液从嘴里流出。不幸的是，这些科学解释尚不为人所知，所以村民们不停挖掘尸体寻找解释。事实上，被挖出来的尸体太多以至于奥斯丁帝国的皇后派遣自己的医师来证明这些吸血鬼的故事是假的，并且制定法律禁止村民们破坏坟墓。可是呢，尽管对吸血鬼的狩猎慢慢减少了，这些传说却在民间迷信中保存了下来。这也启发了很多文学作品，比如波里多利的《吸血鬼》，哥特式的小说《卡米拉》，以及，最有名的，布莱姆·斯托克的《德拉库拉》。尽管斯托克在他的作品中加入了历史材料，比如伊丽莎白·巴托里的处女血浴以及弗拉德·德古拉的残忍行刑，却是这些民间神话启发了他的故事中的主要元素：特兰西瓦尼亚式的设定，用大蒜保护自己，还有用木棍插入心脏。这些特性都是为我们所熟知，他（布莱姆·斯托克）自己所发明的吸血鬼特性也延续了很多年：害怕十字架，恐惧太阳光，以及吸血鬼不能从镜子中看到自己。通过发明这些新的吸血鬼特征，斯托克通过详细描述并扩充吸血鬼的故事完美地造就了这个古老的传说。就像我们所看到的，也许你已经见过我的近亲们，一群早于吸血鬼德拉库拉的潜伏在夜晚的生物，并且还会有更多会慢慢爬到我们的噩梦中去。是的，只要它们依赖生灵的血而活，它们就属于我们吸血鬼家族。即使闪闪发光的吸血鬼也算数。说到底，是这种一直以来对于吸血鬼传奇的讲述跟想象加工使我们吸血鬼真正永久存活下来了。啊哈哈哈哈哈！

**P14 2013-11-04 The deadly irony of gunpowder - Eric Rosado**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=14)

Everybody loves fireworks -- the lights, the colors, and, of course, the big boom. But the history of fireworks isn't all hugs and celebrations. Long before epic fireworks displays, chemists in China invented the key ingredient that propels those bright lights into the sky. That invention was what we now call gunpowder. Our story begins back in ancient China in the mid-ninth century where early Chinese alchemists were trying to create a potion for immortality. Instead, what they created was a flammable powder that burned down many of their homes. They quickly realized that this black powder, which they called fire medicine, was precisely the opposite of something that would make you live forever. In these early days, the Chinese hadn't yet figured out how to make the powder explode; it was simply very flammable, and their armies used it to make flaming arrows and even a flamethrower. But once they figured out the right proportions of ingredients to create a blast, they began using the powder even more, creating fireworks to keep evil spirits away and bombs to defend themselves against Mongol invaders. It was these Mongols, most likely, who spread the invention of gunpowder across the world. After fielding Chinese attacks, they learned how to produce the powder themselves and brought it with them on their conquests in Persia and India. William of Rubruck, a European ambassador to the Mongols, was likely responsible for bringing gunpowder back to Europe around 1254. From there, engineers and military inventors created all kinds of destructive weapons. From bombs to guns to cannons, gunpowder left its mark on the world in some pretty terrible ways, in contrast to the beautiful marks it can leave in the air. So, how does black powder propel fireworks into the sky? You might have seen old Westerns or cartoons where a trail of gunpowder is lit and it leads to a large and obviously explosive barrel. Once the fire gets to the barrel, a large boom occurs. But why doesn't the trail itself explode? The reason is that burning the powder releases energy and gases. While the trail is burning, these are easily released into the surrounding air. But when the gunpowder is contained within the barrel, the energy and gases cannot easily escape and build up until BOOM! Firework canisters provide a single, upward-facing outlet to channel this explosive energy. The wick ignites the gunpowder and the energy takes the easiest exit from the canister, launching the firework high into the sky. The flame then makes its way through the firework's encasing and the same reaction occurs high above our heads. So, while the Chinese alchemists never found the compound for eternal life, they did find something that would go on to shape all of civilization, something that has caused many tragic moments in human history, and yet still gives us hope when we look up in celebration at the colorful night sky.

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翻译人员: Tenghui Koh 校对人员: Zhiting Chen每个人都喜欢烟花喜欢华光熠熠，也喜欢色彩缤纷当然也喜欢绽放时的响声但烟花的历史并没有像烟花那么灿烂在有烟花记载的很久以前中国的化学家门发明了一种重要的物质这种物质驱动着亮光冲向天空这种发明就是我们现在所称的火药故事起源于古老的中国在九世纪中期当中国早期的炼金者尝试着制造长生不老药时他们意外地发明了一种易燃的粉末物质这种易燃物质烧掉了很多人们的房屋他们很快意识到这种被他们叫做火药的黑色粉末恰恰与他们日益追求的长生不老药背道而驰在最开始的这个时期中国人还没有找到使粉末爆炸的方法知道的只是这种黑粉非常易燃所以那时中国的军队使用这种黑粉来制造烟焰火箭支甚至喷火器但是当他们研究出能够制造爆炸所需的物质的比例时他们开始更多地使用火药来制造烟花用来驱赶恶魔以及制造炸弹用来抵挡蒙古的入侵者大概是这些蒙古人将火药传播到了世界各地在与中国交战的过程中蒙古人学会了怎样生产火药而且用火药征服了波斯和印度威廉·鲁不鲁乞欧洲派往蒙古的使者于1254年把火药带回了欧洲正是从那时起，工程师和军事发明家发明创造了各种各样具有破坏性的武器从炸弹到抢，再到大炮火药遍布于世界各地很多时候，火药留下的不是漫天华彩而是令人畏惧的痕迹那么，火药是怎样驱使烟花飞向天空的呢？你或许在旧时西部电影或动画片中看到过当一根火药线被点燃就会引向一个巨大的并可爆的桶一旦火进入了这个桶爆炸就会发生但是，为什么这根火药线自己不爆炸呢?这是因为火药燃烧的时候会释放能量和气体当这根火药线燃烧的时候这些能量和气体自然地散放到了周围的空气中但一旦火药进入封闭的桶这些能量和气体不能散开堆积起来直到发生爆炸烟花筒上有一个朝上的单向出口可以输送这股爆炸的能量当火药芯被点燃能量就自然地从烟花筒里释放推动烟花升向天空火焰冲破烟火的层层包围在天空中完成了同样的反应所以说，虽然中国的炼金者没有找到长生不老的灵丹妙药他们却找到了铸成人类文明道路的东西--火药人类历史中的火药造成了许多悲剧但同时给予我们希望因为当我们仰望星空时也能看到黑夜的五彩斑斓

**P15 2013-11-05 Why is yawning contagious - Claudia Aguirre**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=15)

Oh, excuse me! Have you ever yawned because somebody else yawned? You aren't especially tired, yet suddenly your mouth opens wide and a big yawn comes out. This phenomenon is known as contagious yawning. And while scientists still don't fully understand why it happens, there are many hypotheses currently being researched. Let's take a look at a few of the most prevalent ones, beginning with two physiological hypotheses before moving to a psychological one. Our first physiological hypothesis states that contagious yawning is triggered by a specific stimulus, an initial yawn. This is called fixed action pattern. Think of fixed action pattern like a reflex. Your yawn makes me yawn. Similar to a domino effect, one person's yawn triggers a yawn in a person nearby that has observed the act. Once this reflex is triggered, it must run its course. Have you ever tried to stop a yawn once it has begun? Basically impossible! Another physiological hypothesis is known as non-conscious mimicry, or the chameleon effect. This occurs when you imitate someone's behavior without knowing it, a subtle and unintentional copycat maneuver. People tend to mimic each other's postures. If you are seated across from someone that has their legs crossed, you might cross your own legs. This hypothesis suggests that we yawn when we see someone else yawn because we are unconsciously copying his or her behavior. Scientists believe that this chameleon effect is possible because of a special set of neurons known as mirror neurons. Mirror neurons are a type of brain cell that responds equally when we perform an action as when we see someone else perform the same action. These neurons are important for learning and self-awareness. For example, watching someone do something physical, like knitting or putting on lipstick, can help you do those same actions more accurately. Neuroimaging studies using fMRI, functional magnetic resonance imaging, show us that when we seem someone yawn or even hear their yawn, a specific area of the brain housing these mirror neurons tends to light up, which, in turn, causes us to respond with the same action: a yawn! Our psychological hypothesis also involves the work of these mirror neurons. We will call it the empathy yawn. Empathy is the ability to understand what someone else is feeling and partake in their emotion, a crucial ability for social animals like us. Recently, neuroscientists have found that a subset of mirror neurons allows us to empathize with others' feelings at a deeper level. (Yawn) Scientists discovered this empathetic response to yawning while testing the first hypothesis we mentioned, fixed action pattern. This study was set up to show that dogs would enact a yawn reflex at the mere sound of a human yawn. While their study showed this to be true, they found something else interesting. Dogs yawned more frequently at familiar yawns, such as from their owners, than at unfamiliar yawns from strangers. Following this research, other studies on humans and primates have also shown that contagious yawning occurs more frequently among friends than strangers. In fact, contagious yawning starts occurring when we are about four or five years old, at the point when children develop the ability to identify others' emotions properly. Still, while newer scientific studies aim to prove that contagious yawning is based on this capacity for empathy, more research is needed to shed light on what exactly is going on. It's possible that the answer lies in another hypothesis altogether. The next time you get caught in a yawn, take a second to think about what just happened. Were you thinking about a yawn? Did someone near you yawn? Was that person a stranger or someone close? And are you yawning right now? (Yawn) (Lip smacking)

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=15)

翻译人员: Minglei Wang 校对人员: Peipei Xiang不好意思！你是否曾因别人打哈欠而打哈欠？你并不是十分疲惫，可突然间你的嘴巴就会大张，接着一个大哈欠便产生了。这种现象被称为传染性哈欠。尽管科学家们还没有完全了解它产生的原因，但人们目前却正在对许多假说进行研究。下面让我们来看下其中几个最为流行的说法，我们先从两种生理学的假说入手，接着，我们会再来了解一种心理学的假说。第一种生理学假说认为传染性哈欠是由一种特殊的刺激因素所导致，那就是最初的哈欠。这被称作固定行为模式。这就好比条件反射。你的哈欠引起我的哈欠。这与多米诺效应很相似，一个人的哈欠会引发附近其他看到该行为的个体也打哈欠。当这种条件反射被激发，它就必须顺其发展。你曾试图阻止过自己打哈欠吗？那基本是不可能的！另一种生理学假说被称为非意识性模仿或变色龙效应。它发生在人们对他人行为进行无意识模仿时，这种行为通常是细微且无意识的模仿动作。人们常常模仿他人的姿势。如果你坐在某人对面，而那个人正翘着二郎腿，你可能也会跷起腿来。这种假说表明当看到别人打哈欠时我们也会打哈欠，因为我们会无意识的模仿他人的行为。科学家们相信这种变色龙效应的可能性是源自一组特殊的神经元它叫作镜像神经元。镜像神经元是一种大脑细胞，它促使人们相应地做出自己所看到的他人发出的相同动作。这些神经元十分重要，特别是对学习和自我意识。例如，当看到他人的某些动作时如编织，或是涂口红，它会帮助我们更加准确地做出相同的动作。神经影像研究利用功能性磁共振成像发现当我们看到别人打哈欠或甚至听到别人打哈欠时，大脑中容纳镜像神经元的特殊区域会产生反应，从而导致人们会做出相同的反应：打哈欠。从心理学假说来看，它也涉及到镜像神经元所产生的影响。我们称之为共感哈欠。共感是一种理解能力，它使我们体会他人的感受并融入对方的情感，这是一种对于像人类这样的社会性动物来讲十分关键的能力。最近，神经学家发现镜像神经元的一组子集使我们能够进一步增进对他人感受的认知。科学家们对于这种共感性哈欠的发现源自于对先前提及的第一种假说的验证中，也就是固定行为模式。这项研究是为了证明狗打哈欠的条件反射能够仅通过人类所发出的哈欠声来实现。此项研究不仅证明了这一事实，科学家们还发现了另一个有趣的现象。熟悉的哈欠对狗的影响更为频繁，比如主人的哈欠，而陌生的哈欠则不那样明显。随着进一步的探索，其他对于人类及灵长类动物的研究也证实了哈欠的传染性多发生在朋友而非陌生人之间。事实上，传染性哈欠在我们4、5岁时就已经产生了，因为那时的孩子已经能够正确地识别他人的情感。尽管最新的科学研究致力于证明传染性哈欠是基于共感能力，但更多的研究仍在等着我们去解释这其中真正的原因。真正的答案或许就在另一个假说中。下次你再打哈欠时，停下来想想刚才都发生了什么。你是在想打哈欠这件事吗？附近有其他人打哈欠吗？那个人是陌生人还是熟人？还有你现在在打哈欠吗？

**P16 2013-11-08 The chemistry of cookies - Stephanie Warren**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=16)

In a time-lapse video, it looks like a monster coming alive. For a moment, it sits there innocuously. Then, ripples move across its surface. It bulges outwards, bursting with weird boils. It triples in volume. Its color darkens ominously, and its surface hardens into an alien topography of peaks and craters. Then, the kitchen timer dings. Your cookie is ready. What happened inside that oven? Don't let the apron deceive you! Bakers are mad scientists. When you slide the pan into the oven, you're setting off a series of chemical reactions that transform one substance, dough, into another, cookies. When the dough reaches 92 degrees Fahrenheit, the butter inside melts, causing the dough to start spreading out. Butter is an emulsion, or mixture of two substances that don't want to stay together, in this case, water and fat, along with some dairy solids that help hold them together. As the butter melts, its trapped water is released. And as the cookie gets hotter, the water expands into steam. It pushes against the dough from the inside, trying to escape through the cookie walls like Ridley Scott's chest-bursting alien. Your eggs may have been home to squirming salmonella bacteria. An estimated 142,000 Americans are infected this way each year. Though salmonella can live for weeks outside a living body and even survive freezing, 136 degrees is too hot for them. When your dough reaches that temperature, they die off. You'll live to test your fate with a bite of raw dough you sneak from your next batch. At 144 degrees, changes begin in the proteins, which come mostly from the eggs in your dough. Eggs are composed of dozens of different kinds of proteins, each sensitive to a different temperature. In an egg fresh from the hen, these proteins look like coiled up balls of string. When they're exposed to heat energy, the protein strings unfold and get tangled up with their neighbors. This linked structure makes the runny egg nearly solid, giving substance to squishy dough. Water boils away at 212 degrees, so like mud baking in the sun, your cookie gets dried out and it stiffens. Cracks spread across its surface. The steam that was bubbling inside evaporates, leaving behind airy pockets that make the cookie light and flaky. Helping this along is your leavening agent, sodium bicarbonate, or baking soda. The sodium bicarbonate reacts with acids in the dough to create carbon dioxide gas, which makes airy pockets in your cookie. Now, it's nearly ready for a refreshing dunk in a cool glass of milk. One of science's tastiest reactions occurs at 310 degrees. This is the temperature for Maillard reactions. Maillard reactions result when proteins and sugars break down and rearrange themselves, forming ring-like structures, which reflect light in a way that gives foods like Thanksgiving turkey and hamburgers their distinctive, rich brown color. As this reaction occurs, it produces a range of flavor and aroma compounds, which also react with each other, forming even more complex tastes and smells. Caramelization is the last reaction to take place inside your cookie. Caramelization is what happens when sugar molecules break down under high heat, forming the sweet, nutty, and slightly bitter flavor compounds that define, well, caramel. And, in fact, if your recipe calls for a 350 degree oven, it'll never happen, since caramelization starts at 356 degrees. If your ideal cookie is barely browned, like a Northeasterner on a beach vacation, you could have set your oven to 310 degrees. If you like your cookies to have a nice tan, crank up the heat. Caramelization continues up to 390 degrees. And here's another trick: you don't need that kitchen timer; your nose is a sensitive scientific instrument. When you smell the nutty, toasty aromas of the Maillard reaction and caramelization, your cookies are ready. Grab your glass of milk, put your feet up, and reflect that science can be pretty sweet.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=16)

翻译人员: Xue Mei 校对人员: Bighead Ge在慢镜头里似乎一头野兽正在苏醒刚开始，它只是无害的坐在那儿然后，表面开始有了动静它迅速膨胀冒出许多奇怪的气泡它体积一下膨胀两倍颜色诡异的加深表面变硬如同外星球的坑坑洼洼然后，厨房计时器响了饼干做好了！烤箱里发生了什么别被面包师的围裙唬住了他们可是疯狂的科学家呢当你把烤盘放进烤箱时你就开启了一系列化学反应：一种物质-面团被转变成另一种物质-饼干面团温度达到92华氏度时里面的黄油融化面团瘫软下来黄油是一种乳化剂或者说是两种物质的混合物这两种物质可不想呆在一起在这里，指的是水和脂肪一些乳脂块将水和脂肪混合在一起黄油融化时里面水分被释放出来饼干继续升温水分膨胀成气体从里往外挤迫面团想要冲出面团的束缚就像雷德利·斯科特电影《异形》中的场景面团里的鸡蛋可是沙门氏菌的窝巢据估计，每年有142,000美国人被这种细菌感染虽然在沙门氏菌可以存活数周在体外甚至冰冻的环境里但烤箱内的136华氏度对他们来说太热了当面团达到136华氏度时这种细菌就死了所以偷偷咬一口还没进烤箱的生面团是在拿生命冒险呢温度达到144华氏度时，蛋白质开始变化蛋白质一般来源于面团中的鸡蛋鸡蛋含有很多种不同的蛋白质每种的敏感温度不一样刚生出来的鸡蛋里面的蛋白质像一团团的线加热鸡蛋时蛋白质伸展开来和周围的分子混在一起相互缠绕的蛋白质使流体的蛋几乎凝固从而让湿乎乎的面团便硬水分在212华氏度时完全变成蒸汽就像阳光下炙烤的泥团饼干变干变硬表面布满小裂缝沸腾的水滴蒸发留下一个个小坑使得饼干又薄又脆这一切都得益于发酵物碳酸氢钠或烘焙苏打碳酸氢钠和面团里的酸反应产生二氧化碳气体这些气体在饼干表面留下了一个个小坑现在，就快能蘸着牛奶享受你的饼干了其中最增添美味的一个反应发生在310华氏度叫做美拉德反应这个反应是由于蛋白质和糖分解并重新结合形成环状结构可以反射光这样感恩节烤火鸡和汉堡包就拥有了独特诱人的褐色外表该反应会产生大量美味又芬芳的化合物其相互之间还在反应产生更加浓郁的香气和味道焦糖化反应是最后发生的反应焦糖化反应是指糖分子在高温下分解产生甘甜、像坚果一样而且略发苦的化合物也就是焦糖实际上，如果菜谱设定的烤箱温度为350华氏度焦糖化反应就不会发生因为这个反应发生温度为356华氏度要想使饼干颜色略微加深如同来沙滩度假的东北人最好把烤箱温度设定为310华氏度如果希望饼干呈现漂亮的棕褐色就调高温度390华氏度内焦糖化反应都会继续这里还有个小窍门你其实不用买计时器鼻子就是灵敏的科学仪器当你闻到坚果般温暖迷人的香味时香味来自于美兰德反应和焦糖化反应你的饼干就烤好了倒一杯牛奶翘起脚你会发现科学也能很甜蜜

**P17 2013-11-13 The chemical reaction that feeds the world - Daniel D. Dulek**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=17)

What would you say is the most important discovery made in the past few centuries? Is it the computer? The car? Electricity? Or maybe the discovery of the atom? I would argue that it is this chemical reaction: a nitrogen gas molecule plus three hydrogen gas molecules gets you two ammonia gas molecules. This is the Haber process of binding nitrogen molecules in the air to hydrogen molecules, or turning air into fertilizer. Without this reaction, farmers would be capable of producing enough food for only 4 billion people; our current population is just over 7 billion people. So, without the Haber process, over 3 billion people would be without food. You see, nitrogen in the form of nitrate, NO3, is an essential nutrient for plants to survive. As crops grow, they consume the nitrogen, removing it from the soil. The nitrogen can be replenished through long, natural fertilization processes like decaying animals, but humans want to grow food much faster than that. Now, here's the frustrating part: 78% of the air is composed of nitrogen, but crops can't just take nitrogen from the air because it contains very strong triple bonds, which crops cannot break. What Haber did basically was figure out a way to take this nitrogen in the air and put it into the ground. In 1908, the German chemist Fritz Haber developed a chemical method for utilizing the vast supply of nitrogen in the air. Haber found a method which took the nitrogen in the air and bonded it to hydrogen to form ammonia. Ammonia can then be injected into the soil, where it is quickly converted into nitrate. But if Haber's process was going to be used to feed the world, he would need to find a way to create a lot of this ammonia quickly and easily. In order to understand how Haber accomplished this feat, we need to know something about chemical equilibrium. Chemical equilibrium can be achieved when you have a reaction in a closed container. For example, let's say you put hydrogen and nitrogen into a closed container and allow them to react. In the beginning of the experiment, we have a lot of nitrogen and hydrogen, so the formation of ammonia proceeds at a high speed. But as the hydrogen and nitrogen react and get used up, the reaction slows down because there is less nitrogen and hydrogen in the container. Eventually, the ammonia molecules reach a point where they start to decompose back into the nitrogen and hydrogen. After a while, the two reactions, creating and breaking down ammonia, will reach the same speed. When these speeds are equal, we say the reaction has reached equilibrium. This might sound good, but it's not when what you want is to just create a ton of ammonia. Haber doesn't want the ammonia to break down at all, but if you simply leave the reaction in a closed container, that's what will happen. Here's where Henry Le Chatelier, a French chemist, can help. What he found was that if you take a system in equilibrium and you add something to it, like, say, nitrogen, the system will work to get back to equilibrium again. Le Chatelier also found that if you increase the amount of pressure on a system, the system tries to work to return to the pressure it had. It's like being in a crowded room. The more molecules there are, the more pressure there is. If we look back at our equation, we see that on the left-hand side, there are four molecules on the left and just two on the right. So, if we want the room to be less crowded, and therefore have less pressure, the system will start combining nitrogen and hydrogen to make the more compact ammonia molecules. Haber realized that in order to make large amounts of ammonia, he would have to create a machine that would continually add nitrogen and hydrogen while also increasing the pressure on the equilibrium system, which is exactly what he did. Today, ammonia is one of the most produced chemical compounds in the world. Roughly 131 million metric tons are produced a year, which is about 290 billion pounds of ammonia. That's about the mass of 30 million African elephants, weighing roughly 10,000 pounds each. 80% of this ammonia is used in fertilizer production, while the rest is used in industrial and household cleaners and to produce other nitrogen compounds, such as nitric acid. Recent studies have found that half of the nitrogen from these fertilizers is not assimilated by plants. Consequently, the nitrogen is found as a volatile chemical compound in the Earth's water supplies and atmosphere, severely damaging our environment. Of course, Haber did not foresee this problem when he introduced his invention. Following his pioneering vision, scientists today are looking for a new Haber process of the 21st century, which will reach the same level of aid without the dangerous consequences.

**P17 2013-11-13 The chemical reaction that feeds the world - Daniel D. Dulek**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=17)

翻译人员: Ying Minako Zhao 校对人员: Yixuan Liu对你来说在过去几个世纪里人类最重大的发现是什么？电脑？汽车？电？还是原子的发现？我认为应该是以下的化学反应：一个氮气分子加上三个氢气分子反应产生两个氨气分子这个叫做哈伯制氨法它将空气中的氮气分子与氢气分子结合将空气变为肥料如果没有哈伯制氨法那么全世界的粮食产量最多只能养活40亿人而我们现在的世界人口超过70亿所以，如果没有哈伯制氨法超过30亿人将没有食物硝酸盐（NO3）中的氮元素是植物生长所必需的营养农作物在生长时从土壤中吸收氮通过自然的方式来补充土壤中的氮则需要很长时间比如从动物尸体的腐烂过程中产生。但是人们往往需要在更短时间内耕种农作物但是人们往往需要在更短时间内耕种农作物让大家特别头疼的是：虽然氮气占空气成分的78%但是农作物不能直接从空气中吸收氮气因为氮气分子拥有坚固的三键结构很难被农作物破坏哈伯找到了一种能够把空气里的氮吸取出来然后注入土壤中的方法然后注入土壤中的方法在1908年，德国化学家弗里茨·哈伯发明了一种化学方法有效地将空气中丰富的氮资源利用起来他的这种方法把空气中的氮气与氢气结合把空气中的氮气与氢气结合形成氨气氨气可以被注入土壤中并且很快地被转化成硝酸盐但是如果要用哈伯制氨法来保证世界粮食产量他则须要找到一种能够快速且容易的制造氨气的方法他则须要找到一种能够快速且容易的制造氨气的方法为了理解哈伯是怎样完成此壮举的我们首先需要了解一些关于化学平衡的知识我们首先需要了解一些关于化学平衡的知识化学平衡可以在密封容器里进行反应时被达到化学平衡可以在密封容器里进行反应时被达到例如你把氢气和氮气放入密封容器中让它们进行反应在实验刚刚开始的时候我们有许多的氮气和氢气它们高速地发生反应形成氨气但是，持续的反应渐渐消耗氢气和氮气但是，持续的反应渐渐消耗氢气和氮气因为容器中氢气和氮气的量减少反应速度随之减慢最终，氨气分子到达一个临界点它们开始分解成氮气和氢气它们开始分解成氮气和氢气此后，两种化学反应即氨气的形成和分解将渐渐达到同样的速度当它们等速时反应便被称为达到了化学平衡这听起来不错，但其实不然因为你仅仅是想制造一吨纯的氨气因为你仅仅是想制造一吨纯的氨气哈伯不想让反应产生的氨气分解哈伯不想让反应产生的氨气分解但如果让此化学反应在密封容器中自由进行但如果让此化学反应在密封容器中自由进行氨气便会分解法国化学家亨利·路易·勒夏特列帮上了忙他发现如果你向已达到化学平衡的系统里加上一些东西比如，氮气那么这个系统会自动调整，以重新回到平衡那么这个系统会自动调整，以重新回到平衡勒夏特列还发现如果增大系统的压力如果增大系统的压力为了返回到以前的压力状态，系统将继续反应为了返回到以前的压力状态，系统将继续反应就像在一个拥挤的房间分子的数量越多系统的压力就越大让我们看看这个反应的化学方程式在方程式的左边有四个分子在方程式的左边有四个分子而方程式的右边只有两个分子所以，为了让房间变得不那么拥挤以至减小压力氮气和氢气的合成反应会重新开始氮气和氢气的合成反应会重新开始产生更加小巧的氨气分子哈伯意识到为了制造大量的氨气哈伯意识到为了制造大量的氨气他必须首先创造一台机器可以连续不断地注入氢气和氮气并且持续增加平衡系统的压力并且持续增加平衡系统的压力他做到了今天，氨气是世界上被制造得最多的化合物之一每年大约有1亿3千1百万公吨的氨气被产出重量大约为2900亿磅这个相当于3千万头每头约1万磅重的非洲大象的总重3千万头每头约1万磅重的非洲大象的总重80%的氨气被用于制造肥料剩下的20%被用于工业和家庭用的清洁剂中以及制造其它氮化物例如，硝酸最近的研究显示化肥中一半的氮都没有被植物吸收化肥中一半的氮都没有被植物吸收之后，我们发现氮是具挥发性的化合物之后，我们发现氮是具挥发性的化合物积存在地球的水和大气中对我们的环境造成极大污染当然，在哈伯发明制氮法时他并没有预见到这个问题继承哈伯的开创性的发明今日的科学家们在找寻一种21世纪的新制氮法今日的科学家们在找寻一种21世纪的新制氮法它既可以达到制氮的目的又不会给人类带来不好的后果

**P18 2013-11-13 The five major world religions - John Bellaimey**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=18)

Transcriber: Andrea McDonough Reviewer: Jessica Ruby In all times and places in our history, human beings have wondered, "Where did we come from? What's our place in the world? What happens to us after we die?" Religions are systems of belief that have developed and evolved over time in response to these and other eternal mysteries, driven by the feeling that some questions can only be answered by faith and based on an intuition that there is something greater than ourselves, a higher power we must answer to, or some source we all spring from and to which we must return. Hinduism means the religions of India. It's not a single religion but rather a variety of related beliefs and spiritual practices. It dates back five millennia to the time of Krishna, a man of such virtue that he became known as an avatar of Vishnu, an incarnation of the god in human form. He taught that all life follows karma, the law of cause and effect, and our job is to do our duty, or dharma, according to our place in society without worrying how things turn out. When we die, we are reincarnated into a new body. If we followed our dharma and did our proper duty in our past life, we get good karma, which sends our soul upward in the social scale. Our rebirth into the next life is thus determined by what we do in this one. The wheel of rebirths is called samsara. It's possible for a very holy person to lead a life with enough good karma to escape the wheel. This escape is called moksha. Hinduism teaches that everything is one. The whole universe is one transcendent reality called Brahman, and there's just one Brahman but many gods within it, and their roles, aspects, and forms differ according to various traditions. Brahma is the creator, Vishnu is the preserver who sometimes takes on human form, and Shiva is the transformer, or Lord of the Dance. Durga is the fiercely protective divine mother. Ganesha has an elephant head and is the wise patron of success. Hinduism is the third largest religion in the world. And although most Hindus live in India, they can be found on every continent, one billion strong. Now, let's travel west, across deserts and mountains to the fertile crescent about 4,000 years ago. Judaism began with God calling Abraham and Sarah to leave Mesopotamia and migrate to the land of Canaan. In return for their faith in the one true God, a revolutionary concept in the polytheistic world of that time, they would have land and many descendants. From this promise came the land of Israel and the chosen people, but staying in that land and keeping those people together was going to be very difficult. The Israelites were enslaved in Egypt, but God freed them with the help of the prophet Moses, who received the Ten Commandments and later hundreds more. They conquered the Promised Land, but could only keep it for a few hundred years. Israel sits at a crossroads through which many armies marched over the centuries. And in the year 70, the Romans destroyed the temple in their capital, Jerusalem. So, the religion transformed itself from a temple religion with sacrifices and priests to a religion of the book. Because of this, Judaism is a faith of symbolism, reverence, and deep meanings tied to the literature of its history. The many sacred scriptures make up the Hebrew bible, or Tanakh, and hundreds of written discussions and interpretations are contained in an expansive compendium of deeper meanings, called the Talmud. Jews find rich, symbolic meaning in daily life. At the Passover meal, every item on the menu symbolizes an aspect of the escape from slavery. The importance of growing up is emphasized when young people reach the age of bar and bat mitzvah, ceremonies during which they assume responsibility for their actions and celebrate the weaving of their own lives into the faith, history, and texts of the Jewish people. There are 14 million Jews in the world today, 6 million in Israel, which became independent following the horrors of genocide in World War II, and 5 million in the United States. But now let's go back 2500 years and return to India where Buddhism began with a young prince named Siddhartha. On the night he was conceived, his mother, Queen Maya, is said to have been visited in her sleep by a white elephant who entered her side. Ten months later, Prince Siddartha was born into a life of luxury. Venturing forth from his sheltered existence as a young man, he witnessed the human suffering that had been hidden from him and immediately set out to investigate its sources. Why must people endure suffering? Must we reincarnate through hundreds of lives? At first he thought the problem was attachment to material things, so he gave up his possessions. He became a wandering beggar, which he discovered certainly made him no happier. Then he overheard a music teacher telling a student, "Don't tighten the string too much, it will break. But don't let it go too slack, or it will not sound." In a flash, he realized that looking for answers at the extremes was a mistake. The middle way between luxury and poverty seemed wisest. And while meditating under a bodhi tree, the rest of the answer came to him. All of life abounds with suffering. It's caused by selfish craving for one's own fulfillment at the expense of others. Following an eight-step plan can teach us to reduce that craving, and thus reduce the suffering. On that day, Siddhartha became the Buddha, the enlightened one. Not the only one, but the first one. The Buddhist plan is called the Eightfold Path, and though it is not easy to follow, it has pointed the way for millions to enlightenment, which is what Buddhahood means, a state of compassion, insight, peace, and steadfastness. From the time he got up from under that tree to the moment of his death as an old man, the Buddha taught people how to become enlightened: right speech, right goals, a mind focused on what is real, and a heart focused on loving others. Many Buddhists believe in God or gods, but actions are more important than beliefs. There are nearly a billion Buddhists in the world today, mostly in East, Southeast, and South Asia. 2,000 years ago in Judaism's Promised Land, Christianity was born. Just as Hindus called Krishna "God in Human Form," Christians say the same thing about Jesus, and Christianity grew out of Judaism just as Buddhism grew out of Hinduism. The angel Gabriel was sent by the God of Abraham to ask a young woman named Mary to become the mother of his son. The son was Jesus, raised as a carpenter by Mary and her husband Joseph, until he turned 30, when he began his public career as the living word of God. Less interested in religiousness than in justice and mercy, Jesus healed the sick in order to draw crowds and then taught them about his heavenly father -- affectionate, forgiving, and attentive. Then, he would invite everyone to a common table to illustrate his Kingdom of God, outcasts, sinners, and saints all eating together. He had only three years before his unconventional wisdom got him into trouble. His enemies had him arrested, and he was executed by Rome in the standard means by which rabble-rousers were put to death, crucifixion. But shortly after he was buried, women found his tomb empty and quickly spread word, convinced that he had been raised from the dead. The first Christians described his resurrected appearances, inspiring confidence that his message was true. The message: love one another as I have loved you. Christians celebrate the birth of Jesus in December at Christmas, and his suffering, death, and resurrection during Holy Week in the spring. In the ceremony of baptism, a washing away of sin and welcoming into the Christian community, recall Jesus's own baptism when he left his life as a carpenter. In the rite of Communion, Christians eat the bread and drink the wine blessed as the body and blood of Jesus, recalling Jesus's last supper. There are two billion Christians worldwide, representing almost a third of the world's people. Islam began 1400 years ago with a man of great virtue, meditating in a mountain cave in the Arabian desert. The man was Muhammad. He was visited by a divine messenger, again the angel Gabriel, in Arabic, Jibril, delivering to him the words of Allah, the one God of Abraham. In the next few years, more and more messages came, and he memorized and taught them. The verses he recited were full of wise sayings, beautiful rhymes, and mysterious metaphors. But Muhammad was a merchant, not a poet. Many agreed the verses were indeed the words of God, and these believers became the first Muslims. The word Muslim means one who surrenders, meaning a person who submits to the will of God. A Muslim's five most important duties are called the Five Pillars: Shahada, Muslims declare publicly, there is no other God but Allah, and Muhammad is his final prophet; Salat, they pray five times a day facing Mecca; Zakat, every Muslim is required to give 2 or 3% of their net worth to the poor; Sawm, they fast during daylight hours for the lunar month of Ramadan to strengthen their willpower and their reliance on God; and Hajj, once in a lifetime, every Muslim who is able must make a pilgrimage to the holy city of Mecca, rehearsing for the time when they will stand before God to be judged worthy or unworthy of eternal life with Him. The words of God, revealed to the prophet over 23 years, are collected in the Quran, which literally translates into "the recitation." Muslims believe it to be the only holy book free of human corruption. It's also considered by many to be the finest work of literature in the Arabic language. Islam is the world's second largest religion, practiced by over one and a half billion Muslims around the globe. Religion has been an aspect of culture for as long as it has existed, and there are countless variations of its practice. But common to all religions is an appeal for meaning beyond the empty vanities and lowly realities of existence, beyond sin, suffering, and death, beyond fear, and beyond ourselves.

**P18 2013-11-13 The five major world religions - John Bellaimey**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=18)

翻译人员: Chenwei CAO 校对人员: Jenny Yang从古至今 在地球上的每个角落人们都会问道“我们从哪里来？”“我们为何而来？”“我们死后会怎样？”宗教是在人类历史长河中逐渐发展、演化而来的信仰体系它试图回答上述问题和揭示其他宇宙间的永恒奥秘宗教也来源于一种内心的感触相信问题只能由信仰解答还建立在一种直觉之上认为世上存在比我们自身更宏大的东西一种令人敬畏的，我们必须向它回应的力量抑或存在一个万物的源泉同时也是我们所有人回归的终点印度教 (Hinduism) 指“印度的宗教”它不是一个单一的宗教而是各种相关信仰和灵修方式的集合印度教可追溯至五千年前克利须那 (Krishna 黑天) 的时代黑天道德高尚最终被奉为毗湿奴 (Vishnu) 的化身这位神的人形化身黑天教导人们 众生从“业”“业”就是因果报应律而我们要做的 就是依据我们的社会地位履行各自的职责 也就是达摩 (dharma 法)不去担心事情最终会如何我们死后 会转世到一个新的身体里如果我们守佛法在前世里尽职尽责会造善业灵魂的社会等级也会上升因此 我们来世投胎的结果取决于我们此生的所作所为转世不止 也被称为轮回 (samsara)但至圣之人也有可能积得足够的善业从而脱离轮回叫做解脱（moksha）印度教认为 万物皆一整个宇宙都是一种超验的现实——梵 (Brahman)而且 尽管梵只有一个却有众多神明在不同的文化传统下这些神明也有不同的角色、外貌和形态梵天 (Brahma) 是创造者毗湿奴是维护者有时化身为人形湿婆 (Shiva) 是毁灭者也叫舞王 (Lord of the Dance)杜尔迦 (Durga) 是尚武的守护母神象头神格涅沙 (Ganesha) 代表智慧是成功的守护神印度教是世界第三大宗教虽然大多数印度教信徒生活在印度但在各个大洲都可以找到他们的踪迹总共有十亿人之巨现在 让我们把目光投向西方越过沙漠与高山来到四千年前肥沃的新月地带犹太教 (Judaism) 始于上帝命令亚伯拉罕 (Abraham)和他的妻子撒拉 (Sarah) 离开美索不达米亚迁往迦南 (Canaan) 之地因为他们信仰唯一、真正的神——这在当时多神教盛行的时代是一个革命性的概念——作为回报 他们将有土地与无穷的子孙他们被许有以色列这片土地成为上帝的选民但是留在这片土地上维持民众统一困难重重以色列人在埃及为奴但是在先知摩西的协助下上帝解放了以色列人摩西受获“十诫”之后又有数百条他们征服了应许之地 (以色列)但只维持了数百年而已以色列位于交通要道几百年来无数军队途经于此公元70年罗马人摧毁了他们在首都耶路撒冷的圣殿因此 犹太教脱胎换骨从一个有牺牲与祭司的殿宇宗教 (temple religion)转变为经籍宗教 (a religion of the book)正因为此 犹太教里充满了象征主义、崇敬和与其历史紧密相连的深刻含义希伯来圣经也叫塔纳赫 (Tanakh)由很多宗教典籍组成还有数以百计的论著和注疏汇集在一本包罗万象意义深长的法典里叫做塔木德 (Talmud)犹太人在日常生活中融入丰富的象征含义在逾越节宴席上每一道菜都象征了当年“出埃及”时的一个方面犹太教中 “长大成人”意义重大当青少年到了成人礼的年龄 (Bar and Bat Mitzvah)在这期间以及之后 他们将对自己的行为承担责任庆祝他们的生命从此与犹太民族的信仰、历史和典籍融合在一起在当今世界 一共有1400万犹太人其中600万人在以色列以色列在第二次世界大战恐怖的种族大屠杀后获得独立在美国 也有500万犹太人让我们回到2500年前的印度这里是佛教 (Buddhism) 起源的地方源始于一位叫做悉达多 (Siddhartha) 的王子据说 在他的母亲——摩耶王后 (Queen Maya)受孕的那天夜晚她梦见一头白象从肋部进入她的身体十个月后 王子悉达多将生生来过着舒适奢华的生活而当他终于走出他的庇护所时那时他还是一个年轻人他目睹了人世的苦难在此之前一直不为他所知他立即开始寻找这苦难的来源为什么人们要经受痛苦？为什么人们必须经历数百次的轮回？起初 他以为问题在于人们对物质的依恋所以他放弃了自己的财产四处流浪 成了一名乞丐但他发现 这并没有让他更快乐一次 他偶然听到一名音乐老师对学生说“不要把弦拧得太紧 太紧弦会断但是 也不要让它太松否则就发不出声音”在那瞬间 他意识到在极端里寻找答案是错误的选择奢华与贫困二者的中间道路才是最明智的在一棵菩提树下打坐时他悟到了全部的答案所有的生命都充满了痛苦痛苦来源于人们的私欲为实现自己的私欲 不惜牺牲他人通过一个含有八个步骤的计划我们可以减少渴求从而减少痛苦就在那一天 悉达多成为佛陀达到觉悟的智者虽然不是唯一的一个 但是是最早的这个计划也被称为“八正道”虽然它并不容易执行但是为数百万寻求觉悟的人指明了方向觉悟也就是成佛的状态一种充满怜悯洞悉平和和坚定的状态从他从那棵树下起身直到到他衰老死去的那一刻佛陀教导人们如何成为觉悟的人：说正确的话树立正确的目标专注于真实存在的事物专注于去爱他人许多佛教徒相信上帝或神但实际行为比信念更重要在当今世界共有将近十亿佛教徒主要分布在东亚、东南亚和南亚2000多年前 在犹太教的应许之地基督教 (Christianity) 诞生了正如印度教徒将黑天称为“上帝的人的化身”基督徒也称耶稣为上帝的化身基督教源于犹太教正如佛教源于印度教亚伯拉罕的神派遣天使加百列 (Gabriel)向处女玛利亚 (Mary) 预告她将成为一名母亲她的儿子就是耶稣玛丽和她的丈夫约瑟 (Joseph)将耶稣培养成一名木匠直到耶稣30岁那年他开始了他的公职生涯作为神的化身耶稣不怎么关心宗教性更注重公正与怜悯他医治病人 以吸引人群然后教导他们他的天父的深情、宽容和爱心然后 他会邀请大家一同聚餐向他们描绘上帝之国被排斥者、罪人和圣人都一起进餐只过了三年他反传统的观点就让他陷入麻烦他被敌人逮捕将在罗马被处以死刑用处死煽动群众者的标准方式——钉死在十字架上但他被埋葬后不久有女人发现他的坟墓是空的言语迅速扩散开来相信耶稣已死而复生最早的基督徒们记述了耶稣复生的场面这更加鼓舞人们相信 他的教导是真的这个教导是：你们要彼此相爱 像我爱你们一样基督徒在12月庆祝耶稣的生日就是圣诞节在春季的圣周期间纪念他的苦难、死亡和复活在洗礼仪式上洗刷罪恶欢迎进入基督徒团体并回想耶稣自己的洗礼当他告别木匠的生活在圣餐礼上基督徒吃无酵饼、喝葡萄酒作为耶稣的体和血的代表纪念耶稣最后的晚餐全世界有二十亿基督徒占世界人口的近三分之一伊斯兰教 (Islam) 始于1400年前有一个品德高尚的人在在阿拉伯沙漠的一个山洞里静坐这名男子就是穆罕默德 (Muhammad)他受到一位神圣使者的拜访也是天使加百列在阿拉伯语中 他叫吉卜利勒 (Jibril)向他传达真主的话亚伯拉罕的唯一的神接下来的几年里他收到越来越多的消息他将其记住 并教给他人他背诵的诗句里充满了睿智的话语漂亮的押韵和神秘的隐喻但穆罕默德是一个商人 不是诗人许多人相信 这些诗句确实是神的话语于是这些人成为了最早的穆斯林穆斯林这个词的意思是“投降者”意味着服从于神的旨意的人穆斯林有五项最重要的原则被称为“五功” (Five Pillars)第一是萨哈达 (Shahada 清真言) 穆斯林要公开宣称真主安拉 (Allah) 是唯一的主而穆罕默德是主最后的使者第二是礼拜 (Salat) 他们面朝麦加一天礼拜五次第三是天课 (Zakat) 每一个穆斯林都必需将自己财产的2%或3%分给穷人第四是斋戒 (Sawm) 在斋月期间从日出到日落他们不得饮食以加强他们的意志力和他们对神的信赖最后是朝觐 (Hajj) 一生一次每一个穆斯林 只要能够 就一定要去圣城麦加 (Mecca) 朝圣为将来他们站在真主面前接受审判练习是否配得上和真主一起获得永生神的话语在23年间不间断透露给先知收集在《古兰经》里字面上的意思就是“朗诵”穆斯林相信这是唯一未经人类的玷污的圣书许多人也认为 这是用阿拉伯语写成的最杰出的文学作品伊斯兰教是世界第二大宗教全球有超过十五亿穆斯林信仰伊斯兰教有史以来宗教一直是人类文化的一部分宗教实践也有着无数的变化但所有的宗教都是对意义的诉求超越虚无超越存在的卑微现实超越罪恶痛苦和死亡超越恐惧和超越自己

**P19 2013-11-22 Making a TED-Ed Lesson - Visualizing big ideas**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=19)

Do you ever struggle to find the perfect description when trying to convey an idea? Like a foggy picture, adjectives and modifiers fail to depict what's in your mind. Illustrators often face a similar challenge, especially when attempting to explain complex and difficult concepts. Sometimes the imagery is intangible or way too complicated to explain with a picture. Although complex information could be relayed using charts and stats, this could get pretty boring. Instead, just like when writing an essay to describe, for example, emotions, illustrators can use visual metaphors to bring to life difficult concepts. Just as a written metaphor is a description that relates one object to another, a visual metaphor uses imagery to suggest a particular association or point of similarity. Our lesson "Big Data" is a great example of a situation where visual metaphors played a huge role in explaining the concept. What is Big Data in the first place? Good question! Big Data is a huge amount of digital information produced worldwide on a daily basis, challenging us to find solutions for storing, analyzing, and also imagining it visually. Quite an elusive concept! How should we depict this? Let's take a look at our "Big Data" script. We start with smaller computer servers that branch out into bigger networks to produce data, then even bigger networks and production of even more data. You see where we're going with this -- an object growing and branching out in many directions and producing something as a result? Does that remind you of something? Just like those computer networks, a tree grows and branches out to produce more leaves each year. And every year, just as the data accumulates and faces us with a challenge to find storage solutions, it gets harder to collect those piles of leaves when they fall off the tree. Aha! There's our visual metaphor! Okay, so we have the script, audio, and a visual metaphor. The next step in visual development is to design the characters and environments of the animation. To do so, we think of an appropriate and appealing style to illustrate the ideas and help the viewer better understand what they're hearing. Let's go back to the script and see if we can find any clues there. Our story starts in the 1960s when the first computer networks were built. This decade will serve as a good point to make the stylistic choice for our animation as it will allow us to refer to artwork from that era. You may want to start by looking at some art books (design, illustrations, cartoons, etc.) from that era and find a style that may our own purpose. Look closely, study the material, and try to understand the choices artists of that time made and why. For example, the 1960s minimalist animation style was a significant departure from the cinematic realism that was popular in animated films at the time. The choice to use limited animation techniques was originally made for budgetary reasons, but it became a signature style that influenced many future generations of animators. In this stylistic approach, the simplified characters, flat backgrounds, and angular shapes come together to create new interpretations of reality, which also sounds like a good place to begin visualizing our own Big Data. Well, let's try an experiment. "In the 1980s islands of similar networks speaking different dialects sprung up all over Europe and the States, making remote access possible but tortuous." Is this better? "In the 1980s islands of similar networks speaking different dialects sprung up all over Europe and the States, making remote access possible but tortuous. To make it easy for our physicists across the world to access the ever-expanding Big Data stored at CERN without traveling, the networks needed to be talking with the same language." As you probably observed, graphic representations are a great way to capture the interest of your audience. By depicting what you want to present and explain with strong, memorable visuals, you can communicate your idea more effectively. So, now, challenge yourself. Think of an abstract concept that cannot be explained with simple words. Go ahead and try your hand at visually developing that idea.

**P19 2013-11-22 Making a TED-Ed Lesson - Visualizing big ideas**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=19)

翻译人员: Fiona Zhang 校对人员: Zhiting Chen你在寻求用完美的方式来传达想法的时候有感到过困难吗？像雾中景色任何形容和修饰都不能描绘出你脑海里的想法。插画师往往面临着类似的挑战，尤其是在解释复杂概念的时候。有时，这些想象是无形的或者复杂到用图示都无法解释。虽然用统计图表可以传达复杂的信息，但又显得很无趣。相反，就像写文章的时候若要描述类似于情绪之类的东西，插画师可以使用视觉隐喻来形象化难以表述的概念。正如书面隐喻是用语言把一个对象关联到另一个，视觉隐喻则是用图像来展示两者之间的特殊联系或相似点。我们这堂"大数据”课本身就是一个视觉隐喻应用于解释的复杂概念的范例。首先，什么是“大数据”？问得好 ！“大数据”是全世界每天都在生产的海量的数字信息，我们得想方设法去存储它，分析它，还要把它视觉化处理。一个非常难懂的概念 ！我们应如何描绘它呢？看看我们的"大数据"脚本。我们一开始使用较小但有扩展功能的网络服务器来产生的数据，然后（扩展出）更大网络生产更多的数据。看看我们需要表达的内容吧-这是一个物体，会生长，会多方向伸展，还会产生结果。这让你联想到什么了吗？和计算机网络一样，一棵树会生长和分支以便来年生产出更多叶子。每年，仅仅是数据的积累就让我们我们面临存储方案的挑战，再加上从树上掉下来的叶子就难上加难了。啊哈 ！这就是我所谓的视觉隐喻 ！好了，我们有了脚本，音频、和视觉隐喻。视觉隐喻制作的下一步就是设计动画的角色和环境。为达到效果，得想出一个既适当又吸引人的风格来演示这个想法让大家更好的理解听到的内容。让我们再回到脚本看看我们是否能找到一些线索。我们的故事开始于 20 世纪 60 年代第一代计算机网络建设刚刚完成。这十年将成为我们选择动画风格的契机，因为我们可以把整个时代的作品作为参考。从那个时代的艺术书籍如设计、 插图、 漫画等出发去找一种我们想要的风格。仔细观察，研究资料，接着尝试去理解当时的艺术家为什么作出那样的选择。例如，20 世纪 60 年代流行的极简主义动画形式是从写实电影基础上分化出来的这是当时最受欢迎的动画片（模式）。最初是出于预算的原因只能选择有限的动画技术但它最终成为影响了未来几代人动画制作者的标志性风格。利用（简约）风格做法，使用极简的人物形象，单调的背景，和有棱角的形状来对现实进行全新的诠释，这听起来是着手制作“大数据”可视化不错的的开端。好吧，让我们做一个实验。“20 世纪 80 年代的欧洲和美国基本普及了网络的使用大家用着相同的网络但讲着不同方言，虽然实现了远程访问但交流起来很困难。”这样（表达）更好不？"20 世纪 80 年代的欧洲和美国基本普及了网络的使用大家用着相同的网络但讲着不同方言，虽然实现了远程访问但交流起来很困难。要让世界各地的物理学家不用出门就能使用网络来访问存储在欧洲核子研究委员会上不断扩大的“大数据”，那在网络上就得用相同的语言来对话"。你可能已经看到，图形化表示是捕获你的听众的兴趣好方法。通过强有力且令人难忘的视觉效果来描述你想解释的内容可以更有效地传达你的想法。所以，现在，挑战自己。找一个不能用简单的词来解释的抽象的概念。行动起来吧！试着利用视觉手段构建你的想法。

**P20 2013-11-27 Music and creativity in Ancient Greece - Tim Hansen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=20)

We live in a society obsessed with music. We use music to worship, tell stories, to celebrate, to work, exercise, declare our love and sometimes our hatred, and, arguably most importantly, to dance. And, of course, we play music ourselves because, well, it's a pleasant thing to do. Thousands of years ago in Ancient Greece, when it came to music, things weren't much different. They might have had lyres and tunics instead of MP3 players and jeans, but the Ancient Greeks were just as obsessed with music as we are today. In fact, music was such an important part of Ancient Greek society that it makes us seem tame by comparison. To really understand just how integral music was to the Ancient Greeks, let's begin by acquainting ourselves with a bit of their mythology. In Ancient Greek mythology, it was believed that human creativity was the result of divine inspiration from a group of goddesses known as the Muses. While scholars have argued over the years that there are anything between 3 and 13 Muses, the standard number accepted today is 9. Each Muse oversees her own specific area of artistic expertise, ranging from song and dance to history and astronomy. It might seem strange to categorize history and astronomy as creative pursuits, but the Ancient Greeks saw these disciplines as more than just school subjects. These were the hallmarks of civilization in what, to their eyes, was a pretty barbaric world. An educated, civilized person was expected to be proficient in all aspects of creative thought inspired by the Muses, and the common medium through which these disciplines were taught, studied, and disseminated was music. You see, it's no coincidence that the word Muse is very similar to the word music. It's where the word originates. Poetry, be it a love poem or an epic poem about a dragon-slaying hero, was sung with a musical accompaniment. Dancing and singing, obviously, were accompanied by music. Theater was always a combination of spoken word and music. History was recounted through song. Even the study of astronomy was linked to the same physical principles as musical harmony, such as the belief held by many Greek thinkers that each of the planets and stars created their own unique sound as they traveled through the cosmos, thrumming like an enormous guitar string light-years long. However, music pervaded more aspects of their lives than just education. Ancient Greeks considered music to be the basis for understanding the fundamental interconnectedness of all things in the universe. This concept of connectivity is known as harmonia, and it's where we get the word harmony. Music was used as a form of medicine to treat illnesses and physical complaints, as a vital accompaniment to sporting contests, and as a means to keep workers in time as they toiled away on monotonous or menial tasks. One of the most important applications of music in Ancient Greek society is found in the belief that music can affect a person's ethos. A word we still use today, ethos is a person's guiding beliefs or personal ethics, the way that one behaves towards oneself and others. The Greek philosopher Plato, one of the most famous and influential Greek thinkers of the time, asserted that music had a direct effect on a person's ethos. Certain kinds of music could incite a person to violence while others could placate a person into a benign, unthinking stupor. According to Plato, only very specific types of music were beneficial to a person's ethos. One should only listen to music that promotes intelligence, self-discipline, and courage, and all other kinds of music must be avoided. Furthermore, Plato fervently denounced any music that deviated from established musical conventions, fearing that doing so would lead to the degradation of the standards of civilization, the corruption of youth, and eventually complete and utter anarchy. While Plato's fears can seem extreme, this argument has appeared in modern times to condemn musical trends such as jazz or punk or rap. What do you think Plato would say about the music you listen to? Is it beneficial to your ethos, or will it degenerate you into a gibbering, amoral barbarian?

**P20 2013-11-27 Music and creativity in Ancient Greece - Tim Hansen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=20)

翻译人员: Xue Mei 校对人员: Peipei Xiang我们生活的社会对音乐无比着迷伴随着音乐，我们举行宗教仪式讲述故事庆祝工作锻炼表达爱意有时也表达愤恨而最重要的也许是跳舞当然，我们也弹奏音乐因为，这是件愉悦的事几千年前，在古希腊提起音乐和今天并无二致他们有的可能是里拉琴和长罩衫而不是MP3和牛仔裤但古希腊也和当今社会一样音乐无处不在实际上，音乐之于古希腊社会的重要程度让我们觉得相形见绌要理解为什么音乐对于古希腊如此不可或缺我们首先来了解他们的神话在古希腊神话中人们相信创造力是神灵启发的这些神灵就是今天所指的缪斯学者一直在讨论到底有3个还是13个缪斯今天广为接受的标准数字为9个缪斯们在其各自的艺术专业领域各司其职从唱歌到跳舞到历史和天文这种分类看起来也许有点儿奇怪历史和天文被当作一种创造性的学科但是古希腊人认为这些领域不仅仅是一种学科它们被当作是文明的特征在他们看来世界是很野蛮的每一个受过教育的文明人都应该精通所有由缪斯启迪的创造性思想其中的常见媒介即传授学习和传播的介质便是音乐你看，缪斯（Muse）和音乐（Music）单词十分形似并非偶然而是该单词的词源诗歌，无论是爱情诗还是刺杀巨龙的英雄史诗都在音乐伴奏下吟唱当然，跳舞和唱歌也离不开音乐伴奏戏剧就是口头语言和音乐的结合历史通过歌曲讲述甚至天文学研究都和音乐和声的物理法则紧密相连很多希腊思想家认为每个行星和恒星都创造了自己的音调当它们在宇宙运动时就像在弹拨无数的吉他弦琴弦有数光年长音乐对他们生活的渗透不仅仅局限于教育古希腊人认为音乐是理解宇宙万物相互运动的基本这种万物相关联的思想就是和声也是词语和谐的来源音乐也曾被当作良药用来治疗疾病和生理疼痛如体育比赛时热闹的伴唱也用来协调工人从事单调或繁重的劳役古希腊社会音乐最重要的应用之一就是认为音乐可以影响气质我们今天仍然用这个词气质是人的信仰或个人的伦理观是他们独处或和他人相处的方式希腊哲学家柏拉图那个时期希腊最富盛名和影响力的希腊思想家坚称音乐对个人气质有直接影响力某几种音乐可以煽动暴力而有些音乐可以麻木心智让人精神恍惚，没有灵魂柏拉图说只有特定的几种音乐对人气质有益人们应该只听对促进智力自律和勇气有益的音乐应该回避其他所有音乐此外，柏拉图热切的公开指责任何背离已成型的音乐惯例的音乐担心这样的音乐将导致文明标准的堕落青少年的腐化最终导致彻底的无政府状态柏拉图的担忧也许很极端现代也有此类争论有些音乐潮流受到谴责如爵士、朋克或Rap你觉得柏拉图对你所听的音乐会有什么见解呢这有助于提升你的个人气质吗还是会导致你堕落成为愚蠢、不道德的野蛮人呢

**P21 2013-11-27 The loathsome, lethal mosquito - Rose Eveleth**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=21)

What's the worst bug on the planet? You might vote for the horsefly or perhaps the wasp, but for many people, the worst offender is by far the mosquito. The buzzing, the biting, the itching, the mosquito is one of the most commonly detested pests in the world. In Alaska, swarms of mosquitos can get so thick that they actually asphyxiate caribou. And mosquito-borne diseases kill millions of people every year. The scourge that is the mosquito isn't new. Mosquitoes have been around for over a hundred million years and over that time have coevolved with all sorts of species, including our own. There are actually thousands of species of mosquitos in the world, but they all share one insidious quality: they suck blood, and they're really, really good at sucking blood. Here's how they do it. After landing, a mosquito will slather some saliva onto the victim's skin, which works like an antiseptic, numbing the spot so we don't notice their attack. This is what causes the itchy, red bumps, by the way. Then the bug will use its serrated mandibles to carve a little hole in your skin, allowing it to probe around with its proboscis, searching for a blood vessel. When it hits one, the lucky parasite can suck two to three times its weight in blood. Turns out we don't really like that too much. In fact, humans hate mosquitos so much that we spend billions of dollars worldwide to keep them away from us -- from citronella candles to bug sprays to heavy-duty agricultural pesticides. But it's not just that mosquitos are annoying, they're also deadly. Mosquitos can transmit everything from malaria to yellow fever to West Nile virus to dengue. Over a million people worldwide die every year from mosquito-borne diseases, and that's just people. Horses, dogs, cats, they can all get diseases from mosquitoes too. So, if these bugs are so dastardly, why don't we just get rid of them? We are humans after all, and we're pretty good at getting rid of species. Well, it's not quite so simple. Getting rid of the mosquito removes a food source for lots of organisms, like frogs and fish and birds. Without them, plants would lose a pollinator. But some scientists say that mosquitos aren't actually all that important. If we got rid of them, they argue, another species would simply take their place and we'd probably have far fewer deaths from malaria. The problem is that nobody knows what would happen if we killed off all the mosquitos. Something better might take their spot or perhaps something even worse. The question is, are we willing to take that risk? (Buzzing)

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翻译人员: Peipei Xiang 校对人员: Yue Cao地球上最可恶的虫子是什么？你可能会说马蝇，或者黄蜂，但是对很多人来说，最可恶的莫过于蚊子。它的嗡嗡声，它会咬人，它带来的奇痒无比，蚊子是这个世界上最遭人恨的害虫之一。蚊子是这个世界上最遭人恨的害虫之一。在阿拉斯加，成群的蚊子之密密麻麻甚至可以使驯鹿窒息。而由蚊子导致的疾病每年都会夺去数百万人的性命。给我们带来诸多烦恼的蚊子并非什么新物种。蚊子已经存在了超过一亿年，蚊子已经存在了超过一亿年，在这个过程中，它跟其他各种各样的物种一起共同进化， 其中也包括我们人类。在这个过程中，它跟其他各种各样的物种一起共同进化， 其中也包括我们人类。在这个过程中，它跟其他各种各样的物种一起共同进化， 其中也包括我们人类。地球上存在着数千种蚊子，地球上存在着数千种蚊子，不过它们都有一个共同的邪恶特征：它们吸血，而且它们非常、非常擅长吸血。看看它们是怎样做的吧。找到落脚点之后，首先它会在受害者的皮肤表面涂上大量的唾液，这些唾液起到防腐剂的作用，它可以麻醉即将被叮咬的部位而使我们毫无知觉。对了，这些唾液也正是被蚊子咬过之后 会起又痒又红的肿块的原因。接着，它用它锯齿状的颚在你的皮肤上戳出一个小破口，以便它可以用吻管探测周围，以便它可以用吻管探测周围，来寻找血管。当它找到的时候，这个幸运的“食客”可以吸取达到它的身体重量两到三倍的血液。当然，我们非常不喜欢被蚊子叮。事实上，我们人类如此痛恨蚊子，全世界花费数十亿美元，来使它们能离我们远远的——从香茅油驱蚊蜡烛，到除虫喷雾，到高强度的农业杀虫剂。这不仅仅是因为蚊子非常烦人，也因为它们还可以致命。蚊子可以传播各种疾病，包括疟疾，黄热病，西尼罗河病毒，登革热。全球每年有超过100万人死于由蚊子传播的疾病，而这只是人类。马，狗，猫，它们也会感染蚊子传播的疾病。那么，既然这些蚊子如此邪恶，为什么我们不把它们彻底消灭呢？毕竟我们是人类啊，我们很擅长让物种灭绝。可是事情并没有那么简单。消灭蚊子也意味着消灭很多物种的食物来源，也意味着消灭很多物种的食物来源，比如青蛙、鱼，还有鸟。没有了蚊子，植物会少掉一个授粉者。不过也有些科学家说，蚊子其实没有那么重要。他们说，如果我们消灭了蚊子，其他一些物种可以轻易地取代它们的位置，而疟疾导致死亡的人数会大幅下降。但问题是，没有人知道灭绝蚊子后会发生什么。没有人知道灭绝蚊子后会发生什么。也许更好的物种会取代它们的位置，但也可能是更糟糕的物种。问题是，我们愿意冒这个险吗？

**P22 2013-12-06 From DNA to Silly Putty, the diverse world of polymers - Jan Mattingl**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=22)

What do silk, DNA, wood, balloons, and Silly Putty all have in common? They're polymers. Polymers are such a big part of our lives that it's virtually impossible to imagine a world without them, but what the heck are they? Polymers are large molecules made of small units called monomers linked together like the railroad cars from a train. Poly means many, and mono means one, and mers or mero means parts. Many polymers are made by repeating the same small monomer over and over again while others are made from two monomers linked in a pattern. All living things are made of polymers. Some of the organic molecules in organisms are small and simple, having only one of a few functional groups. Others, especially those that play structural roles or store genetic information, are macromolecules. In many cases, these macromolecules are polymers. For example, complex carbohydrates are polymers of simple sugars, proteins are polymers of amino acids, and nucleic acids, DNA and RNA, which contain our genetic information, are polymers of nucleotides. Trees and plants are made of the polymer cellulose. It's the tough stuff you find in bark and stems. Feathers, fur, hair, and fingernails are made up of the protein keratin, also a polymer. It doesn't stop there. Did you know that the exoskeletons of the largest phylum in the animal kingdom, the arthropods, are made of the polymer chitin? Polymers also form the basis for synthetic fibers, rubbers, and plastics. All synthetic polymers are derived from petroleum oil and manufactured through chemical reactions. The two most common types of reactions used to make polymers are addition reactions and condensation reactions. In addition reactions, monomers simply add together to form the polymer. The process starts with a free radical, a species with an unpaired electron. The free radical attacks and breaks the bonds to form new bonds. This process repeats over and over to create a long-chained polymer. In condensation reactions, a small molecule, such as water, is produced with each chain-extending reaction. The first synthetic polymers were created by accident as by-products of various chemical reactions. Thinking they were useless, chemists mostly discarded them. Finally, one named Leo Baekeland decided maybe his useless by-product wasn't so useless after all. His work resulted in a plastic that could be permanently squished into a shape using pressure and high temperatures. Since the name of this plastic, polyoxybenzylmethylenglycolanhydride, wasn't very catchy, advertisers called it Bakelite. Bakelite was made into telephones, children's toys, and insulators for electrical devices. With its development in 1907, the plastics industry exploded. One other familiar polymer, Silly Putty, was also invented by accident. During World War II, the United States was in desperate need of synthetic rubber to support the military. A team of chemists at General Electric attempted to create one but ended up with a gooey, soft putty. It wasn't a good rubber substitute, but it did have one strange quality: it appeared to be extremely bouncy. Silly Putty was born! Synthetic polymers have changed the world. Think about it. Could you imagine getting through a single day without using plastic? But polymers aren't all good. Styrofoam, for example, is made mainly of styrene, which has been identified as a possible carcinogen by the Environmental Protection Agency. As Styrofoam products are being made, or as they slowly deteriorate in landfills or the ocean, they can release toxic styrene into the environment. In addition, plastics that are created by addition polymerization reactions, like Styrofoam, plastic bags, and PVC, are built to be durable and food-safe, but that means that they don't break down in the environment. Millions of tons of plastics are dumped into landfills every year. This plastic doesn't biodegrade, it just breaks down into smaller and smaller pieces, affecting marine life and eventually making their way back to humans. Polymers can be soft or hard, squishy or solid, fragile or strong. The huge variation between means they can form an incredibly diverse array of substances, from DNA to nylon stockings. Polymers are so useful that we've grown to depend on them every day. But some are littering our oceans, cities, and waterways with effects on our health that we're only beginning to understand.

**P22 2013-12-06 From DNA to Silly Putty, the diverse world of polymers - Jan Mattingl**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=22)

翻译人员: Xiaoyu Ye 校对人员: Mingyu Cui丝绸，DNA，木材，气球，和橡皮泥有什么共同点？它们都是高分子聚合物(polymer)，简称高聚物。高聚物是生活中一个十分重要的部分，没有高聚物的世界是不可想象的。但它们到底是什么？高分子聚合物是大分子物质，由单分子物质(monomer)聚合而成，连接起来像是一节节车厢连成火车。它的英文中“Poly”的意思是多，“mono”意思是单，“mers”或“mero”是“一部分”的意思。许多高聚物由相同单分子物质重复形成，有的由两种单分子按照一定模式连接。所有生物都由高分子聚合物组成。有些生物体内的有机物小而简，只有很少一些功能单元。其它功能，尤其作为结构功能或保存基因信息的单元，都是大分子物质。大部分情况下这些大分子都是高聚物。举个例子，复杂的碳水化合物都是简单糖类的高分子聚合；蛋白质是氨基酸的高分子聚合；核酸，包括脱氧核糖核酸以及核糖核酸，它们包含了我们的遗传信息，是核苷酸的高分子聚合形式。树木等等植物是由高聚物纤维素组成，它们是树皮和茎的坚硬组分。羽毛，毛皮，毛发，以及指甲，都由同一种蛋白质角蛋白组成，它也是种高聚物。还有更多类似的例子：你知道在动物学中最大的门的动物的外骨骼节肢动物的外骨骼，是由高聚物几丁质组成的吗？高分子聚合物还包括了合成纤维，合成橡胶以及塑料。所有合成的高聚物都源于石油，通过一系列化学反应合成。最常见的两种用来制造高聚物的反应是加成反应和缩聚反应。在加成反应中，单分子简单的加在一起形成高聚物。过程从产生一个自由基开始，自由基是带有一个未成对电子的基团。自由基攻击其它基团，断开化学键以形成新键。这个过程不断重复，逐渐形成了长链高聚物。在缩聚反应中，小分子比如水分子，将经过每一个链延伸反应。第一个合成高聚物是偶然间创造出来的，它是几个化学反应的副产物。那时候许多化学家认为它们没用，大部分就丢弃了。直到有个化学家利奥・贝克兰德认为也许这没用的副产物并非一无是处。他研究下去并制造了一种塑料，可以永久地形成任何一种形状，只要有足够的压力和高温。然而这种塑料的名字，polyoxybenzylmethylenglycolanhydride太长了，商人们把它称作贝克莱特（酚醛塑料）。这种塑料后来制成了电话，儿童玩具，以及电子产品的绝缘体。自从1907年发现了它，塑料工业发生了爆炸式发展。另外一种熟悉的高聚物，橡皮泥，也是偶然发明的。在第二次世界大战中，美国十分迫切的需要合成橡胶来支持军队。通用电气公司的一队化学家曾尝试制造，但最终只得到了一种软黏的油泥。它并不能作为橡胶的好替代物，但它的确有一个奇怪的特性：它的弹性十分优良。橡皮泥诞生了！合成高聚物已经改变了整个世界。想想看，你能想象有这么一天不使用任何塑料吗？但不是所有高聚物都是好的。举个例子，泡沫塑料主要由苯乙烯合成，而苯乙烯被环保部认定为一种潜在致癌物。随着泡沫塑料的生产，它们缓慢的使得土壤和海水恶化，它们会释放苯乙烯到环境中。此外，塑料由加聚反应产生，比如泡沫塑料，塑料袋，聚氯乙烯材料，它们能长久保存且不污染食物。但这同样意味着它们在自然环境中不会自行分解。每年成千上万吨的塑料被丢弃到土壤中。这些塑料不会生物降解，它们只会分解成较小的碎片，影响海洋生物，最终伤害到人类。高聚物可软可硬，可湿软可坚固，可脆弱可强硬。这些巨大的差异意味着它们能形成极其广泛的不同种物质，从DNA到尼龙丝袜，高聚物十分重要，以至于我们每天都十分依赖。但有些正在污染我们的海洋，城市，以及水源，最终威胁到我们的健康。而这一点我们才刚刚理解。

**P23 2013-12-10 The death of the universe - Renée Hlozek**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=23)

Looking up at the night sky, we are amazed by how it seems to go on forever. But what will the sky look like billions of years from now? A particular type of scientist, called a cosmologist, spends her time thinking about that very question. The end of the universe is intimately linked to what the universe contains. Over 100 years ago, Einstein developed the Theory of General Relativity, formed of equations that help us understand the relationship between what a universe is made of and its shape. It turns out that the universe could be curved like a ball or sphere. We call this positively curved or closed. Or it could be shaped like a saddle. We call this negatively curved or open. Or it could be flat. And that shape determines how the universe will live and die. We now know that the universe is very close to flat. However, the components of the universe can still affect its eventual fate. We can predict how the universe will change with time if we measure the amounts or energy densities of the various components in the universe today. So, what is the universe made of? The universe contains all the things that we can see, like stars, gas, and planets. We call these things ordinary or baryonic matter. Even though we see them all around us, the total energy density of these components is actually very small, around 5% of the total energy of the universe. So, now let's talk about what the other 95% is. Just under 27% of the rest of the energy density of the universe is made up of what we call dark matter. Dark matter is only very weakly interacting with light, which means it doesn't shine or reflect light in the way that stars and planets do, but, in every other way, it behaves like ordinary matter -- it attracts things gravitationally. In fact, the only way we can detect this dark matter is through this gravitational interaction, how things orbit around it and how it bends light as it curves the space around it. We have yet to discover a dark matter particle, but scientists all over the world are searching for this elusive particle or particles and the effects of dark matter on the universe. But this still doesn't add up to 100%. The remaining 68% of the energy density of the universe is made up of dark energy, which is even more mysterious than dark matter. This dark energy doesn't behave like any other substance we know at all and acts more like anti-gravity force. We say that it has a gravitational pressure, which ordinary matter and dark matter do not. Instead of pulling the universe together, as we would expect gravity to do, the universe appears to be expanding apart at an ever-increasing rate. The leading idea for dark energy is that it is a cosmological constant. That means it has the strange property that it expands as the volume of space increases to keep its energy density constant. So, as the universe expands as it is doing right now, there will be more and more dark energy. Dark matter and baryonic matter, on the other hand, don't expand with the universe and become more diluted. Because of this property of the cosmological constant, the future universe will be more and more dominated by dark energy, becoming colder and colder and expanding faster and faster. Eventually, the universe will run out of gas to form stars, and the stars themselves will run out of fuel and burn out, leaving the universe with only black holes in it. Given enough time, even these black holes will evaporate, leaving a universe that is completely cold and empty. That is what we call the heat death of the universe. While it might sound depressing living in a universe that will end its lifetime cold and devoid of life, the end fate of our universe actually has a beautiful symmetry to its hot, fiery beginning. We call the accelerating end state of the universe a de Sitter phase, named after the Dutch mathematician Willem de Sitter. However, we also believe that the universe had another phase of de Sitter expansion in the earliest times of its life. We call this early period inflation, where, shortly after the Big Bang, the universe expanded extremely fast for a brief period. So, the universe will end in much the same state as it began, accelerating. We live at an extraordinary time in the life of the universe where we can start to understand the universe's journey and view a history that plays itself out on the sky for all of us to see.

**P23 2013-12-10 The death of the universe - Renée Hlozek**

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翻译人员: Minglei Wang 校对人员: Bighead Ge仰望夜空，我们为其永无止境的广阔而感到惊讶。然而数十亿年前的天空又会是什么样子的呢 ？有一种科学家，被称为宇宙学家，她们就专门思考这样的问题。宇宙的尽头与其自身的构成有着密切的联系。一百多年前，爱因斯坦提出了广义相对论，帮助我们以方程的形式来理解宇宙的组成和其形状之间的关系。结果表明宇宙可能是呈球状或半球状的曲线。我们称之为正弯曲或正关闭。或者它也可能呈马鞍形。我们称之为负弯曲或负开放。又或者它也可能是扁平状。这样不同的形状决定着宇宙将会怎样存在和灭亡。如今我们认为宇宙最接近扁平状。然而组成宇宙的各个部分同时也会影响其最终的命运。我们能够预测宇宙如何随着时间而发生改变，这需要我们对目前组成宇宙的各要素的数量及其能量密度进行测量。那么，宇宙是由什么构成的呢？宇宙中包含着我们肉眼所能看到的一切，比如恒星、气体和行星。我们称这些为普通物质或重子物质。尽管它们就在我们的周围，但这些组成部分的总能量密度却十分渺小，它们仅占整个宇宙总能量的5%左右。那么现在我们就来探讨组成宇宙另外95%的部分是什么。其他近27%的宇宙能量密度是由暗物质构成的。暗物质与光的相互作用很弱，也就是说暗物质本身并不发射或反射光线，这与其他恒星和恒星不同，但从其它方面来讲，暗物质与普通物质是相似的—暗物质通过重力吸引物体。事实上，我们唯一能够探测暗物质的方法就是通过暗物质与其它物质的重力相互作用，比如物体如何围绕暗物质运行或暗物质如何扭曲光线使其周围空间呈显曲线状。目前我们还没能发现一块暗物质颗粒，但全世界的科学家们都在探索这个或这些神秘的物质以及它对宇宙所产生的影响。可是这样的组成结构还是未能达到100%。剩余68%的宇宙能量密度来自于暗能量，这种物质比暗物质更加神秘。这种暗能量的性质与我们所熟知的其他物质完全不同它更像是反重力。暗能量具有一种重力压力，这是普通物质和暗物质所不具有的。宇宙并没有因为重力而向一起聚集，这与我们所预想的不同，相反宇宙却似乎是在不断膨胀，并且这种膨胀还处于一种持续增长的速度。有关暗能量的主导观点认为它是一个宇宙常量。那意味着暗能量具有一种特殊属性，它能够使暗能量随着宇宙体积的增长而扩大，从而使其能量密度保持不变。因此，随着宇宙不断膨胀，正如此时此刻，暗能量也会随之不断增长。然而暗物质和重子物质，从另一方面来看，则不会随宇宙而增长反而他们会不断地减弱。因此，由于宇宙常量所具有的性质，未来的宇宙中更多充斥的将是暗能量，宇宙将会变得越来越冷其膨胀速度也会越来越快。最终，宇宙将会由于缺少气体而无法形成恒星，同时恒星自身也会燃烧殆尽，宇宙中留下的只会是一个个黑洞。如果经历足够的时间，即使是这些黑洞也会消失，那时宇宙将会是一片寒冷空虚。那就是我们所说的宇宙热寂说。尽管这听起来让人觉得生活在宇宙之中十分沮丧，因为它将在寒冷和了无生气中走向灭亡，但宇宙最终冰冷的消亡却完美地与其火热的发端相称。我们称宇宙的加速最终状态为德西特阶段，这是根据荷兰数学家威廉·德西特命名的。然而，我们也相信宇宙还存在另一个德西特膨胀阶段，它发生在宇宙形成的初期。我们称其为早期膨胀阶段，那是在大爆炸后，宇宙急速膨胀的短暂时期。因此宇宙将会以与其产生时相同的状态结束，加速。我们生活在一个对于宇宙生命来讲意义非凡的时代，在在这样的时代我们能够去了解宇宙的历程，同时也能够去了解它那呈现在天空中为我们每个人所展示的历史。

**P24 2013-12-11 My glacier cave discoveries - Eddy Cartaya**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=24)

So how many of you have ever been in a cave before? Okay, a few of you. When you think of a cave, most of you think of a tunnel going through solid rock. In fact, that's how most caves are. Around this half of the country, most of your caves are made of limestone. Back where I'm from, most of our caves are made from lava rock because we have a lot of volcanoes out there. But the caves I want to share with you today are made completely of ice, specifically glacier ice as formed in the side of the tallest mountain in the state of Oregon called Mount Hood. Now, Mount Hood's only one hour's drive from Portland, the largest city in Oregon where over two million people live. Now, the most exciting thing for a cave explorer is to find a new cave and be the first human to ever go into it. The second most exciting thing for a cave explorer is to be the first one to make a map of a cave. Now, these days, with so many people hiking around, it's pretty hard to find a new cave, so you can imagine how excited we were to find three new caves within sight of Oregon's largest city and realize that they have never been explored or mapped before. It was kind of like being an astronaut because we were getting to see things and go places that no one had ever seen or gone before. So, what is a glacier? Well, those of you that have ever seen or touched snow, you know that it's really light because it's just a bunch of tiny ice crystals clumped together and it's mostly air. If you squish a handful of snow to make a snowball, it gets really small, hard, and dense. Well, in a mountain like Hood where it snows over twenty feet a year, it crushes the air out of it and gradually forms it into hard, blue ice. Now, each year more and more ice stacks up on top of it and eventually gets so heavy that it starts to slide down the mountain under its own weight, forming a slow-moving river of ice. When an ice pack like that starts to move, we call it a glacier and we give it a name. The name of the glacier these caves were formed is the Sandy Glacier. Now, each year as new snow lands on the glacier, it melts in the summer sun, and it forms little rivers of water on the flow along the ice and they start to melt and bore their way down through the glacier, forming big networks of caves, sometimes going all the way down to the underlying bedrock. Now, the crazy thing about glacier caves is that each year new tunnels form, different waterfalls pop up or move around from place to place inside the cave. Warm water from the top of the ice is boring its way down, and warm air from below the mountain actually rises up, gets into the cave, and melts the ceilings back taller and taller. But the weirdest thing about glacier caves is that the entire cave is moving because it's formed inside a block of ice the size of a small city that's slowly sliding down the mountain. Now, this is Brent McGregor, my cave exploration partner. He and I have both been exploring caves a long time and we've been climbing mountains a long time, but neither of us have ever really explored a glacier cave before. Back in 2011, Brent saw a YouTube video of a couple of hikers that stumbled across the entrance to one of these caves. There were no GPS coordinates for it, and all we knew was that it was somewhere out on the Sandy Glacier. So, in July of that year, we went out on the glacier, and we found a big crack in the ice. We had to build snow and ice anchors, so we could tie off ropes and repel down into the hole. This is me looking into the entrance crevasse. At the end of this hole, we found a huge tunnel going right up the mountain underneath thousands of tons of glacier ice. We followed this cave back for about a half mile until it came to an end. And then with the help of our survey tools, we made a three-dimensional map of the cave on our way back out. So, how do you map a cave? Well, cave maps aren't like trail maps or road maps because they have pits and holes going to overlapping levels. To make a cave map, you have to set up survey stations every few feet inside the cave, and you use a laser to measure the distance between those stations. And you use a compass and an inclinometer to measure the direction the cave is headed and measure the slope of the floor and the ceilings. Now, those of you taking trigonometry, that particular type of math is very useful for making maps like this because it allows you to measure heights and distances without actually having to go there. In fact, the more I mapped and studied caves, the more useful I found all that math that I originally hated in school to be. So, when you're done surveying, you take all this data, you punch it into the computer, and you find someone that can draw really well, and you have them draft up a map that looks something like this. And it will show you both a bird's eye view of the passage as well as a profile view of the passage, kind of like an ant farm view. We named this cave Snow Dragon Cave because it was like a big dragon sleeping under the snow. Now, later this summer as more snow melted off the glacier, we found more caves, and we realized they were all connected. Not long after we mapped Snow Dragon, Brent discovered this new cave not very far away. The inside of it was coated with ice so we had to wear big spikes in our feet called crampons, so we could walk around without slipping. This cave was amazing! The ice in the ceiling was glowing blue and green because the sunlight from far above was shining through the ice and lighting it all up. Now, we couldn't understand why this cave was so much colder than Snow Dragon until we got to the end, and we found out why. There was a huge pit or shaft called a moulin going a 130 feet straight up to the surface of the glacier. Cold air from the top of the mountain was flowing down this hole, blasting through the cave, freezing everything inside of it. And we were so excited about finding this new pit, we actually came back in January the following year so we could be the first ones to explore it. It was so cold outside, we actually had to sleep inside the cave. Here's our camp on the left side of this entrance room. The next morning we climbed out of the cave and hiked all the way to the top of the glacier where we finally rigged and repelled this pit for the very first time. Brent named this cave Pure Imagination, I think, because the beautiful sights we saw in there were beyond what we could have ever imagined. So, besides really cool ice, what else is inside these caves? Well, not too much lives in them because they're so cold, and the entrance is actually covered up with snow for about eight months of the year, but there are some really cool things in there. There's weird bacteria living in the water that actually eat and digest rocks to make their own food to live under this ice. In fact, this past summer scientists collected samples of water and ice specifically to see if things called extremophiles, tiny lifeforms that have evolved to live in a completely hostile conditions, might be living under the ice, kind of like what they hope to find in the polar ice caps of Mars some day. Another really cool thing is that as seeds and birds land on the surface of the glacier and die, they get buried in the snow and gradually become part of the glacier, sinking deeper and deeper into the ice. As these caves form and melt their way up into the ice, they make these artifacts rain down from the ceiling and fall into the cave floor where we end up finding them. For example, this is a nodal first seed we found. It's been frozen in ice for over a hundred years, and it's just now starting to sprout. This mallard duck feather was found over 1800 feet in the back of Snow Dragon Cave. This duck died on the surface of the glacier long, long ago, and its feathers have finally made it down through over a hundred feet of ice before falling inside the cave. And this beautiful quartz crystal was also found in the back of Snow Dragon. Even now Brent and I find it hard to believe that all these discoveries were essentially in our own backyard, hidden away just waiting to be found. Like I said earlier, the idea of discovery in this busy world we live in kind of seems like something you can only do with space travel now, but that's not true. Every year new caves get discovered that no one has ever been in before. So, it's actually not too late for one of you to become a discoverer yourself. You just have to be willing to look and go where people don't often go and focus your eyes and your mind to recognize the discovery when you see it because it might be in your own backyard. Thank you very much.

**P24 2013-12-11 My glacier cave discoveries - Eddy Cartaya**

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翻译人员: shuishui yu 校对人员: QI YU在座的各位有谁曾经去过洞穴呢？好吧，有几个当提到洞穴的时候，大多数人想到的是一个穿过坚硬岩石的隧道的确，大多数洞穴是这样的在这国家大多数的洞穴都是由石灰岩构成的而在我的家乡大多数洞穴是由火山岩构成的因为在那儿有很多火山但今天我想要和大家展示的洞穴，却完全是由冰构成的确切的说是由形成于俄勒冈州的最高山-胡德山的冰川构成胡德山距波特兰市仅一个小时车程波特兰是俄勒冈州最大的城市有200多万人口对洞穴探险者来说，最令人兴奋的事情就是，发现一个新的洞穴，并且成为第一个踏进这个洞穴的人第二件令人兴奋的事是，成为第一个绘制洞穴地图的人但现在这年头大家都喜欢到处探险要找到一个新的洞穴还是挺难的所以可想而知，当我们在波特兰这个俄勒冈州最大城市的范围内找到了三个新洞穴，并且意识到从未有人进去勘察或者绘制过地图时，我们有多么的兴奋了！这有点像在做宇航员在做的事因为我们能够亲眼看到人所未见并且踏足于人所为止的地方那到底什么是冰川呢？见过或者摸过雪的人都知道，雪花非常轻因为它们只是由一些微小的冰晶聚合在一起，而其中大部分都是空气如果你把一团雪用力揉成一个雪球，它会变的又小又硬，密度很大在胡德山，每年会有大概超过20英尺的降雪这么厚的雪层层堆积，由于重力关系，雪中的空气都被挤压出去逐渐形成了坚硬的蓝色冰层这样年复一年，冰层层叠加这些冰变得越来越重最终由于自身重力的原因，滑下山去形成了缓慢移动的冰河当大量的冰像这样开始移动的时候，被称之为“冰川”通常我们会为这些冰川取个名字我们这次发现洞穴的冰川，就叫做”桑迪冰川”（该冰川为桑迪河支流Muddy Fork的源头）每年冰川上都会有新的降雪这些降雪在夏日时融化，在冰层表面形成了细流这些小水流融化并渗入到冰川下从而形成了巨大的洞穴网络有时甚至能一路流到冰川底部的基岩（基层：位于松软的风化层底部的完整岩石）关于冰川洞穴非常奇特的事情就是，每年都有新的洞穴通道形成，各种不同的水流会出现甚至会在洞穴的不同地方移动较温暖的水从冰层顶部一路向下流动而热空气却从山底上升进到洞穴中，从而使得洞穴顶部的冰逐渐融化洞穴变得越来越高而最不可思议的事是，整个冰穴会发生移动因为它处于一整块冰块中而这个近似于小城市大小的冰块会慢慢滑下山底这是布伦特·麦格雷戈我的洞穴探险伙伴我们两个都有很长一段探险洞穴的经历并且也有丰富的爬山经验但我们在此之前从来都没有探险过冰穴2011年的时候，布伦特在油管上看到一段几个探险者的视频他们意外发现了一个洞穴的入口视频里并没有显示该洞穴的地理坐标我们只知道那洞穴位于桑迪冰川的某处所以那年七月我们便出发前往桑迪冰川我们在冰上发现了一条巨大的裂缝我们只能先固定好冰雪锚，再把绳子固定在锚上从而借助绳子进入到洞里这是从裂缝入口朝里看的样子在这洞穴的底部我们发现了一个巨大的通道它正好位于山体内，上方是成千上万吨的冰川我们沿着洞穴走了大概800米到达尽头借助勘测工具我们从洞穴由内朝外的方向，为这个洞穴绘制了一张三维地图那如何绘制一张洞穴地图呢？洞穴地图不同于路线图或者道路图因为它们有重重叠叠的坑或者孔洞绘制一张洞穴图需要先在洞穴里每隔几米设定一个勘测点然后用激光发射器测量两个勘测点的距离之后利用指南针和倾斜仪测量洞穴的朝向，以及地表和顶部的倾斜的角度三角测量法便在其中派上用场了因为你可以通过计算得出高度和距离，却不用爬上爬下，拉根卷尺到想要测的点实际上，在我绘制和研究越来越多的洞穴地图时我越发觉得数学是如此的实用！虽然我曾经在学校时很讨厌它那么，勘测时获得的所有数据被一个一个输入到电脑中画图的专业人士再通过这些数据把地图绘制出来像这样这张图同时展示了过道的鸟瞰图以及侧视图看上去有点像一个蚂蚁农场我们把这个洞穴命名为雪龙穴（Snow Dragon）因为它真的很像一只沉睡在积雪下的大龙这个夏天晚些时候当更多的积雪融化后我们发现了更多的洞穴从而我们意识到，这些洞穴都是联通的在我们绘制了雪龙穴地图不久之后布伦特在雪龙穴不远处发现了一个新的洞穴这个新发现的洞穴内部全部被冰覆盖着所以我们得穿上的用于攀岩的钉鞋这样走在冰上才不至于滑倒这个洞穴的景观令人叹为观止！洞顶部的冰闪耀着蓝色和绿色的光芒这是由于外界太阳光穿过冰层时，可见光中大部分光都被吸收只有蓝色和绿色的光能透过冰层，到达我们眼前一开始我们很疑惑为什么这个洞穴比雪龙穴还要冷很多直到我们走到洞穴的尽头才发现那有一个超级大的深坑，它被称之为“冰川锅穴”它距离冰川表层大约有40米深冷空气从山顶流入这个坑洞流经整个洞穴把洞里所有的东西都冻上了发现这个坑穴令我们激动不已因此我们决定明年一月再回到这那样我们便能成为第一个发现并探测它的人由于洞穴外面实在太冷我们不得不在洞穴里面过夜并把营扎在洞穴入口的左侧第二天时我们爬出这个洞穴并一路爬上了冰川顶部然后安装好攀爬设备，借助绳索首次进入坑穴中布伦特把这个洞穴称为“纯净想象”我想是因为内部的景致美得超出了我们的想象那么除了冰冻的冰外，这些洞穴里还有什么呢？实际上并没有什么生物生活在那里因为实在太冷了而且每年将近有八个月的时间，洞穴都是被白雪覆盖的但我们确实发现了一些非常酷的生物有一种神奇的细菌能生活在水里它们通过分解岩石来供能，而从能生存在冰层下这个夏天一些科研工作者采集了洞穴里水和冰的样品主要就是为了研究其中存在的极端微生物一种进化成了能在非常恶劣的环境里生存的物种也许生存在冰层下的这种细菌，会是科研工作者们所希望发现的，类似于可能在火星极地冰盖里生存的生物另外一件有趣的事情是，落在冰川层上的种子和鸟类死亡后被埋在雪里并逐渐成为冰川的一部分，越埋越深当这些洞穴逐渐形成顶部的冰开始融化埋藏在冰层里的几百上千年前的生物残骸便像雨一样从洞顶落到地面我们就是这样在洞里发现它们的比如这是我们发现的一个多节种子它已经在冰里埋藏了上百年近期才开始发芽而这根野鸭羽毛是在雪龙穴背后500多米处被发现的这只野鸭是很久很久以前在冰川表面死亡的它的羽毛在落入这个洞穴前，已经逐渐埋入几百米深的冰层里我们还在雪龙穴里发现这块漂亮的石英晶体直到现在，布伦特和我都很难相信这些奇妙的发现就在我们身边只是比较隐蔽，还等着我们去发现像我之前说的在我们这个忙忙碌碌的世界里，“发现”的意义有点类似于太空旅行但这不是绝对的每年都有新的洞穴被发现所以说，对于我们每个人成为一个“发现者”从来都不晚你只要有兴趣去观察，去探访那些人迹罕至的地方聚精会神地去寻找发现因为它可能就在你的身边谢谢大家！

**P25 2013-12-16 The popularity, plight and poop of penguins - Dyan deNapoli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=25)

Penguins have long captured the imagination and the hearts of people the world over. But while popular culture depicts them as clumsy, adorable birds with endlessly abundant populations, the truth is that penguins are exceedingly graceful, often ornery, and their populations are in rapid free fall. Their real life situation is far more precarious than people think. And if current trends do not change, it may not be long before penguins can only be found in movies. There are many things about penguins that make them odd birds, so to speak. For one thing, they are one of the few bird species that cannot fly, having evolved from flight-capable birds about 60 million years ago. Surprisingly, their closest living relative is the albatross, a bird known for its enormous wingspan and extraordinary soaring abilities. It may seem strange that losing the ability to fly would be an evolutionary advantage, but the penguin's short, flipper-like wings and solid bones allow them to swim faster and dive deeper than any other bird on Earth, filling an ecological niche that no other bird can. Penguins inhabit the southern hemisphere, being one of the few bird species able to breed in the coldest environments. But contrary to popular belief, they are not restricted to cold regions nor are there any at the North Pole. In fact, only 4 of the 18 penguin species regularly live and breed in Antarctica. Most penguins live in subtemperate to temperate regions. And the Galapagos penguin even lives and breeds right near the equator off the coast of South America. They are also found in South Africa, Namibia, Australia, and New Zealand, as well as on a number of islands in the southern Atlantic, Pacific, Indian, and Antarctic Oceans. Although penguins spend 75% of their lives at sea, they must come to shore every year to reproduce and to molt their feathers. They do this in a variety of places, from the temporary ice sheets of the Antarctic to the beaches of South Africa and Namibia, to the rocky shores of subantarctic islands, to the craggy lava surfaces in the Galapagos. Different penguin species have different nesting practices. Some dig burrows into dirt, sand, or dried guano; some nest in tussock grasses; some build nests out of small rocks, sticks, and bones; while others don't build any nests at all. Although most penguins lay a clutch of two eggs, the two largest species, the King and the Emperor, lay a single egg that they incubate on top of their feet for approximately two months. Unfortunately, 15 of the 18 penguin species are currently listed as threatened, near-threatened, or endangered by the International Union for Conservation of Nature. In the last several decades, we have seen the world populations of most penguin species decline by up to 90%, with two of them, the Yellow-eyed and Galapagos penguins, down to just a few thousand birds. Penguins are an indicator species, the proverbial "canary in the coal mine." Simply put, if penguins are dying, it means our oceans are dying. And sadly, most of this decline is attributable to human activities. Historically, penguins have had to deal with multiple disturbances. The mass collection of penguin eggs and the harvesting of the seabird guano they nested in caused the dramatic decline of several penguin species. If you're wondering what humans would want with seabird poop, it was used as an ingredient in fertilizer and in gunpowder, being so valuable that in the 19th century, it was known as white gold. Current threats to penguins include the destruction of both marine and terrestrial habitats, introduced predators, entrapment in fishing nets, and pollution from plastics and chemicals. There have also been several large-scale oil spills over the past 50 years that have killed or impacted tens of thousands of penguins around the world. But the two major threats to penguins today are global warming and overfishing. Global warming impacts penguins in multiple ways, from interrupting the production of krill due to decreased sea ice formation in the Antarctic, to increasing the frequency and severity of storms that destroy nests, to shifting the cold water currents carrying the penguins' prey too far away from penguin breeding and foraging grounds. Even though humans may be the greatest threat to penguins, we are also their greatest hope. Many research and conservation projects are underway to protect penguin habitats and restore vulnerable populations. With a little help from us and some changes in the practices that impact our planet and oceans, there is hope that our tuxedo-clad friends will still be around in the next century.

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翻译人员: Minglei Wang 校对人员: Zhiting Chen长期以来，企鹅总是会引发全世界人们的想象并深深地吸引着他们的心。流行文化中，企鹅被描述为一种笨拙、可爱、并且数量庞大的鸟类，事实上企鹅十分优雅，时常脾气暴躁，同时它们的数量在急剧减少。它们所面临的危机远比我们所想的严重。如果现状无法改善，不久后，我们就只能从电影中看到企鹅了。企鹅具有很多可谓特殊鸟类的特质。首先，它们是少数不能飞行的鸟类之一，虽然它们在大约6千万年前曾经是具有飞行能力的鸟类惊奇的是，现存生物中与企鹅关系最近的是信天翁，这种鸟类以其巨大的翼展，和非凡的翱翔能力为人所熟知。这看来或许很奇怪，但失去飞行能力的确成为了一种进化优势，企鹅短小的鳍状翅膀和坚实的骨骼使它们能够比地球上其他鸟类游得更快、潜得更深，从而占据着自己独一无二的生态位。企鹅栖息在南半球，它们是少数能在严寒环境中繁衍的鸟类。但与普遍的观点相反，企鹅并非只能生活在寒冷的地域，同时它们也不生活在北极。事实上，在18种企鹅中，仅有4种固定在南极栖息繁衍。大部分企鹅生活在亚温带至温带地区。加拉帕斯群岛的企鹅甚至栖息繁衍于靠近赤道的南美洲海岸。它们还分布在南非、纳米比亚、澳大利亚、新西兰以及一些位于南大西洋、太平洋、印度洋和南大洋的岛屿上。尽管企鹅一生有75%的时间都生活在水中，但它们每年都必须上岸进行繁殖和换毛。它们在不同的地方完成这些事情：从南极的临时冰盖到南非和纳米比亚的海滩；从亚南极岛屿的岩岸再到加拉帕斯群岛上陡峭的熔岩表层。不同种类的企鹅有着不同的筑巢方式。有的在泥土、沙子或鸟粪上打洞；有的在草丛中筑巢；有的用小石块、树枝和骨头筑巢；还有的甚至根本不筑巢。尽管大多数企鹅每次产两枚蛋，但有两种最大的企鹅：国王和帝王企鹅，每次仅产一枚蛋，它们将蛋置于双脚上孵化，这个过程大约持续两个月。不幸的是，18种企鹅中的15种都已被列为受威胁、近受威胁或濒危物种，这是由世界环保组织所公布的。在过去的几十年中，我们看到世界上众多种类的企鹅数量都减少了近90%，其中的两种--黄眼企鹅和加拉帕斯企鹅的数量仅剩数千只。企鹅是指示物种，就好比“矿井里的金丝雀”一样。简言之，如果企鹅正在灭绝，那就意味我们即将失去海洋。可悲的是企鹅数量的减少大多归咎于人类的行为活动。从历史上看，企鹅长期受到各种干扰。人类大量采集企鹅蛋并收取它们筑巢所用的鸟粪，这使得多种企鹅数量骤减。你可能会问，人们挖取鸟粪有什么用呢？它曾被用作肥料和火药的原料，因此十分珍贵，在19世纪，它曾被称为白色黄金。目前企鹅所面临的威胁包括海洋和陆地栖息地的破坏、引进捕食者、渔网捕捞、以及塑料和化学污染问题。此外，许多大面积的漏油事件在过去的50年里扼杀或殃及了全世界数万只的企鹅。然而企鹅当前面临最大的威胁却是全球变暖和过度捕捞。全球变暖从不同方面影响着企鹅，从南极海冰减少导致磷虾的繁殖受阻；到加剧暴风雨的频率和强度，导致企鹅巢穴受损；再到改变冷水流走向，使企鹅的食物远离它们繁衍和觅食的范围。尽管人类或许是企鹅最大的威胁，我们同时也是他们最大的希望。很多研究和保护项目已经开始对企鹅栖息地进行保护并逐步恢复这珍贵的种群。只要我们献出一份帮助，改变生活中一些影响地球和海洋的行为，这些身着燕尾服的伙伴们将仍会伴随我们步入下一个世纪。

**P26 2013-12-16 The true story of 'true' - Gina Cooke**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=26)

Everyone knows that stories are made up of words, from short poems to epic novels. But did you know that a single word itself can tell an entire story? You see, just as we can look at a story's plot, setting, and characters, we can also study the history of an individual word, where it developed, and the cultures and people who helped shape it. Looking into the story of a word is like counting the rings of a tree. Newer words, like Google or cyborg, have shorter stories. But the older the word, the longer the story and the more it stands to reveal to us not only about itself, but about ourselves and our history. The oldest words in present-day English are those that come from Old English, the ancestor of our modern language whose first seeds were planted about 1500 years ago. Compared to languages like Greek or Chinese that date back thousands of years, English is just a sapling in the lexical forest. But the stories of its words often start long before English itself took root. One such word is the familiar word true, as in true stories. Let's take a look. True usually means factual, correct, or faithful to reality. It can also mean exact, properly positioned, upright, or straight. A true friend is loyal, reliable, faithful, and steadfast. The word true is a simple word, and we can add some affixes to grow its family tree with words like truer, truest, truly, truth, and untruth. But if we go in the other direction to look at the roots of true itself, we find even more relatives further up the family tree. The words trust, bethroth, and truce all derive from the same source as true, and these words all denote faithfulness or confidence. A thousand years ago, the word true looked and sounded different than it does today. In several Old English dialects, the word treow was a noun that meant good faith or trust, a pledge or a promise. But it also had another definition, tree, and that's no coincidence. If we trace the roots back even farther, we find that both meanings derive from a common origin, where some of the earliest expressions of the concept of truth were associated with the uprightness of an oak, the steadiness of a silver birch, and the fidelity of an orchard baring fruit year after year. This may sound like a stretch at first, but trees are the oldest living organisms on this planet. Some that would have been called treow long ago still stand today. The Fortingall Yew in Scotland is more than 2,000 years old. A Californian Bristlecone Pine is more than 5,000. And Utah's Pando-quaking Aspen Grove has a single root system that dates back more than 80 millennia. Trees have also held a sacred place in many cultures throughout history. The Celtic peoples who first inhabited the British Isles believed that trees housed deities. And, in fact, the ancient Druids take their name from the same ancient root as tree. Planting a tree is itself an act of faith and commitment. Not only are trees upright and prototypically straight, but they are actual, solid, and real, something you can see and touch. And they are as reliable and steadfast to us today as they were a millennium ago, nurturing us, sheltering us, and providing the pages of our books. Philosophers and poets, people in search of the truth, have often sought it in trees. "What did the tree learn from the Earth to be able to talk with the sky?" asked Pablo Neruda. "A tree falls the way it leans," says an old proverb. Just as trees mark our landscapes and witness our histories, the stories of words landscape our language, capturing the rains and sunshine of generations and sending roots and branches far and wide. As there is a whole orchard in a single seed, there is a whole story in a single word, and that's the truth.

**P26 2013-12-16 The true story of 'true' - Gina Cooke**

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翻译人员: Xuwen Zhu 校对人员: Zhiting Chen众所周知，故事是由词组成的，不管是短短的叙事诗还是长篇史诗小说。但是你知道吗有一个单词自己就有一个完整的故事。正如我们可以研究一个故事的情节，设置和人物，我们也可以研究一个单词的历史，看这个词如何演化以及在成形过程中起作用的文化和人。研究一个单词自己的故事就像数一棵树的年轮。新的单词，比如Google（谷歌）或cyborg(半机械人)，它们自己的故事很短。而一个单词的“年纪”越大，它的故事就越长，向我们展示的不光关于这个单词，还有关于我们自己和我们的历史 的信息，也越多。在当今英语的最古老的单词都来自古英语。古英语是我们现代语言的始祖起源于大约1500年前。相对于希腊语和中文这些历史长达几千年的语言，英语在语言森林里只是一棵小树苗。但英语单词的故事却早在英语发源之前就开始了。其中一个这样的词是我们熟悉的“真”(true)用法比如“真实的故事”(true stories).让我们来看一下。True通常指事实性的，正确的，或符合现实的。它也可以指精确，恰当放置的，正直，或笔直。“真正的朋友”(A true friend)是忠诚的，可靠，忠实，和坚定的。True是一个简单的词，我们可以添加一些词缀在这个词的家谱上造出更多衍生词比如“更真实”(truer)最真实（truest），真实地(truly)，事实（truth），以及虚假(untruth)。但如果我们反其道而行去追溯true这个词的根源，我们会在老家谱上找到更多亲戚。信任（trust），订婚（betroth），以及停战(truce)这些词都和true有一样的词源，都一样有着“忠诚”或“信任”的意味。一千年前，true这个词不管拼写还是发音都和今天很不一样。在几种古英语方言里，这个词treow是一个名词意思是忠诚的信仰，或者信任，是一种誓言或承诺。但它也有另外一层意思树而这并非巧合。如果我们追溯到更远的历史我们发现，这两个含义（诚信和树）来自一个相同的起源，在那里，一些有关“真实”这个概念的表述是和橡树的笔直，白桦树的稳固，以及年复一年生产水果的果园表现出的那种尽责联系在一起的。这乍听起来有些牵强，但别忘了，树是这个星球上最古老的生命体。一些当年会被人们称为treow的树今天仍然存在。苏格兰的福廷格尔红豆杉已经活了2000多年了。加州有一棵狐尾松有5000多岁。犹他州有一片山杨树林他们有一个共用的根系其历史可以追溯到八万多年前。历史上，树也在诸多文化中占有神圣的地位。凯尔特民族一开始居住在英伦三岛，他么相信树里居住着神。而事实上，古德鲁伊教的名字就来自于同样古老的树名。植树本身就是一种代表信仰和承诺的行为。不仅因为树木在形态上是向上而且通常是笔直的更因为它们如此真实而坚固，是你可以亲眼看到、亲手触摸的东西。而且，就和千年以前一样，树木始终那么可靠坚定，养育我们，庇护我们，以及贡献我们书本的纸张。哲学家和诗人，这些寻求真理的人，经常会从树木上去寻找（真理）。“树从土地里学到了什么东西让它能和天空交谈？”诗人巴勃罗·聂鲁达这样问道。“树倒的方向也是它倾斜的方向” （意为你的认知、信仰、向别人展示的态度 ，都可能会成为你的短板)这是一个古老的谚语。正如树木成就了我们的风景并见证我们的历史，单词的故事就是语言这幅风景画的树木，收集一代代人智慧的阳光雨露将根和枝叶伸得更远。就像一颗种子可以长成一个果园一个单词里也有一整个故事。真的。

**P27 2013-12-18 How do we smell - Rose Eveleth**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=27)

It's the first sense you use when you're born. One out of every fifty of your genes is dedicated to it. It must be important, right? Okay, take a deep breath through your nose. It's your sense of smell, and it's breathtakingly powerful. As an adult, you can distinguish about 10,000 different smells. Here's how your nose does it. Smell starts when you sniff molecules from the air into your nostrils. 95% of your nasal cavity is used just to filter that air before it hits your lungs. But at the very back of your nose is a region called the olfactory epithelium, a little patch of skin that's key to everything you smell. The olfactory epithelium has a layer of olfactory receptor cells, special neurons that sense smells, like the taste buds of your nose. When odor molecules hit the back of your nose, they get stuck in a layer of mucus covering the olfactory epithelium. As they dissolve, they bind to the olfactory receptor cells, which fire and send signals through the olfactory tract up to your brain. As a side note, you can tell a lot about how good an animal's sense of smell is by the size of its olfactory epithelium. A dog's olfactory epithelium is 20 times bigger than your puny human one. But there's still a lot we don't know about this little patch of cells, too. For example, our olfactory epithelium is pigmented, and scientists don't really know why. But how do you actually tell the difference between smells? It turns out that your brain has 40 million different olfactory receptor neurons, so odor A might trigger neurons 3, 427, and 988, and odor B might trigger neurons 8, 76, and 2,496,678. All of these different combinations let you detect a staggeringly broad array of smells. Olfactory neurons are always fresh and ready for action. They're the only neuron in the body that gets replaced regularly, every four to eight weeks. Once they are triggered, the signal travels through a bundle called the olfactory tract to destinations all over your brain, making stops in the amygdala, the thalamus, and the neocortex. This is different from how sight and sound are processed. Each of those signals goes first to a relay center in the middle of the cerebral hemisphere and then out to other regions of the brain. But smell, because it evolved before most of your other senses, takes a direct route to these different regions of the brain, where it can trigger your fight-or-flight response, help you recall memories, or make your mouth water. But even though we've all got the same physiological set-up, two nostrils and millions of olfactory neurons, not everybody smells the same things. One of the most famous examples of this is the ability to smell so-called "asparagus pee." For about a quarter of the population, urinating after eating asparagus means smelling a distinct odor. The other 75% of us don't notice. And this isn't the only case of smells differing from nose to nose. For some people, the chemical androstenone smells like vanilla; to others, it smells like sweaty urine, which is unfortunate because androstenone is commonly found in tasty things like pork. So with the sweaty urine smellers in mind, pork producers will castrate male pigs to stop them from making androstenone. The inability to smell a scent is called anosmia, and there are about 100 known examples. People with allicin anosmia can't smell garlic. Those with eugenol anosmia can't smell cloves. And some people can't smell anything at all. This kind of full anosmia could have several causes. Some people are born without a sense of smell. Others lose it after an accident or during an illness. If the olfactory epithelium gets swollen or infected, it can hamper your sense of smell, something you might have experienced when you were sick. Not being able to smell anything can mess with your other senses, too. Many people who can't smell at all also can't really taste the same way the rest of us do. It turns out that how something tastes is closely related to how it smells. As you chew your food, air is pushed up your nasal passage, carrying with it the smell of your food. Those scents hit your olfactory epithelium and tell your brain a lot about what you're eating. Without the ability to smell, you lose the ability to taste anything more complicated than the five tastes your taste buds can detect: sweet, salty, bitter, sour, and savory. So, the next time you smell exhaust fumes, salty sea air, or roast chicken, you'll know exactly how you've done it and, perhaps, be a little more thankful that you can.

**P27 2013-12-18 How do we smell - Rose Eveleth**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=27)

翻译人员: Rong Han 校对人员: Bighead Ge它是你出生时第一个使用的感觉。你每五十个基因之中就有一个用于它。它肯定很重要，对不对？好吧，做个深呼吸从你的鼻子吸气。它就是你的嗅觉，它的强大简直要让你倒吸一口凉气。一个成人可以区分出大约一万种不同的气味。你的鼻子是这样做到的：开始时你把空气中的分子从鼻孔吸入。你的鼻腔中95%的部分用来过滤刚吸入的空气然后这些空气才进入你的肺里。但是在你的鼻子的最后面有一个区域叫做嗅上皮，是一小块皮肤它是你能闻到东西的关键。嗅上皮是一层嗅觉受体细胞组成的，它们是一群能感觉到气味的特殊神经元就好像你鼻子里的味蕾。当气味分子撞到你的鼻子后部，他们就会被困在一层粘液里，这层粘液就盖在嗅上皮表面。气味分子被（粘液）溶解之后，就结合到嗅觉受体细胞上，这些细胞再产生和发送出信号通过嗅束传到你的大脑。一个题外话，你可以根据一种动物嗅上皮的大小来判断它的嗅觉有多好。狗的嗅上皮比人类的小小嗅上皮要大20倍。不过关于这一小群细胞我们还有很多不知道的呢。比如说，我们的嗅上皮是带色素的，科学家们还不知道这是为什么。但你究竟是如何区分不同的气味的呢？事实证明你的大脑里有4千万个不同的嗅觉受体神经元，所以 气味A可能会触发神经元 3、 427、 和 988，而气味 B 可能触发神经元 8、 76 和 2,496,678。所有这些不同的组合可以让你闻出多到惊人的各种气味。而且，你的嗅觉神经元总是精神抖擞并随时准备行动。他们是身体里唯一被定期更新的神经元，每四到八个星期更新一次。一旦这些神经元被触发，信号通过一束称为嗅束的线路传播直到遍布你的大脑里的它们目的地。信号会在扁桃体，丘脑和大脑皮层都有停留。这种传播方式和视觉及声音信号的处理方式不同。这些信号都先要到达一个中继中心，位于大脑半球的中央，然后再输出到大脑的其他区域。但是嗅觉，它比其他感官更早进化出来，它是通过一条直接的途径进入大脑的不同区域。它在这些区域可以触发你的战逃反应，帮助你回忆，或者让你流口水。但即使我们都有相同的生理结构，两个鼻孔和数以百万计的嗅觉神经元，不是每个人都能闻到同样的气味。这方面最著名的例子之一就是能够闻到所谓的&quot;芦笋尿&quot;。人群中大约四分之一的人，在吃了芦笋后排尿时，会嗅到一种特定的气味。而另外75%的人就闻不到。这还不是唯一一种不同的鼻子闻到不同的气味的例子。对某些人来说，化合物雄甾酮闻起来像香草 ；而对其他人来说，闻起来就像汗尿。这些人太不幸了，因为雄甾酮常见于猪肉这一类好吃的东西里。所以考虑到这些闻到汗尿味的人，猪肉生产商们会将公猪阉割，使它们不能产生雄甾酮。不能闻到某种气味被称为嗅觉障碍，大约已有100 个已知的例子。大蒜素嗅觉障碍的人闻不到大蒜味。丁香酚嗅觉障碍的人闻不到丁香味。有些人什么味也闻不到。这种完全性的嗅觉障碍可能有几个成因。有些人天生没有嗅觉，有些人在发生意外之后或患病期间失去嗅觉。如果嗅上皮肿涨或受了感染，会影响你的嗅觉。你可能已经在生病时有过这种经历。而且闻不到气味的时候，你的其他感官也会受到影响。很多闻不到任何味道的人尝到的味道也和我们不一样。其实东西吃起来的味道和它闻起来的味道是密切相关的。你咀嚼食物的时候，空气被推入你的鼻腔夹带着你的食物的味道。这些气味接触到你的嗅上皮，告诉你的大脑很多关于你在吃的东西的信息。如果不能闻，你也就不能品尝到任何比简单的五味复杂一点的味道了。你的味蕾可以尝到这五味：甜，咸，酸，苦，和薄荷味。所以下次你闻到尾气油烟，咸咸的海洋空气，或者烤鸡你就知道你到底是怎么闻到的了，而且，或许，对于你可以闻到味多一点点感激的心。

**P28 2013-12-24 Should we eat bugs - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=28)

[Why don't we eat bugs?] For centuries, people have consumed bugs, everything from beetles to caterpillars, locusts, grasshoppers, termites, and dragonflies. The practice even has a name: entomophagy. Early hunter-gatherers probably learned from animals that foraged for protein-rich insects and followed suit. As we evolved and bugs became part of our dietary tradition, they fulfilled the role of both staple food and delicacy. In ancient Greece, cicadas were considered luxury snacks. And even the Romans found beetle larvae to be scrumptious. Why have we lost our taste for bugs? The reason for our rejection is historical, and the story probably begins around 10,000 BC in the Fertile Crescent, a place in the Middle East that was a major birthplace of agriculture. Back then, our once-nomadic ancestors began to settle in the Crescent. And as they learned to farm crops and domesticate animals there, attitudes changed, rippling outwards towards Europe and the rest of the Western world. As farming took off, people might have spurned bugs as mere pests that destroyed their crops. Populations grew, and the West became urbanized, weakening connections with our foraging past. People simply forgot their bug-rich history. Today, for people not accustomed to entomophagy, bugs are just an irritant. They sting and bite and infest our food. We feel an "ick factor" associated with them and are disgusted by the prospect of cooking insects. Almost 2,000 insect species are turned into food, forming a big part of everyday diets for two billion people around the world. Countries in the tropics are the keenest consumers, because culturally, it's acceptable. Species in those regions are also large, diverse, and tend to congregate in groups or swarms that make them easy to harvest. Take Cambodia in Southeast Asia where huge tarantulas are gathered, fried, and sold in the marketplace. In southern Africa, the juicy mopane worm is a dietary staple, simmered in a spicy sauce or eaten dried and salted. And in Mexico, chopped jumiles are toasted with garlic, lemon, and salt. Bugs can be eaten whole to make up a meal or ground into flour, powder, and paste to add to food. But it's not all about taste. They're also healthy. In fact, scientists say entomophagy could be a cost-effective solution for developing countries that are food insecure. Insects can contain up to 80% protein, the body's vital building blocks, and are also high in energy-rich fat, fiber, and micronutrients like vitamins and minerals. Did you know that most edible insects contain the same amount or even more mineral iron than beef, making them a huge, untapped resource when you consider that iron deficiency is currently the most common nutritional problem in the world? The mealworm is another nutritious example. The yellow beetle larvae are native to America and easy to farm. They have a high vitamin content, loads of healthy minerals, and can contain up to 50% protein, almost as much as in an equivalent amount of beef. To cook, simply sauté in butter and salt or roast and drizzle with chocolate for a crunchy snack. What you have to overcome in "ick factor," you gain in nutrition and taste. Indeed, bugs can be delicious. Mealworms taste like roasted nuts. Locusts are similar to shrimp. Crickets, some people say, have an aroma of popcorn. Farming insects for food also has less environmental impact than livestock farms do because insects emit far less greenhouse gas and use up less space, water, and food. Socioeconomically, bug production could uplift people in developing countries since insect farms can be small scale, highly productive, and yet relatively inexpensive to keep. Insects can also be turned into more sustainable food for livestock and can be reared on organic waste, like vegetable peelings, that might otherwise just end up rotting in landfills. Feeling hungry yet? Faced with a plate of fried crickets, most people today would still recoil, imagining all those legs and feelers getting stuck between their teeth. But think of a lobster. It's pretty much just a giant insect with legs and feelers galore that was once regarded as an inferior, repulsive food. Now, lobster is a delicacy. Can the same paradigm shift happen for bugs? So, give it a try! Pop that insect into your mouth, and savor the crunch.

**P28 2013-12-24 Should we eat bugs - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=28)

翻译人员: Shi Tan 校对人员: Wenbo Li长时间以来人类都在食用各种虫子从甲虫到毛毛虫蝗虫蚱蜢白蚁再到蜻蜓这种用食习惯甚至还有个名字食虫性（ENTOMOPHAGY）早期的狩猎采集者们大概从动物那里学到了怎样寻找富含高蛋白的虫子并且也模仿了起来。随着人类的发展吃虫子变成了我们的饮食习惯，因为虫子既是日常可见的东西又很美味。在古希腊蝉被认为是很奢侈的美味。罗马人甚至发现甲虫幼虫十分可口。而现在，我们为什么丧失了对虫子的喜爱？这是有历史原因的大概要追溯到公元前一万年的肥沃月弯地区，它位于今天的中东地区是农业的主要发源地。在那时，我们游牧民族祖先曾经在肥沃月弯地区定居下来他们在那儿里，学会了怎样种植庄稼和怎样驯化野兽，于是人们换了一种生活方式并向欧洲拓展然后传到了整个西方世界当农业发展了起来人们意识到虫子只是毁坏庄家的害虫而当人口增加西方开始城镇化发展以后，使得我们与我们的祖先的游牧文化的联系越来越淡人们忘记了食用虫子的历史而现在，对于那些不习惯吃虫子的人虫子成了令人讨厌的东西。它们叮咬人类并且祸害庄稼看到虫子我们觉得“恶心”并且讨厌它们所烹调成的美味。大约已经有2000种昆虫被转化成了食物，对于世界上的二十亿人类来说这构成了他们日常饮食的很大一部分。热带国家的人们是最积极虫子的食用者因为对于他们的文化来说是可接受的。那些地区的虫子个头很大，多种多样并且喜欢聚成一大群使得他们更容易被捕获。就拿东南亚的柬埔寨来说大量狼蛛聚集在市场上炸来贩卖在非洲南部多汁的蝴蝶树虫是常见的可口食物，用一种辣口的调料来炖或者盐腌了吃。在墨西哥，剁碎的Jumiles（臭虫）用大蒜，柠檬和盐来烤着吃。虫子能够被整个食用或者被研磨成细粉粗粉或者糊状来加在食物里。虫子不只是好吃而且还营养事实上，科学家认为食虫性对那些食物没有保障的发展中国家来说能够变成一个省钱的有效途径。因为虫子含有80%的蛋白质蛋白质是身体的头等重要物质，虫子还富含高能量脂肪纤维和微量元素例如维他命和矿物质你知道吗？大部分可使用的虫子身体内含有和牛肉相同甚至更高的铁元素使得虫子成为了储量巨大，未经开发的资源尤其是缺铁是现在世界上最常见的营养难题。另一个有营养的例子是黄粉虫，这个黄色的甲虫幼虫源自于美国且容易饲养。它含有很高的维他命成分大量矿物质，还包含了高达50%的蛋白质，和基本和牛肉里蛋白质的含量是等量的。就烹饪方法来说，简单地用黄油和盐来炒或者烤了沾点巧克力就可以做成很酥软的点心这样看来，你为什么还要感到“恶心”呢你不但补充营养还享受到了美味。虫子的确是种舌尖上的美味。黄粉虫味道像坚果。蝗虫像虾。对于蟋蟀，有些人认为它有爆米花的芳香。大量饲养可食用的虫子比牲畜对环境的影响要小得多因为虫子释放更少的温室气体使用更少的空间，水，还有食物对于社会经济来说，虫子的生产能提高发展中国家人们的生活质量因为虫子养殖是小规模高产量，且相对来说管理费用低廉。虫子能够成为对牲畜来说更环保的食物而且能够用有机废物饲养像是蔬菜的皮不然蔬菜皮只能烂在地里。感觉到饿了吗？面对一盘炸蟋蟀的时候然而现在还是大部分人会退缩一想到那些虫子的腿和触角会卡在他们的牙齿里。但是你想想龙虾。它其实就像个大虫子也有腿和触角它也曾经被认为是不好的，令人生厌的食物。而现在，龙虾是一道大餐。这个故事也适用于虫子吗？所以，试试吧！把虫子扔进嘴里，享受虫子的酥脆吧！^\_^

**P29 2014-01-06 How sugar affects the brain - Nicole Avena**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=29)

Picture warm, gooey cookies, crunchy candies, velvety cakes, waffle cones piled high with ice cream. Is your mouth watering? Are you craving dessert? Why? What happens in the brain that makes sugary foods so hard to resist? Sugar is a general term used to describe a class of molecules called carbohydrates, and it's found in a wide variety of food and drink. Just check the labels on sweet products you buy. Glucose, fructose, sucrose, maltose, lactose, dextrose, and starch are all forms of sugar. So are high-fructose corn syrup, fruit juice, raw sugar, and honey. And sugar isn't just in candies and desserts, it's also added to tomato sauce, yogurt, dried fruit, flavored waters, or granola bars. Since sugar is everywhere, it's important to understand how it affects the brain. What happens when sugar hits your tongue? And does eating a little bit of sugar make you crave more? You take a bite of cereal. The sugars it contains activate the sweet-taste receptors, part of the taste buds on the tongue. These receptors send a signal up to the brain stem, and from there, it forks off into many areas of the forebrain, one of which is the cerebral cortex. Different sections of the cerebral cortex process different tastes: bitter, salty, umami, and, in our case, sweet. From here, the signal activates the brain's reward system. This reward system is a series of electrical and chemical pathways across several different regions of the brain. It's a complicated network, but it helps answer a single, subconscious question: should I do that again? That warm, fuzzy feeling you get when you taste Grandma's chocolate cake? That's your reward system saying, "Mmm, yes!" And it's not just activated by food. Socializing, sexual behavior, and drugs are just a few examples of things and experiences that also activate the reward system. But overactivating this reward system kickstarts a series of unfortunate events: loss of control, craving, and increased tolerance to sugar. Let's get back to our bite of cereal. It travels down into your stomach and eventually into your gut. And guess what? There are sugar receptors here, too. They are not taste buds, but they do send signals telling your brain that you're full or that your body should produce more insulin to deal with the extra sugar you're eating. The major currency of our reward system is dopamine, an important chemical or neurotransmitter. There are many dopamine receptors in the forebrain, but they're not evenly distributed. Certain areas contain dense clusters of receptors, and these dopamine hot spots are a part of our reward system. Drugs like alcohol, nicotine, or heroin send dopamine into overdrive, leading some people to constantly seek that high, in other words, to be addicted. Sugar also causes dopamine to be released, though not as violently as drugs. And sugar is rare among dopamine-inducing foods. Broccoli, for example, has no effect, which probably explains why it's so hard to get kids to eat their veggies. Speaking of healthy foods, let's say you're hungry and decide to eat a balanced meal. You do, and dopamine levels spike in the reward system hot spots. But if you eat that same dish many days in a row, dopamine levels will spike less and less, eventually leveling out. That's because when it comes to food, the brain evolved to pay special attention to new or different tastes. Why? Two reasons: first, to detect food that's gone bad. And second, because the more variety we have in our diet, the more likely we are to get all the nutrients we need. To keep that variety up, we need to be able to recognize a new food, and more importantly, we need to want to keep eating new foods. And that's why the dopamine levels off when a food becomes boring. Now, back to that meal. What happens if in place of the healthy, balanced dish, you eat sugar-rich food instead? If you rarely eat sugar or don't eat much at a time, the effect is similar to that of the balanced meal. But if you eat too much, the dopamine response does not level out. In other words, eating lots of sugar will continue to feel rewarding. In this way, sugar behaves a little bit like a drug. It's one reason people seem to be hooked on sugary foods. So, think back to all those different kinds of sugar. Each one is unique, but every time any sugar is consumed, it kickstarts a domino effect in the brain that sparks a rewarding feeling. Too much, too often, and things can go into overdrive. So, yes, overconsumption of sugar can have addictive effects on the brain, but a wedge of cake once in a while won't hurt you.

**P29 2014-01-06 How sugar affects the brain - Nicole Avena**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=29)

翻译人员: Jingwei Gu 校对人员: Kelly Tang想象一下温热、绵软的曲奇饼干，酥脆的糖果，天鹅绒般柔软的蛋糕，还有堆着高高冰淇淋的华夫蛋筒。你已经流口水了么？你想要吃甜点了么？为什么？你的大脑中到底发生了什么才使得含糖类食物变得如此不可抗拒？糖是一个用来描述一类被称为碳水化合物的分子的统称术语，在很多食品与饮料中都可以找到它。只要去看一下你买的甜食上的标签。葡萄糖、果糖、蔗糖、麦芽糖、乳糖、右旋糖，还有淀粉都是糖的各类形式。果糖含量很高的玉米糖浆、果汁、粗糖，还有蜂蜜也是一样的。而且，糖不仅存在于糖果和甜点中，它也被添加于番茄酱、酸奶、果脯、加味水，亦或是燕麦棒中。正因为糖无处不在，所以要明白它如何影响大脑才显得很重要。当糖分接触到你的舌头时会发生什么？只吃一点点糖会使你渴求更多么？你咬了一口麦片，它所含的糖分会触发甜味受体，也就是舌头上味蕾的一部分。这些受体会向脑干发送信号，从那里，它会分支进入前脑的许多部位，其中一个就是大脑皮层。大脑皮层的不同部分会处理不同的味觉：苦、咸、鲜，以及我们现在所谈的甜。从这里（大脑皮层），信号会激活大脑的犒赏系统。犒赏系统是一系列穿过大脑不同部位的电化学途径。它是个复杂的网路，但是它会帮助解答一个单一的、潜意识中进行的问题：“我应该再来一次吗，享受当你品尝祖母做的巧克力蛋糕时那种温暖、却有些模糊了的感觉？”然后你的犒赏系统就会说："嗯，当然了！'然而，它不仅会被食物激活。社交、性行为，还有毒品都只是可激活犒赏系统的事物的几个例子而已。但是过渡激活犒赏系统会启动一系列不幸的事：失控、渴求，还有对糖分忍耐度的增长。让我们回到吃麦片的例子上去。它会来到你的胃里并最终到达肠道。然后你猜怎么着？那里也存在着糖分受体。它们不是味蕾，但它们也会发送信号来向你的大脑表明你已经吃饱了或者你的身体需要生产更多的胰岛素来帮助消化你额外摄入的糖分。犒赏系统的“主要流通货币”是多巴胺，一种重要的化学物质或者说是神经递质。前脑中存在着许多多巴胺受体，但是它们的分布并不均匀。某些部位的受体密集成群，并且，这些多巴胺热点就是我们犒赏系统的一部分。像酒精、尼古丁或者是海洛因一类的麻醉药品会使得多巴胺超过限度，以至于令有些人不停地寻求那种快感，换一句话说，就是上瘾了。糖分也会促进多巴胺分泌，尽管不像毒品那样极端。而且，糖分在诱发多巴胺的食物中也非常少见。比如说，西兰花就对此没有什么影响。也许这就能解释为什么让孩子们多吃蔬菜是如此的难。谈到健康食品，比方说你感觉很饿决定要享用营养均衡的一餐。用过餐后，犒赏系统热点中的多巴胺含量就会激增。但如果你连续很多天都吃这同一餐，多巴胺的增量就会越来越少，最终达到稳定。这是因为在食物问题上，大脑演变得对那些崭新的亦或是不同的味觉异常敏感。这是为什么呢？有两个原因：第一，为了检查出已经变质的食物。第二，我们的饮食越多样，我们就越有可能得到所有我们需要的营养。为了保持那种饮食多样性，我们需要能够识别新的食物，更重要的是，我们需要维持想吃新食物的欲望。这就是为什么当食物一成不变的时候多巴胺的分泌就会逐渐趋于平稳。现在，让我们回到那一餐的问题上。如果用富含糖分的食物取代健康、平衡的饮食会发生什么呢？如果你不怎么摄入糖分或者不一次摄入太多，它带来的影响就和平衡的饮食没有什么两样。但是如果你吃的太多，多巴胺的分泌就会不稳定。换句话说，摄取大量糖分会持续使犒赏系统兴奋。从这个角度来讲，糖类就有一点像毒品了。这就是一个人们之所以对含糖食品着迷的原因。这样，想想之前那些所有不同种类的糖。每一种都是独特的，但是每一次摄取这些糖分的时候，它就会在大脑中引发多米诺骨牌一般的效应，并激活犒赏系统。太多，太频繁，就可能会过度。因此，没错，糖分的过度摄取可以使大脑上瘾，不过，偶尔品尝一块蛋糕并不会有什么坏处。

**P30 2014-01-06 How to fossilize...yourself - Phoebe A. Cohen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=30)

Imagine being a fossil: touring the world's great museums, inspiring awe in onlookers of all ages, posing for hordes of fawning photographers. Sound like something you'd like? Well, good luck! At least 99.9% of creatures that have ever lived aren't preserved in the fossil record. But forget about them, everyone else will, and listen up! If you want your corpse in the exclusive 0.01% Club, the Hall of Preserved Fossil Fame, it will not be easy. You better work! Step one: die. It's a cold, hard fact of fossilization. Everything paleontologists find was once alive and, at some point, died. We'll skip the details and assume you had a long, fulfilling life so we can get to what is really important -- how you die. There are many ways to become a fossil, so let's highlight your top death options. You could get yourself trapped in tree sap, which, when hardens, turns into amber and can survive intact for millions of years. But unless you find a really big tree to sit under, amber preservation will likely remain the domain of insects and other very small animals. Generally, the right place to be if you want to end up a fossil is wherever sediment is actively being deposited, like a lake or an ocean floor. A mountaintop or prairie? Not good! You need to get buried, the faster the better, because the longer you hang around on the surface, the more likely you'll get eaten, scavenged, or otherwise destroyed before ever having a chance to get preserved. If you can get buried someplace with little to no oxygen, like a bog or a deep lake bottom, even better. That lack of oxygen will slow down your decay and give you more time to fossilize. So, let's say you're lucky enough to die and get buried in a shallow sea under muddy, sandy sediments. What's your next move? One option is a process called permineralization. While all your soft parts decay away, your bones get saturated with mineral-rich waters. Bit by bit, microscopic crystals precipitate out of these waters to fill in the empty spaces and pores in your bones. Otherwise, you'd better hope the sediments around you harden while your bones decay away and another sediment or mineral fills in the spaces your bones leave behind, creating a perfect cast of your skeleton. Over time, the sediments around your fossil will lithify or turn into rock. But you're not in the clear yet! Many things could happen to those sedimentary rocks that might destroy your chances of getting discovered. They could get uplifted into a mountain range and eroded away or carried along in an oceanic plate and subducted back into the Earth's mantle, melting your fossil into hot mush. Fingers crossed your rock surroundings will get gently lifted up by plate tectonics, sea levels will change, and you'll end up under dry land close to the surface, but not so close that erosion from wind and rain wipes you away before someone can come find you. The last step in this long process, an intrepid paleontologist has to come find you. Maybe she's a research scientist scouting for fossils your age and type or just an amateur collector hoping for a fortuitous find. She whacks away at layers of rock above you or spots your fossil exposed in a creek bank after a flood. And there you are, a magnificent scientific discovery, millions of years in the making! She and her colleagues gently extract you from the surrounding sediment, measure and photograph all the bits and pieces they find, and begin the complex task of reconstructing how and when you lived based on the evidence they find in your bones. Paleontologists will be some of your biggest fans along with all those admiring crowds at the museum. You made it! You spent years underground in obscurity, shedding blood, sweat, tears, and your internal organs. You worked yourself to the bone until your bones disintegrated and were replaced by minerals and sediments. But it was all worth it because you're a famous fossil! Now, you better hold that pose!

**P30 2014-01-06 How to fossilize...yourself - Phoebe A. Cohen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=30)

翻译人员: Xinrong Li 校对人员: Dongxue Sun想象自己若成为化石：在世界各大博物馆之间游走，使各年龄层的游客们都心怀敬畏，在大批殷勤的摄影师面前摆造型。听起来觉得还不错？那么，祝你好运！至少99.9%曾经存在过的生物没能成为化石。不过不用管它们，因为剩下的都会成为化石，仔细挺好！如果你想要你的遗骨成为那0.01%，进入名人化石保存室，并不容易。你最好努力！第一步：死亡。成为化石的过程是冰冷无情的。古生物学家发现的一切都是曾经活过，并且最终死掉的。我们把细节跳过假设你拥有长久而幸福的一生然后再来看看最关键的部分——你怎么死的。变成化石的方式有很多，我们着重聊聊那些高端一些的死法。你可以将自己裹在树的汁液中，汁液会凝固变成琥珀可以完好无损的保存几百万年。但除非你找到一棵足够大的树，不然琥珀很可能只会保存昆虫和其他很小很小的动物尸体。如果你想成为化石，一般来讲，最好的地方是沉积物容易保存的地方，像湖底或海底。山顶或大草原？不靠谱！你要被埋起来，埋的越快越好，因为你暴露在外的时间越久，就越可能被吃掉，被捡走，或者被破坏在能够得到机会长久保存之前如果你被埋在一个地方一个缺少氧气甚至无氧的地方，像泥塘或者深湖底，那就更好了。缺氧会减缓你尸体的腐烂给你更多时间变成化石。那么，假设你幸运地死掉并且被埋在浅海在泥泞的、布满砂石的沉积物下。下一步干吗呢？一种选择是经历所谓的石化过程。伴随着你身上柔软的部分都慢慢腐烂，你的骨骼充满富含矿物质的海水。渐渐地，这些海水中凝结的微小晶体填充进你骨骼里的细孔。不然，你最好盼着在你骨骼渐逝时，你周边的沉积物硬化有别的沉积物或矿物填充你骨骼留下的空间，铸造成完美的骨骼造型。久而久之，你身体化石周围的沉积物将岩石化或者变成岩石。但你还不是不能放心！这些沉积岩还会发生很多变化并且可能导致后人没办法发现你身体变成的化石他们可能因为地壳上升成为山脉又被侵蚀流失或是随着大洋板块潜没又进入地幔，将你的化石熔化。穿流过你周围的岩石会通过板块构造慢慢抬升，海平面会变化，你最终会在干燥的陆面下接近地表，但又不是特别近所以在你被发现之前表层的岩石被风雨侵蚀流失。这个漫长过程的最后一步，一位勇敢的古生物学家必须要找到你。也许她是一名研究员四处寻找你这样年龄和类型的化石或者只是业余收藏者期待偶然的发现。她打碎你上面的层层岩石或者在河边经过一场洪水后你化石的一部分露出来。你就这样出现了，一个重大科学发现，经历几百万年的磨砺！她和她的同事们小心翼翼地把你从周围沉积物中取出，测量、拍照对他们发现的一点一滴，然后基于他们在你骨骼中发现的证据开始复杂的工作重现你如何以及何时生活过。古生物学家会是你的一部分超级粉丝还有博物馆里那些欣赏的众人。你成功了！你在地下默默无闻了那么多年，流血，流汗，流泪，失去五脏六腑。你努力到只剩骨头直到你的骨骼分解被矿物和沉积岩取代。当这一切都值得因为你成了著名的化石！现在，最好保持那个姿势！

**P31 2014-01-08 How to build a fictional world - Kate Messner**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=31)

In J.R.R.'s world, Gandalf is one of five wizards sent by the Valar to guide the inhabitants of Middle Earth in their struggles against the dark force of Sauron. Gandalf's body was mortal, subject to the physical rules of Middle Earth, but his spirit was immortal, as seen when he died as Gandalf the Grey and resurrected as Gandalf the White. According to the Wachowski's script, an awakened human only has to link up and hack the neon binary code of the Matrix to learn how to fly a helicopter in a matter of seconds. Or if you are the One, or one of the Ones, you don't even need a helicopter, you just need a cool pair of shades. Cheshire cats can juggle their own heads. iPads are rudimentary. No Quidditch match ends until the Golden Snitch is caught. And the answer to the ultimate question of life, the universe, and everything is most certainly 42. Just like real life, fictional worlds operate consistently within a spectrum of physical and societal rules. That's what makes these intricate worlds believable, comprehensible, and worth exploring. In real life, the Law of Gravity holds seven book sets of "Harry Potter" to millions of bookshelves around the world. We know this to be true, but we also know that ever since J.K. typed the words wizard, wand, and "Wingardium Leviosa," that Law of Gravity has ceased to exist on the trillions of pages resting between those bookends. Authors of science fiction and fantasy literally build worlds. They make rules, maps, lineages, languages, cultures, universes, alternate universes within universes, and from those worlds sprout story, after story, after story. When it's done well, readers can understand fictional worlds and their rules just as well as the characters that live in them do and sometimes, just as well or even better than the reader understands the world outside of the book. But how? How can human-made squiggles on a page reflect lights into our eyes that send signals to our brains that we logically and emotionally decode as complex narratives that move us to fight, cry, sing, and think, that are strong enough not only to hold up a world that is completely invented by the author, but also to change the reader's perspective on the real world that resumes only when the final squiggle is reached? I'm not sure anyone knows the answer to that question, yet fantastical, fictional worlds are created everyday in our minds, on computers, even on napkins at the restaurant down the street. The truth is your imagination and a willingness to, figuratively, live in your own world are all you need to get started writing a novel. I didn't dream up Hogwarts or the Star Wars' Cantina, but I have written some science thrillers for kids and young adults. Here are some questions and methods I've used to help build the worlds in which those books take place. I start with a basic place and time. Whether that's a fantasy world or a futuristic setting in the real world, it's important to know where you are and whether you're working in the past, present, or future. I like to create a timeline showing how the world came to be. What past events have shaped the way it is now? Then I brainstorm answers to questions that draw out the details of my fictional world. What rules are in place here? This covers everything from laws of gravity, or not, to the rules of society and the punishments for individuals who break them. What kind of government does this world have? Who has power, and who doesn't? What do people believe in here? And what does this society value most? Then it's time to think about day-to-day life. What's the weather like in this world? Where do the inhabitants live and work and go to school? What do they eat and how do they play? How do they treat their young and their old? What relationships do they have with the animals and plants of the world? And what do those animals and plants look like? What kind of technology exists? Transportation? Communication? Access to information? There's so much to think about! So, spend some time living in those tasks and the answers to those questions, and you're well on your way to building your own fictional world. Once you know your world as well as you hope your reader will, set your characters free in it and see what happens. And ask yourself, "How does this world you created shape the individuals who live in it? And what kind of conflict is likely to emerge?" Answer those questions, and you have your story. Good luck, future world-builder!

**P31 2014-01-08 How to build a fictional world - Kate Messner**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=31)

翻译人员: Yanjiao Chen 校对人员: Samson Zhong作家托爾金(J.R.R. Tolkien)筆下的世界，甘道夫是维拉(the Valar)派来引导中土世界的人们和黑暗魔君索伦抗争的五个男巫之一。甘道夫的肉体是会殒灭的，会受到中土世界自然规律的控制，但他的灵魂不灭，他以灰袍甘道夫的身份死去，然后以白袍甘道夫的身份复活。在沃卓斯基(Wachowski)的剧本里，一个被唤醒的人只需要接入并且盗取黑客帝国的二进制码，就可以在几秒钟内，学会怎样开直升飞机。若你是救世主(黑客任务)，或救世主之一，你甚至不用什么直升飞机，你需要的，只是一副酷酷的墨镜。柴郡猫(Cheshire cats)可以把自己的头抛着杂耍，iPads只是最最基础的。魁地奇(Quidditch)球赛不会结束，除非有人抓到了金色飞贼。关于生命、宇宙和一切终极问题的答案，绝对是42.(根據《银河系漫游指南》)就像现实生活一样，虚幻世界的运行，也有一整套固定的自然规律和社会法则。这就是为什么这些错综复杂的虚幻世界是可信的，可理解的和值得探索的。现实世界中，万有引力定律把全套7 册哈利波特牢牢固定在世上无数书架上。我们对此毫不怀疑，而我们同时也相信，当J.K.罗琳写下“男巫”“魔杖”和“Wingardium Leviosa”(悬浮咒)时,万有引力定律，在架上的小说内容中，凭空消失了。科幻和奇幻小说作者字面上而言就是世界的创造者。他们创造规则，地图，宗族，语言，文化，宇宙，数个宇宙中交替着多重宇宙，从这些世界中，一个个故事接踵而生。倘若妙笔生花，读者便能像书中人物角色一样理解虚构世界还有其中的法则有时候，与书本外的现实世界相比，读者反而更能理解书中的世界。不過這是如何辦到的呢？怎样才能让文字，引人入胜，并把讯息传到读者脑海里，让我们以感情和逻辑解读成复杂的故事驱使我们奋斗，哭泣，歌唱，并且去思考这些文字不仅仅强有力地支撑起作者一手创造的世界，并且在阅读时，改变读者对现实世界的看法。我不知道有没有人会知道这个问题的答案，可是，我们每天在大脑中都不断地产生虚构的世界也构筑虚在电脑，甚至街角餐馆的纸巾上事实上，只要你有想象力并且愿意以不一样的视角看待周遭的世界一部小说的素材就已足够了。我没能构想出霍格沃茨(Hogwards)或是星際大戰的Cantina(星際酒館)，但我为儿童和年轻人写过一些科幻惊险小说。接着要与各位分享的方法和问题就是我用来创造书中描绘的世界我从最基本的时间和地点开始。无论是奇幻世界，还是未来的现实世界，场景是非常重要的一点你要清楚你的故事是发生在过去、现在、还是未来我习惯建立一个时间表，来交代这个世界的演变；历史事件是如何形塑现状的。然后，以脑力激荡构想笔下世界的各种细节,以及这世界运行的道理。这可包罗万象了,从有无重力的影响,到社会规范,还有违法情事的惩治,政府组织的型态,谁掌控权力?哪些人是没权力的？人们共享何种信念？社会最重视的价值观，再来就是考虑日常生活天气怎样？居民的住所、工作场所、以及学校位置。他们的饮食、娱乐教养下一代，还有扶养上一代的方式。虚构的世界里，居民和动植物之间的关系，以及这些动植物的外观。当地所拥有的科学技术，交通运输，通讯联络，和获取信息的方式。需要斟酌之处可不少！所以，花些时间好好考虑这些事情，和这些问题的答案，那么你就已经具备充足的条件去开创你自己的奇幻世界啦！一旦你了解自己笔下的世界，如同你希望读者心有灵犀一样，那么就让你的人物徜徉其中，看看事情如何发展。问问你自己你所创造的世界会怎样影响身处其中的人？可能会产生什么矛盾？回答了这些问题，你就创作出了自己的故事。祝你好运！未来的世界创造师！

**P32 2014-01-10 Start a TED-Ed Club today!**

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There are over two billion school-aged individuals living in the world today. That's more young people than any other time in human history. That's billions of minds teaming with uninhibited creativity. That's billions of curious souls. The world's youth is the embodiment of the world's future, and that future has no limits because each and every young person brings a completely new and a completely unique perspective to the world around them. Ayana is passionately pursuing the meaning of life, among other things. What will life come to mean to her and to her closest friends? Will future smartphone owners download a student-built mood app, and will they prefer iteration number one or number two? Will Sophia become an Olympian, a teacher, an advocate for world peace, or will she become all three? And will Tyler's obsession with space and his pursuit of infinity lead him to travel beyond the world his ideas and the ideas of his peers will most certainly define? Picture the collective potential and the ideas of over two billion passionate young people. TED-Ed is thrilled to announce a new program that aims to give them the space and time to pursue those passions and to support them in presenting those ideas in the form of short, TED-like talks. The program is called TED-Ed Clubs. The mission: to celebrate the best ideas of young people around the world. Here's how it works. Visit ed.ted.com and fill out the club facilitator application. Once approved, you'll receive access to a set of free tools designed to help you start a TED-Ed Club at your school. There are 13 suggested meetings. Each meeting helps club members gain a discrete presentation skill. In the final meetings, club members present their ideas in the form of short, TED-like talks. Teachers, you can nominate presentations to be featured on TED-Ed or at the annual TED Youth conference. And students, the world is waiting to be redefined by your biggest, smallest, boldest, quirkiest, bravest, most inspiring, and most brilliant ideas!

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翻译人员: Philip Wong 校对人员: Peipei Xiang目前，全球有20亿人达到了学龄。这是目前人类史上年轻人最多的时期。这是数十亿个富有无尽创造力的头脑，也是数十亿个充满好奇的灵魂。年轻一代代表着世界的未来。这个未来充满了无限的可能。因为每个年轻人都有一个全新而独特的看待这个世界的视角。Ayana 正热衷于探求生命意义。生命对于她本人或她的挚友意味着什么？将来智能手机的拥有者是否会去下载学生自行开发的情绪应用软件？他们会喜欢一号迭代还是二号迭代？Sophia 将来是否会成为一名奥运运动员，一个老师，世界和平拥护者，还是身兼以上三职？Tyler 对空间和永恒的着迷与追求是否会引领着他超越他以及他的伙伴们所认知的世界？让我们来勾画一下这二十亿多热情的年轻人的集体潜能和创意吧！TED-Ed 非常荣幸地告诉大家我们将推出一个给这些年轻人空间与时间去追求理想，支持他们的全新节目，他们可以用简短的，类似于TED演讲一样的形式展示他们的想法。节目名字就叫 TED-Ed 俱乐部。我们的宗旨是：展示全球年轻人最好的想法。如何参与呢？进入 ed.ted.com 网站，填写俱乐部组织者申请表。申请被批准后，您将收到一系列的免费工具，这些工具将帮助你在你的学校开展TED-Ed 俱乐部。目前预计将会有13场会议。每场会议都旨在帮助俱乐部成员提升演讲能力与技巧。在最后一场会议中，俱乐部成员将会以简短的，类似于TED演讲的方式来表述自己的想法。如果您是老师，您可以挑选一个演讲放在TED-Ed来展示，或是在TED Youth年度会议上展示。如果您是学生，这个世界正期待着你用你们最大的最小的最大胆的最个性的最勇敢的最鼓舞人心的和最闪亮的想法来重新定义。

**P33 2014-01-10 The mystery of motion sickness - Rose Eveleth**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=33)

Can you read in the car? If so, consider yourself pretty lucky. For one-third of the population, looking at a book while moving along in a car or a boat or train or plane quickly makes them sick to their stomach. But why do we get motion sickness in the first place? Well, believe it or not, scientists aren't exactly sure. The most common theory has to do with mismatched sensory signals. When you travel in a car, your body gets two different messages. Your eyes are seeing the inside of a vehicle, which doesn't seem to be moving. Meanwhile, your ear is telling your brain you're accelerating. Wait, your ear? Your ear has another important function besides hearing. In its innermost part lies a group of structures known as the vestibular system, which gives us our sense of balance and movement. Inside there are three semicircular tubules that can sense rotation, one for each dimension of space. And there are also two hair-lined sacks filled with fluid. When you move, the fluid shifts and tickles the hairs, telling your brain if you're moving horizontally or vertically. All this tells your body which direction you're moving in, how much you've accelerated, even at what angle. In a car, your vestibular system correctly senses your movement, but your eyes don't see it, especially when glued to a book. The opposite can happen. You're at the movies, and the camera makes a sweeping move. This time, your eyes think you're moving while your ear knows you're sitting still. But why does this conflicting information make us feel so terrible? Scientists aren't sure, but they think there's an evolutionary explanation. Fast moving vehicles and video recordings have only existed in the last couple of centuries, a blink in evolutionary time. For most of our history, there wasn't that much that could cause this sensory mix-up, except for poisons. And because poisons are not the best thing for survival, our bodies evolved a direct but unpleasant way to get rid of what we ate that was causing the confusion. It's a pretty reasonable theory, but it leaves things unexplained, like why women are more affected by motion sickness than men, or why passengers get more nauseous than drivers. Another theory suggests that the cause is more about the way some unfamiliar situations make it harder to maintain our natural body posture. Studies show that being immersed in water or just changing your stance can greatly reduce the effects of motion sickness. But we don't really know what's going on. We know the more common remedies for car queasiness -- looking at the horizon, over-the-counter pills, chewing gum, but none are totally reliable nor can they handle intense motion sickness and sometimes the stakes are far higher than just not being bored during a long car ride. At NASA, where astronauts are hurled into space at 17,000 miles per hour, motion sickness is a serious problem. In addition to researching the latest space-age technologies, NASA also spends a lot of time figuring out how to keep astronauts from vomiting up their space rations. Like understanding the mysteries of sleep or curing the common cold, motion sickness is one of those seemingly simple problems that, despite amazing scientific progress, we still know very little about. Perhaps one day the exact cause of motion sickness will be found, and with it, a completely effective way to prevent it, but that day is still on the horizon.

**P33 2014-01-10 The mystery of motion sickness - Rose Eveleth**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=33)

翻译人员: Denise Tso 校对人员: Zhiting Chen你可以在车上阅读吗？如果可以的话， 你算是挺幸运的了。因为对大约1/3的人口来说，在移动中的汽车上、船上、火车上、或者飞机上阅读很快就会让他们觉得反胃噁心但是首先，我们为什么 会有这种”晕动症“呢？这个嘛，信不信由你其实科学家都不是很确定最广为接受的理论是晕动症跟感官讯号错配有关。当你坐到车上，你的身体会接受到 两种非常不同的信息。你的眼睛看见车的内部，感觉车好像没有在动。同时，你的耳朵却在告诉你的脑袋你在加速的状态中等等，你的耳朵？对呀，你的耳朵其实除了听觉外还有另外一个重要的作用。在它最深处的位置有一组架构叫作前庭系统，给予人们平衡和动感的感知。这个系统里面有三条半圆细管以感知转动，每一条都负责一个空间维度。另外系统还有两个有毛发排列的囊袋里面充满液体。所以当你移动时液体也会跟着移动并触动到毛发告诉你的大脑你到底是在横向移动还是垂直移动。把这些元素结合一起，身体就会感知你往哪边移动，加快的速度有多少，甚至是在什么坡度上移动。所以，当你坐车的时候，你的前庭系统能够 准确地感知到你在移动，可你的眼睛却看不到这个状态，尤其是当你的注意力停留在书本上的时候。相反的情况也可能出现。譬如说，你坐在电影院里电影有个镜头是快速横扫整个场景的。这次，是你的眼睛认为你在移动而你的耳朵则知道你其实稳坐不动。可为什么这种相互矛盾的咨询会让我们如此不适？科学家其实也没有一个确定的答案，但是他们认为这个现象 可以跟人类进化问题有关。我们知道， 快速移动的交通工具和拍摄录影都只在最后两个世纪才出现，从宏观来讲其实跟 眨一下眼没有分别。在人类的历史上，也没有那么多情况导致这种感官混淆的问题发生除了毒药外。而因为毒药对生存不利，我们的身体演化出一种直接但不怎么让人舒服的方法来让我们摆脱我们可能吃进去而造成冲突的东西。这个理论看起来挺合理，但它留下很多部分没有解释譬如，为什么女人比男人更受晕动病影响呢？再譬如，为什么乘客比司机会更容易噁心不适？另一个理论解释说背后的原因可能跟不熟悉的环境使身体更难保持自然的姿势有关。研究显示沉浸在水中或单纯改变站姿可以大大降低晕动症的不适。不过就像我刚刚说的， 我们不是很清楚真正原因。我们知道的是晕车最常见的舒缓措施有--往地平线看，嚼香口胶，服用成药--但这些方法并不完全可靠也无法处理非常强烈的晕动症而这方面的研究比是否会在長途車上 因为不能读书覺得无聊意义来得更重要。在美国国家宇航局， 宇航员以每小时17000英里的高速进入太空，晕动症对他们来讲 是一个严重的问题。因此，除了研究最新的太空科技，美国国家宇航局也花了大量时间尝试寻求方法不让宇航员吐在他们小心准备的太空配给上。跟了解睡眠之谜和治愈普通感冒一样，尽管科学进步神速但晕动症仍然是其中一个，看见来很简单，但是我们却了解很少的难题。可能終有一天我们会发掘晕动症的确切起因。而因为它，有效避免这个问题的方法也会出现，但那一天仍在遥远的未来。

**P34 2014-01-16 The Infinite Hotel Paradox - Jeff Dekofsky**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=34)

In the 1920's, the German mathematician David Hilbert devised a famous thought experiment to show us just how hard it is to wrap our minds around the concept of infinity. Imagine a hotel with an infinite number of rooms and a very hardworking night manager. One night, the Infinite Hotel is completely full, totally booked up with an infinite number of guests. A man walks into the hotel and asks for a room. Rather than turn him down, the night manager decides to make room for him. How? Easy, he asks the guest in room number 1 to move to room 2, the guest in room 2 to move to room 3, and so on. Every guest moves from room number "n" to room number "n+1". Since there are an infinite number of rooms, there is a new room for each existing guest. This leaves room 1 open for the new customer. The process can be repeated for any finite number of new guests. If, say, a tour bus unloads 40 new people looking for rooms, then every existing guest just moves from room number "n" to room number "n+40", thus, opening up the first 40 rooms. But now an infinitely large bus with a countably infinite number of passengers pulls up to rent rooms. countably infinite is the key. Now, the infinite bus of infinite passengers perplexes the night manager at first, but he realizes there's a way to place each new person. He asks the guest in room 1 to move to room 2. He then asks the guest in room 2 to move to room 4, the guest in room 3 to move to room 6, and so on. Each current guest moves from room number "n" to room number "2n" -- filling up only the infinite even-numbered rooms. By doing this, he has now emptied all of the infinitely many odd-numbered rooms, which are then taken by the people filing off the infinite bus. Everyone's happy and the hotel's business is booming more than ever. Well, actually, it is booming exactly the same amount as ever, banking an infinite number of dollars a night. Word spreads about this incredible hotel. People pour in from far and wide. One night, the unthinkable happens. The night manager looks outside and sees an infinite line of infinitely large buses, each with a countably infinite number of passengers. What can he do? If he cannot find rooms for them, the hotel will lose out on an infinite amount of money, and he will surely lose his job. Luckily, he remembers that around the year 300 B.C.E., Euclid proved that there is an infinite quantity of prime numbers. So, to accomplish this seemingly impossible task of finding infinite beds for infinite buses of infinite weary travelers, the night manager assigns every current guest to the first prime number, 2, raised to the power of their current room number. So, the current occupant of room number 7 goes to room number 2^7, which is room 128. The night manager then takes the people on the first of the infinite buses and assigns them to the room number of the next prime, 3, raised to the power of their seat number on the bus. So, the person in seat number 7 on the first bus goes to room number 3^7 or room number 2,187. This continues for all of the first bus. The passengers on the second bus are assigned powers of the next prime, 5. The following bus, powers of 7. Each bus follows: powers of 11, powers of 13, powers of 17, etc. Since each of these numbers only has 1 and the natural number powers of their prime number base as factors, there are no overlapping room numbers. All the buses' passengers fan out into rooms using unique room-assignment schemes based on unique prime numbers. In this way, the night manager can accommodate every passenger on every bus. Although, there will be many rooms that go unfilled, like room 6, since 6 is not a power of any prime number. Luckily, his bosses weren't very good in math, so his job is safe. The night manager's strategies are only possible because while the Infinite Hotel is certainly a logistical nightmare, it only deals with the lowest level of infinity, mainly, the countable infinity of the natural numbers, 1, 2, 3, 4, and so on. Georg Cantor called this level of infinity aleph-zero. We use natural numbers for the room numbers as well as the seat numbers on the buses. If we were dealing with higher orders of infinity, such as that of the real numbers, these structured strategies would no longer be possible as we have no way to systematically include every number. The Real Number Infinite Hotel has negative number rooms in the basement, fractional rooms, so the guy in room 1/2 always suspects he has less room than the guy in room 1. Square root rooms, like room radical 2, and room pi, where the guests expect free dessert. What self-respecting night manager would ever want to work there even for an infinite salary? But over at Hilbert's Infinite Hotel, where there's never any vacancy and always room for more, the scenarios faced by the ever-diligent and maybe too hospitable night manager serve to remind us of just how hard it is for our relatively finite minds to grasp a concept as large as infinity. Maybe you can help tackle these problems after a good night's sleep. But honestly, we might need you to change rooms at 2 a.m.

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翻译人员: JIN锦금 Qian钱전 校对人员: kiki zhang在1920年，德国数学家David Hilbert设计了一个著名的思维实验向我们展示了深入思考无限的理念到底有多难。想象一个酒店有无限数量的房间和一个认真工作的夜班经理。一天晚上，无限酒店满房了，被无限数量的客人全部预定了。一个男士走进了酒店并且要求一个房间。夜班经理并没有拒绝他，而是决定给他一个房间。怎么可能？很简单，他让1号客房的客人搬到了2号客房，2号客房的客人搬到3号客房，以此类推。每个客人从“n”号房间搬入“n+1”号房间。因为那里有一个无限个房间，总有一个新房间给每一个已有的客人这样1号房间就留给了新的客人。这个过程可以被重复给任何有限数量的新客人们。假设一个观光大巴40人下车要找房间，那么每个已在的客人只要从“n"号房间搬到“n+40"号房间，因此，就能打开新的40个房间。但是现在有一个无限大的巴士拉了可数的无限多的乘客来租房间。可数的无限是关键。现在，极大的巴士的无限的乘客一开始为难了夜店经理，但是他意识到有一个方法来安置每一个新人。他让1号房间的客人搬到了2号房间。他然后让2号房间的客人搬到了4号房间，3号房间的客人搬到6号房间，以此类推。每一个当前的客人从”n"号房间搬到了“2n“号房间，填补了只有无限的偶数号房间。通过这个，他现在清空了所有的无限的奇数号房间，无限大的巴士的乘客们将占用这些奇数房间。每个人的开心和酒店的生意达到了从未有过的兴荣。好吧，事实上，它只是和以前一样一直在兴荣，在一夜之间把无数的美元存入银行。关于这家惊人的酒店的消息传开了。人们从世界各地蜂拥而来。一天晚上，意外发生了。夜班经理看了外面并且看到了由无限大巴们组成的一个无限的排列，每个大巴都有一个可数的无限多的客人。他能干些什么？如果他不能给他们找到房间，这个酒店可能会失去一大笔无数的钱，并且他肯定会失去他的工作。幸运的是，他记得在公元300年前，Euclid证明了质数的一个无穷量。所以，为了完成这个看上去不可能的任务找到无数的床给无数的大巴上的无数的疲倦的旅客们，夜店经理安排给每个当前的客人第一个质数，2，幂指数为他们当前的房间号。因此，当前所居住房间号为7那么就要住到房间号为2的7次方的房间里，也就是128号房。夜班经理然后带领在第一个超级大巴们上的人们并且安排了房间号给他们下一个质数，3，幂指数为他们在大巴的座位号。因此，座位号为7的第一辆大巴上的人到房间号为3的七次方即2187号房间去。这个过程持续给第一辆大巴上的所有人。第二辆大巴上的乘客们被安排到了下一个质数，5的幂.接下的大巴，7的幂。每辆大巴如下：11的幂，13的幂，17的幂，等等。因为这些数字每一个都只有1和它们的幂本身作为因数，因此就没有重叠数字号的房间。所有大巴乘客们呈扇形散开到各自房间去利用独特的房间安置计划基于独特的质数们。这样一来，夜班经理能够安排每辆大巴的每位乘客入住。尽管，还有许多房间是空的，像是6号房因为6不是任何质数的幂。幸运的是，他的老板数学不是很棒，所以他的工作是安全的。夜班经理策略的实现是可能的仅仅因为infinite酒店一定是难办之事，它只能处理最低水平的无穷数，主要是可数的无限自然数1，2，3，4.等等。George Cantor称这个水平为无穷大阿列夫零.我们使用自然数为房间号同时也是大巴的座位号。如果我们处理更高级顺序的无穷数，比如实数，这些结构策略便是不可能的因为我们没有办法系统地包含每一个数字。实数Infinite酒店有负数号的房间在地下室，分数号的房间，因此房间号为二分之一的人总怀疑他的房间小于1号房的人。平方根的房间，像房间号为根号2的房间和房间号为圆周率的房间，这些乘客期待免费的点心。而什么样的自重的夜班经理会想要在那工作甚至是为了无穷的薪水？但是再看看Hilbert的Infinite酒店，永远都不会有空缺并且总是有房间给更多的人，永远的勤劳还有可能太热情好客的夜班经理面临着这样的场景是在提醒我们我们这样相对有穷的思维想掌握一个像无穷数一样大的概念。是有多么困难可能你在好好睡了一晚后能解决这些问题但是老实说，我们可能需要你在凌晨2点换房间。

**P35 2014-01-21 Biodiesel - The afterlife of oil - Natascia Radice**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=35)

Just a minute ago, this oil helped make a delicious meal possible. But now, it's just some nasty goop. What should we do with it? Well, the easiest thing would be to pour it down the drain; that makes it seem like it's gone, but it's not really gone. Instead, it's collecting bits of food and other random stuff, producing monstrous, greasy blockages that clog not only your own drain but entire sewage systems, causing flooding and pollution. Many places have laws for proper disposal of grease, but we can go one step further. Instead of just throwing it away safely, we can turn it into something useful. And if you're wondering what anyone could possibly want with a bunch of digusting, used cooking oil, the answer is: biodiesel. You've probably heard of diesel engines. They power farming and construction equipment, trucks, buses, ships, trains, backup generators, and even some cars. Most of the fuel that feeds these engines is refined from petroleum, which comes from long-dead dinosaurs and other ancient fossils. But diesel fuel can also be derived from more recently-dead organisms, like plants and animals. And this type of fuel is what we call biodiesel. Biodiesel is a biodegradable energy source, made from plant oils or animal fats, that can usually be burned in regular diesel engines. You guessed it, it's the 'bio' version of diesel. It's cleaner than normal diesel, so there has been a push to generate it from crops like soybeans. Now, growing plants for fuel, instead of food, comes with its own problems. But fortunately, we already have some oils and fats right here. Preparing your used cooking grease for recycling is easy. First, let it cool down to room temperature. Then, transfer it to a clean container. You can use any old bottles you have lying around, like milk jugs, as long as they're completely empty, rinsed, and dried. Use a funnel to avoid spills and a sieve to filter out any small food particles. You can even add bacon grease and other animal fats or the excess oil from canned food, like tuna or sardines, just make sure it's really oil and not brine. So, what happens now that your oil is safely contained? Well, many cities have recycling services that will pick up large amounts of grease from restaurants and other establishments. But there are locations where individuals can drop off their containers, as well. All of this grease will end up at a processing plant, where it can be converted to useable biodiesel. How does this conversion work? Well, all these oils and fats you donated are made up of triglycerides, a glycerol molecule connected to three fatty acid chains. To convert fats to fuel, they react with an alcohol, usually methanol or ethanol, which produces long-chain esters and glycerol. To compare, here are some molecules of regular diesel fuel. Now, here are the molecules we created by breaking apart the triglycerides. Glycerol is the odd man out, so it's removed at the end of the process. But look at these esters! If you squint, their structures look pretty similar to those of the long-chain hydrocarbons in regular diesel. And diesel engines, with a few small modifications, can also be made to squint and burn these esters like regular diesel fuel. Et voila! Biodiesel. Now, you might be wondering whether all this hassle over recycling used cooking oil is even worth it. After all, how much energy can it possibly generate? Well, if all the grease that New Yorkers throw away in one day were converted to jet fuel, it would be enough to power several hundred flights from New York to Los Angeles. And let's not forget that using waste oil instead of burning more fossil fuels will limit our negative effects on the environment. Recycling used cooking grease turns goop into good. By contributing a little bit, individuals and businesses can help create an alternative, stable source of diesel oil, while protecting the environment and keeping our cities cleaner. And that's pretty slick.

**P35 2014-01-21 Biodiesel - The afterlife of oil - Natascia Radice**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=35)

翻译人员: Elvis Liu 校对人员: Tom Liu就在一分钟之前油使我们做一餐美味的饭食成为可能但是现在 油变成了脏兮兮的黏糊糊的一滩我们应该怎么处理它？最简单的处理方式是：倒掉油看似消失了实际上并没有它裹挟着一些食物和一些其他的奇怪东西变成了恶心的油腻腻的堵塞物这不仅会堵塞你自家的下水管还会堵塞整个下水系统并导致污水溢出和污染很多地方立法规范废油的处理但我们可以多做些什么我们可以把油转变成一些有用的东西而不是简单地废弃掉它如果你疑惑什么人可能想要恶心的用过了食用油答案是：生物柴油你可能听过柴油引擎他们为农耕、建筑设备、 货车、大巴、轮船、火车和备用发电机以及轿车供能多数为这些机械供能的燃油都提炼自石油石油来自远古死亡的恐龙以及远古化石但是柴油也可以从更多的新近死亡的有机体中提炼例如动植物我们称这种柴油为生物柴油生物柴油是一种由植物油 和动物脂提炼而来的生物降解能量资源生物柴油通常可以被用于 柴油机械的燃烧你猜想这是“生物”柴油比一般柴油清洁所以现在从大豆等作物中提取的技术有着广泛的需求现在，为了生产燃料种植植物而不是用食物产生燃料， 有着它自己的问题但幸运的是，取得油脂轻而易举回收你烹饪过的油脂很简单首先，让它冷却至室温然后将它倒进干净的容器里你可以使用身边的瓶子比如牛奶盒但要是完全干净的需要冲洗后擦干用漏斗防止油溢出还要用筛子将食物残渣过滤你还可以加入培根油和其他动物油脂甚至是罐头食物的剩余油脂例如金枪鱼和沙丁鱼罐头但要切记只能加油而不是卤水装好油后怎么办呢？许多城市有回收服务他们可以回收餐厅和其他地方的大量废油但也有可以让市民提供废油的地方所有这些油脂将会来到一个处理工厂在这里它们被转化为可用的生物柴油转化的原理又是什么呢？你提供的所有油脂都由甘油三酸酯组成一个和三个脂肪酸链相连接的甘油分子为了变成燃料它们和酒精反应通常是甲醇和乙醇然后生成长链酯和甘油对比地说，这是一些普通柴油的分子现在，这些事我们通过 分解甘油三酸酯得到的新分子甘油是多出来的分子所以在处理过程最后 要把它除去但请观察这些酯如果你眯着眼看，它们的结构和普通柴油中的长链碳水化合物 十分相似柴油机在经过一些细小的改装后你也可以眯着眼看它们可以像烧普通柴油一样 燃烧这些酯大功告成！ 生物柴油！现在，你可能会质疑这些回收烹饪油的成本是否真正值得毕竟，它究竟可以提供多少能量呢？好的，如果纽约城一天内 所有扔掉的油脂都被转化成飞机燃料这将会为从纽约到洛杉矶的 几百架航班提供能源而且不要忘了用废油取代燃烧化石燃料会减少我们对环境施加的危害回收用过的烹饪油脂能变废为宝通过贡献一点点个人和企业可以帮助创造一种稳定的替代柴油同时保护环境保持城市清洁这是聪明的做法subtitle by Zhiyang Liu

**P36 2014-01-21 History vs. Andrew Jackson - James Fester**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=36)

A national hero? Or public enemy number one? Historical figures are often controversial, but few were as deified or vilified in their lifetime as the seventh President of the United States. This is History vs. Andrew Jackson. "Order, order, hm, uh, what were we...ah yes, Mr. Jackson! You stand accused of degrading the office of the presidency, causing financial collapse and wanton cruelty against American Indians. How do you plead?" "Now, Your Honor, I am not a big city lawyer, but I do know a few things. And I know that President Jackson was a self-made frontiersman, a great general, a real man of the people." "Your Honor, this 'man of the people' was a gambler, a drunk, and a brawler. Why, I've heard it said that he would fight at the drop of the hat and then drop the hat himself. I ask you, was such a man fit for the most distinguished office in the nation? Can we forget the debacle of his inauguration? Who ever heard of inviting a drunken mob into the White House? It took ages to get the upholstery clean." "That drunken mob, sir, was the American people, and they deserve to celebrate their victory." "Order, order! Now, did this celebration have pie?" "Very well. Mr. Jackson, is it not the case that immediately upon assuming office you introduced the spoils system, replacing hundreds of perfectly good federal employees with incompetent party loyalists?" "Your Honor, the President did no such thing. He tried to institute rotation in office to avoid any profiteering or funny business. It was the rest of the party who insisted on giving posts to their lackeys." "But Mr. Jackson complied, did he not?" "Now, uh, see here." "Moving on. Mr. Jackson, did you not help to cause the financial Panic of 1837, and the ensuing economic depression with your obsessive war against the Bank of the United States? Was not vetoing its reauthorization, as you did in 1832, an act of irresponsible populace pandering that made no economic sense?" "Your Honor, the gentleman has quite the imagination. That bank was just a way for rich Yanks to get richer. And all that money panic was caused when British banks raised interest rates and cut lending. To blame it on the President is preposterous, I say." "But if Mr. Jackson had not destroyed the National Bank, it would have been able to lend to farmers and businesses when other credit dried up, would it not?" "Hm, this is all highly speculative. Can we move on?" "Certainly, Your Honor. We now come to Mr. Jackson's most terrible offense: forcing entire tribes out of their native lands via the Indian Removal Act." "I resent that accusation, sir. The U.S. of A. bought that land from the Indians fair and square." "Do you call coercion and threats by a nation with a far more powerful army fair and square? Or signing a treaty for removing the Cherokee with a small group that didn't include their actual leaders? They didn't have time to properly supply themselves before the army came and forced them to march the Trail of Tears." "Now, hold on a minute. This was all Van Buren's doing after President Jackson left office." "But Mr. Jackson laid the groundwork and made sure the treaty was ratified. All President Van Buren had to do afterwards was enforce it." "Look here, Your Honor. Our government's been purchasing Indian land since the beginning, and my client was negotiating these deals even before he was President. President Jackson truly believed it was best for the Indians to get compensated for their land and move out West, where there was plenty of space for them to keep living the way they were accustomed, rather than stick around and keep butting heads with the white settlers. Some of whom, I remind our court, wanted to exterminate them outright. It was a different time." "And yet, even in this different time, there were many in Congress and even the Supreme Court who saw how wrong the Removal Act was and loudly opposed it, were there not?" "My client was under a great deal of pressure. I say, do you think it's easy governing such a huge country and keeping the Union together, when states are fixing to nullify federal laws? President Jackson barely got South Carolina to back down over those import tariffs, and then Georgia had to go discover gold and start grabbing up Cherokee land. It was either get the Indians to move or get in another fight with a state government." "So, you admit that Mr. Jackson sacrified moral principles to achieve some political goals?" "I do declare, show me one leader who hasn't." As societies change and morals evolve, yesterday's hero may become tomorrow's villain, or vice versa. History may be past, but our understanding of it is always on trial.

**P36 2014-01-21 History vs. Andrew Jackson - James Fester**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=36)

翻译人员: Xiaoou Chen 校对人员: Yolanda Zhang是国家英雄？还是社会第一公敌？历史人物通常是充满着争议的，但是几乎没有谁在他们的生命中会像第七届美国总统那样被藐视与诽谤。这是历史与安德鲁·杰克逊的对抗。“肃静，肃静，呃，我们之前说到哪了。。。 啊，对了，杰克逊先生！你面对着让总统办公室受辱，并导致造成金融崩溃和肆无忌惮地，残忍地 反对美国印第安人的控告。你是否认罪?”“法官大人，我不是个大城市来的律师，但我还是有些见识的。我知道杰克逊总统是一位白手起家的拓荒者，一位伟大的将军，一个真正的人民的领袖。”“法官大人，这个 '人民的领袖' 是个赌徒，一个醉鬼，还是个打架闹事者。因为我已经听说他会立即参加斗争，然后又迅速拍拍屁股走人。我问您，这样的一个人是否适合 被称为全国最杰出的总统呢？我们是否应该忘记 他就职典礼时的大混乱呢？有谁曾经听说过邀请醉酒的暴徒进入白宫的?花了很长时间受损的白宫 才得以恢复原貌。”“先生，那醉酒的暴民是美国人民，他们有权（在这里）庆祝他们的胜利。”“肃静，肃静！好的，这次庆祝 获得了什么实际利益吗?”“很好。杰克逊先生，你难道不是在上任后，立刻就采用了政党分肥制系统，用不称职的党派忠实者更换了数百个完美的联邦雇员？”“法官大人，（杰克逊）总统 没有做过这种事。他试图制定轮换制度去避免任何暴利或不合理的机制。是党内的其他成员坚持将职位给党派的马屁精们。”“但杰克逊先生同意了这件事， 难道不是么?”“呃，这倒是。”“我们继续。杰克逊先生，是你图谋利用1837 年的金融恐慌，和随后的经济萧条掀起你那残酷的战争，来打击美国的银行吗？难道你在1832 年否决其再次授权，不是一种不负责任的单纯为了迎合民众，但却没有任何经济道理的行为吗?”“法官大人，这位先生非常有想象力。那些银行也只是一种 让富裕的北方佬更有钱的一种手段罢了。那些所谓的货币恐慌都发生在当英国银行上调利率并消减贷款时。我想说将这些罪行归咎于 （杰克逊）总统是荒谬的。”“但如果杰克逊先生没有摧毁国家银行，在其他信贷枯竭的时候，国家银行本来是可以向 农民和企业发放贷款的，难道不会么？”“嗯，这确实很可疑。我们能继续吗?”“当然，法官大人。下面就是杰克逊先生最骇人听闻的罪行：他通过印第安驱逐法案强迫整个印第安部落 离开他们土生土长的家园。”“我反对那个指控，法官先生。美国（政府）公平公正地从印地安人那里买了那片土地。”“难道你要把一个相比印第安人有着更强大的军队的国家的胁迫和威胁称为公平公正吗？或是你要把杰克逊总统与 一小批非印第安人领导的小组签订的驱逐柴拉基族 （北美印第安部落之一）的条约称为公平么？军队前来并强迫他们踏上血泪之路之前， 他们甚至没有时间去准备充足的吃穿用度。”“现在，有一点要强调。这一切都是范布伦在杰克逊总统结束任期后所做的。”“但杰克逊先生奠定了基础，并确保了条约的批准。所有范布伦总统所做的就是去执行罢了。”“法官大人，请听我说。从最开始,我们的政府已经 在购买印第安人的土地了，而且在我的客户成为总统之前，他就在谈判这些交易了。杰克逊总统真正相信这对印第安人最有利，补偿他们的土地，让他们搬到有足够空间的西部，这样他们就可以按照习惯的方式继续生活，而不是留在这里与白人定居者对抗。我要提醒法院， 其中（鼓励签订条约的）一些人是想要彻底消灭他们。那是一个不同的时代。”“然而，即使在这不同的时代，很多人在国会中，甚至最高法院中，依然看见了驱逐法案中的巨大错误，并大声地反对它，难道没有这样的人吗?”“我的客户（当时）顶着巨大的压力。我要说，你觉得 管理这么大的一个国家，并让其保持民调一致是一件容易的事情么？特别是在当各个州决心废除联邦法的时候。杰克逊总统几乎不能让南卡罗莱纳州上交进口关税，然后佐治亚州就不得不去找寻黄金并开始侵占柴落基印第安人的土地。（这样一来）要么让印地安人移居，要么就得与州政府陷入另一场战争。”“那么你承认，杰克逊先生放弃了道德原则去实现一些政治目标吗?”“我要申明，（请）指出 有哪一位领导么没这么做过。”随着社会和道德（标准）的演变，昨日的英雄可能成为明天的恶棍，反之亦然。历史可能已成为过去，但我们始终都在不断审视并理解它。

**P37 2014-01-24 How fast are you moving right now - Tucker Hiatt**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=37)

How fast are you moving right now? That seems like an easy question. The first tempting answer is, "I'm not moving." Upon further reflection, you realize that maybe the Earth's motion counts. So, a second tempting answer is, "19 miles/second around the Sun." But then you recall learning that the Sun moves around the center of the Milky Way galaxy, and the Milky Way moves within the Local Group of galaxies, and the Local Group moves within the Virgo Cluster, and the Virgo Cluster moves within... "How fast are you moving?" is not an easy question. When Mission Control tells astronauts how fast they're going, there's always an assumed standard of rest. At the start of the voyage, speeds are given relative to the launchpad. But later, when the launchpad is just one more arbritrary place down there on Earth's spinning surface, speeds are given relative to the idealized, non-spinning pinpoint center of Earth. On their way to the Moon, Apollo astronauts had a hard time answering the question, "How fast are you moving?" Speed away from Earth was one thing, and speed toward the Moon was quite another. That's because the Earth and the Moon move relative to one another. Ah, of course! Speed is a relative quantity. When Captain Kirk ask Lieutenant Sulu if the Starship Enterprise has reached a speed of warp 7, Sulu should reply, "Relative to what, Captain?" Such a sassy reply may get subordinate Starfleet officers in trouble, but it is the only good answer to the question, "How fast are you moving?" This is basic relatively talking. Not fancy Einsteinian relativity, but good old fashioned (and still correct) Galilean relativity. Galileo seems to have been the first person to realize that there is no such thing as an absolute speed. Speeds are relative. This means that speeds only have meaning when they are referred to a reference frame. Presumably that reference frame is itself at rest. But then we have to ask again, "At rest relative to what?" Because even the concept of rest has lost any hint of absolute meaning. Speed is relative, and rest is relative. Earth's speed is 19 miles/second relative to the Sun. The Enterprise's speed is warp 7 relative to the center of the Milky Way galaxy. Your speed is zero relative to your easy chair. But depending on where you sit, it is hundreds of miles/hour relative to Earth's center. When we furrow a brow and ask, "But how fast is Earth really moving?" we imagine Spaceship Earth plowing through the ocean of space as it orbits the Sun. But space is not an ocean. It has no substance as water does. Space is not a thing; space is nothing. Space is no thing. You can move between two points in space, say between Earth and Mars, but you can't move through space. There's nothing to move through. It's like trying to say how much a hole weighs. A hole weighs exactly nothing because a hole is nothing. It's a void, and so is space. To move relative to nothing is meaningless. The concepts of speed and of rest have only relative meaning. They are absolutely meaningless. They mean something only with respect to arbitrarily chosen, artificial frames of reference. If, someday, you are buckled into your spaceship, and you see from the side window, say, a space station whizz by at constant speed, there is no way to know which of you is really moving. Neither of you is really moving because there is no deep reality about constant speed. Constant speed in a straight line has only relative meaning, a kind of relative reality. Does this mean that all motion is relative? No! Some motions have only relative meaning, but some motions have absolute meaning, are absolutely real. For example, constant speed is relative, but change in speed is absolute. Calling something absolute in science means that arbitrary standards are not used in its measurement. It is unambiguously measurable. When your spaceship fires its engines, your change in speed is beyond doubt. You feel it in your stomach, and your ship's sensors can measure it. Outside your window, the passing space station may seem to be changing speed, but the beings inside the station will not feel it. And no sensors can measure it. You are really changing speed, and they are really are not. There's something absolutely real about changes in speed. The same goes for rotation. If your spaceship is spinning, you can feel it, and your ship's sensors can measure it. The space station outside may seem to be going around you, but it is you who feels queasy, not the folks in the space station. You are really spinning, and they really are not. There's something absolutely real about rotation. So, some motions are relative, and some are not. There is no deep reality about constant speed, but changes in speed are deeply real, and so are rotations. We have to be thoughtful in our analysis of everyday experience in order to identify what is deeply real. Since we can be fooled by perceptions as basic as speed, maybe every perception deserves careful scrutiny. This is what inspired Einstein to his incredible insights about the speed of light and forward time travel. Knowing how to identify what is deeply real is tough and important work. If a police officer ever pulls you over for speeding and asks, &quot;Do you know how fast you were going?&quot; an insightful, though perhaps unwise, reply would be, "Relative to what?" And then, as you sit in the backseat of the police car and feel it accelerate toward jail, you can add, &quot;But some things are absolute!&quot;

**P37 2014-01-24 How fast are you moving right now - Tucker Hiatt**

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翻译人员: Tianchang Luo 校对人员: Chen Zou此时此刻你移动得有多快？这似乎是个简单的问题第一反应得到的答案是“我并没有移动。”经过更一步的思考后你意识到可能地球的运动要算进去所以，第二个容易想到的答案是“以19英里每秒的速度围绕太阳运动。”但是马上你又回想起曾经学过太阳绕着银河系的中心运动银河系在本星系群中运动而本星系群又在室女座星系团中运动室女座星系团运动在……“你移动得有多快？”不是一个简单问题当太空航行地面指挥中心告诉宇航员他们的运动速度时总会有个关于静止的假定标准在航行的一开始速度是以发射台作为参照给出的但随后，当发射台只不过是在地球旋转表面上的又一个任意的地点时速度的给出是根据理想状态下的，停止运转的地球的中心在驶向月球的旅途中阿波罗号宇航员们发现很难回答这个问题“你移动得有多快？”从地球出发是一个速度驶向月球又是另一个速度这是因为地球和月球相对于彼此运动理所当然的速度是一个相对量当Krik船长询问中尉Sulu企业号星舰是否达到曲速7级的速度时Sulu本应该回答“相对于什么而言，船长？”如此无礼的回答只怕会让星际舰队的下级官员们惹上麻烦但它却是“你移动得多快？”这个问题唯一的好答案这基本的相对说法不是大名鼎鼎的爱因斯坦相对论但也是守旧的（而且至今仍然是正确的）伽利略相对性原理伽利略似乎是第一个认识到绝对速度是不存在的人速度是相对的这就意味着当速度与参考系联系起来时它们才具有意义假定这个参考系自身是静止的但我们又要问“静止相对于什么？”因为即使静止这个概念已经失去了任何绝对的意义速度是相对的，静止也是相对的地球以19英里每秒的速度的绕太阳公转企业号飞船的速度是曲速7级相对于银河系的中心你的速度相对于你坐的椅子为零但是根距你坐的地方相对于地球中心，你的速度是几百英里每小时当我们皱着眉毛然后问“那么地球究竟移动得有多快？”我们把地球想象成一艘飞船在宇宙的海洋中乘风破浪在绕着太阳公转的同时但宇宙不是海洋它不像水一样由物质构成宇宙不是一个事物宇宙什么都不是宇宙没有事物你能在宇宙中的两个点之间任意移动假如说在地球和火星之间但你不能穿过宇宙没有什么可以穿过的就好像是在说一个洞有多重一个洞是没有重量的因为一个洞什么也不是它是无效的，宇宙也是没有参照系的移动是毫无意义的加速和静止的概念只有相对意义它们从绝对意义上说是无意义的它们的意义只存在于任意选中的人工参照系中如果有一天，你坐在宇宙飞船中你从舷窗看到一个宇宙空间站匀速飞过没有办法确定你们中的哪一个是在真正移动你们都没有在真正运动因为关于匀速并没有深刻的现实意义在一条直线上的匀速只有相对意义就好像是一种相对的现实这意味着所有运动都是相对的吗？不是！一些运动有相对意义但是一些运动有绝对意义是绝对真实的比方说，匀速运动是相对的但速度的改变是绝对的在科学上，把一件事称作为绝对意味着任意的标准没有被运用在它的测量上它是完全清晰可量的当你的宇宙飞船发动时你在速度上的变化是毫无疑问的你感受到你的胃在翻腾而且你的飞船感应器可以测量出这一变化在你的窗外和你擦肩而过的宇宙空间站看起来可能也在发生速度变化但置身于空间站之内不会感受到而且也没有任何感应器可以测量它你是真的在发生速度变化它们确实没有关于速度变化有些东西是绝对真实的飞船的旋转也一样如果你的飞船在旋转你是能感受到的飞船上的感应器也可以测量在空间站外面的一切看起来在围着你转但你却是感到头晕眼花的那一个而不是空间站里的人们你确实在旋转他们真的没有这就是旋转里面的绝对真实所以，有些运动是相对的，有些不是对于匀速，并没有深刻的现实性但速度的变化却再真实不过了旋转也是我们必须考虑周全在日常经历的分析中为了确定什么是有深刻真实性的由于我们会被知觉所迷惑比如基本的速度也许对每一个知觉都应该加以仔细的审查这启发了爱因斯坦提出了关于光速和到未来旅行的不可思议的见解知道如何分辩什么是深刻的真实是一个艰难而且重要的工作如果你因为超速被警察拦下然后被问“你知道你开的有多快吗？”一个有深刻见解的，尽管可能不明智的回答会是，“相对于什参照系？”然后，当你坐在警车的后座上感受到正在加速前往拘留所的时候你可以再说一句“但是有些事是绝对的！”

**P38 2014-01-28 Animation basics - The art of timing and spacing - TED-Ed**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=38)

Norman McLaren, the great 20th century pioneer of animation technique, once said, "Animation is not the art of drawings that move, but the art of movements that are drawn. What happens between each frame is more important than what exists on each frame." What did he mean? Well, for an object to appear in motion, it necessarily has to change in position over time. If time passes and no change in position occurs, the object will appear to be still. This relationship between the passage of time and the amount of change that occurs in that time is at the heart of every time-based art form, be it music, dance, or motion pictures. Manipulating the speed and amount of change between the frames is the secret alchemy that gives animation the ability to convey the illusion of life. In animation, there are two fundamental principles we use to do this: timing and spacing. To illustrate the relationship between them, we'll use a timeless example: the bouncing ball. One way to think about timing is that it's the speed, or tempo, at which an action takes place. We determine the speed of an action by how many pictures, or frames, it takes to happen. The more frames something takes to happen, the more time it spends on screen, so the slower the action will be. The fewer frames something takes to happen, the less screen time it takes, which gives us faster action. The timing is about more than just speed, it's also about rhythm. Like a drumbeat or melody only exists when a song is being played, the timing of an action only exists while it's happening. You can describe it in words, say, something will take 6 frames, 18 frames, or so on. But to really get a sense of it, you need to act it out or experience it as it would happen in, well, real time. Now, the timing of an action all depends on the context of the scene and what you're trying to communicate. What is doing the acting, and why? Let's take our example. What makes a ball bounce? The action we're talking about here is a result of interacting physical forces, a moving ball's tendency to stay in motion, or its force of momentum vs. the constant force of gravity bringing it back down Earth. The degree to which these invisible forces apply, and the reason why the ball behaves the way it does, all depends on the physical properties of the ball. A golf ball is small, hard and light. A rubber ball is small, soft and lighter. A beach ball is large, soft and light. And a bowling ball is large, hard and heavy. So, each ball behaves very differently, according to its properties. Let's get a sense of the visual rhythm of each. Each ball plays its own beat and tells us something about itself and the time it takes to travel across the screen. The visual rhythm of these hits is the timing. Okay, let's start animating our ball, bouncing up and down with a simple cycle of drawings. We'll draw a circle here, call it point A, our starting point. We'll have it hit the ground here, point B. Let's say it takes about a second to hit the ground and come back up again. This is our timing. Our spacing is where we position the circle in the frames between point A and point B. If we were to move our ball in evenly-spaced increments, we'd get something like this. It's not really telling us anything about itself. Is it a bouncing ball or a circle on an elevator? Let's look at our footage again and think about what's going on as each ball bounces. Following each impact with the ground, the ball's upward momentum is eventually overcome by gravity. This happens at the peak of each arc. As things change direction, the motion is slowest. We see here the successive positions of the ball are close together. The ball then speeds up as it falls, and is at its fastest when it's approaching and hitting the ground. We can see here each position is further apart. The change in position between frames is the spacing. The smaller the change, the slower the action will appear. The greater the change, the faster it will appear. For an action to decelerate, each change in position must be less than the change before it. Likewise, for an action to speed up, or accelerate, each successive change must be greater. Let's change the mechanical spacing of our animated bounce to reflect what we observed in the footage. Slow at the top, fast when it's hitting the ground. Simply by adjusting the spacing, we've succeeded in suggesting the forces of momentum and gravity at play and achieved a much more realistic motion. Same timing but different spacing gives us vastly different results. And in reality, as a ball bounces, the physics of gravity eventually defeat the tendency of the ball to stay in motion. You can see this here in the decreasing height of each successive bounce. However, again, this decrease varies according to the properties of the ball. Even though these circles are the same size here, they're each telling us a different story about themselves, purely in how they move. The relationship between these principles of timing and spacing can be applied in countless ways and used to animate all types of action: a yo-yo, a punch, a gentle tap, a push, a saw, the Sun traveling across the sky, a pendulum. Animation is a time-based art form. It may incorporate the aesthetic elements of other graphic arts, like illustration or painting, but what sets animation apart is that, here, what you see is less important that what you don't see. An object's superficial appearance only tells us so much about itself. It's only when it's in motion that we really understand its nature.

**P38 2014-01-28 Animation basics - The art of timing and spacing - TED-Ed**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=38)

翻译人员: Yan Ge 校对人员: Amy H. Fann20世纪动画技术的先驱者，诺曼·麦克拉伦，曾说过“动画并不是绘画移动的一门艺术，而是将动态画出来的一门艺术。与每一帧上的内容相比，帧与帧之间的联系更为重要。”这是什么意思呢？是指，要想让物体看起来是在移动的，它的位置必须随着时间的推移而变化。如果时间变化而物体的位置却没有变化，它看起来就是静止的。时间变化和这段时间中 物体位置变化的量之间的关系是每一样以时间概念为基础的艺术形式的核心，比如音乐、舞蹈以及电影艺术。控制两帧之间物体位置变化的速度和量是赋予动画生命的秘密法宝。在动画中，我们遵循两个基本原则来进行这一控制：时间原则和空间原则。为了说明这两者之间的关系，我们举一个经典例子： 弹跳球。我们可以这样看待时间：时间，是一个动作的速度或者节奏。我们增减完成动作所使用的图片， 也就是帧的数量，以此决定动作的速度。完成动作所使用的帧数越多，它在屏幕上呈现的时间就越长，动作也就越慢。反之，完成动作所使用的帧数越少，它在屏幕上呈现的时间就越短，动作就会越快。时间不仅仅指速度，它也和节奏有关。鼓点和旋律只存在于播放的音乐之中，同样地，动作的时间只有在动作发生时才存在。你当然可以用文字来描述它，比如，某个动作需要6帧或者18帧来完成。但要想真正理解这个动作，你需要在现实时间里再现或体验它。也就是说，动作的时间完全取决于 背景关联和表达内容。那这些动作是什么？ 又为什么会有这些动作呢？让我们回到弹跳球的例子，球为什么会弹跳呢？这实际上是两股力量交互作用的结果：一方面，运动中的球体由于动力作用想要保持动势；而另一方面，地心引力却不断试图将其拉回地面。这两方无形力量的作用程度以及球体的运动方式都是由球的物理特性决定的。高尔夫球体积小、坚硬、质量轻；橡皮球体积小、 柔软、质量更轻；沙滩球体积大、柔软、非常轻；而保龄球则体积大、坚硬、非常重。所以，每种球都会因其特性而有不同的表现。让我们感受一下每种球运动的视觉节奏。每种球都有自己的节拍，以此来告知我们其特性以及它们穿过屏幕所需的时间。球体连续撞击地面所产生的视觉节奏体就是时间。现在，让我们用简单的绘画让这个球跳动起来。在这里画一个圆圈，作为点A，是运动的起始点。我们让球体在这里接触地面，也就是点B。假设球体从点A落下触地再弹回需要一秒钟。这就是我们所说的时间。而空间则是指每一帧里点A和点B的位置关系。如果我们让球体按等距离运动，就会得到这样的效果。我们很难以此判断这究竟是什么：是一个弹跳球？ 还是电梯上的一个圆圈？让我们再来看一下球弹跳的画面，并且思考每种球到底是如何弹跳的。在球体与地面接触后，其向上的动势最终被地心引力消除。此时球体达到弧线轨迹的顶点。球体改变方向的那一刻， 其运动速度最慢。在顶点附近，球的连续位置非常紧密。此后球体下落，速度加快，在它即将接触地面的瞬间，速度达到峰值。远离顶点，球的连续位置则较为松散。帧与帧之间物体位置的变化体现出空间原则。位置变化越小，动作显得越慢；位置变化越大，动作则显得越快。动作由快变慢，位置变化必须逐渐减小；同样地，动作由慢变快，位置变化则要逐渐增大。让我们通过调节球体的位置变化来表现此前在影片中所看到的球体运动。到达顶端时速度放缓， 落向地面时速度加快，仅仅通过调整空间关系，我们成功地反映了动力与地心引力的作用，并更为真实地表现了球体的运动。运动时间相同，但空间变化不同，所产生的效果也大不相同。现实中的情况是，地心引力终将完全消除球的动势。从球越跳越低的趋势中你就能看出这一点。但仍要强调，根据球特性不同，这种趋势也有不同的表现。虽然这两个圆圈大小相同，但仅仅通过不同的运动方式，它们就能展现各自不同的特性。这些时间和空间原则之间的关系能以无数种方式被运用，并可以用来为任何动作制作动画：悠悠球，击打动作，轻轻地敲击，推的动作，锯子的运动，日升日落，钟摆运动。动画以时间概念为基础的艺术形式。它虽包含插画、油画等绘画艺术的审美元素，却也有其独特之处，那就是，你在画面上没有看到的东西要比你所看到的更为重要。物体的表象能告诉我们的东西有限；只有当它们运动起来，我们才能真正理解其本质特性。

**P39 2014-01-28 Want to be an activist Start with your toys - McKenna Pope**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=39)

I'm McKenna Pope. I'm 14 years old. And when I was 13, I convinced one of the largest toy companies, toy makers in the world, Hasbro, to change the way that they marketed one of their best-selling products. So, allow me to tell you about it. So, I have a brother, Gavin. When this whole shebang happened, he was four. He loved to cook. He was always getting ingredients out of the fridge and mixing them into these, needless to say, uneatable concoctions or making invisible macaroni and cheese. He wanted to be a chef really badly. And, so what better gift for someone, for a kid who wanted to be a chef, than an Easy Bake Oven, right? I mean, we all had those when we were little. And he wanted one so badly. But then, he started to realize something. In the commercials and on the boxes for the Easy Bake Oven, Hasbro marketed them specifically to girls. And the way that they did this was they would only feature girls on the boxes or in the commercials, and there would be flowery prints all over the ovens, and it would be in bright pink and purple. Very gender-specific colors to females, right? So, it kind of was sending a message that only girls are supposed to cook. Boys aren't. And this discouraged my brother a lot. He thought that he wasn't supposed to want to be a chef. because that was something girls did. Girls cooked, boys didn't. Or so, the message that Hasbro was sending. And this got me thinking, "God, I wish there was a way I could change this, that I could have my voice heard by Hasbro, so I could ask them and tell them what they were doing wrong and ask them to change it." And that got me thinking about a website that I had learned about a few months prior called Change.org. Change.org is an online petition-sharing platform, where you can create a petition and share it across all these social media networks, through Facebook, through Twitter, through YouTube, through Reddit, through Tumblr, through whatever you can think of. And so, I created a petition, along with a YouTube video that I added to the petition, basically asking Hasbro to change the way that they marketed it, in featuring boys in the commercials and on the boxes, and most of all creating them in less gender-specific colors. So, this petititon started to take off, like humongously fast, you have no idea. I was getting interviewed by all these national news outlets and press outlets, and it was amazing. In three weeks, maybe three and a half, I had 46,000 signatures on this petition. (Applause) Thank you. So, needless to say, it was crazy. Eventually, Hasbro themselves invited me to their headquarters so they could go and unveil their new Easy Bake Oven product to me, in black, silver and blue. It was literally one of the best moments of my life. It was like "Willy Wonka and the Chocolate Factory." That thing was amazing. What I didn't realize at the time, however, was that I had become an activist. I could change something that, even as a kid, or maybe even especially as a kid, my voice mattered. And your voice matters, too! I want to let you know that it's not going to be easy, and it wasn't easy for me because I faced a lot of obstacles. People online, and sometimes even in real life, were disrespectful to me and my family and talked about how the whole thing was a waste of time, and it really discouraged me. And actually, I have some examples because what's better revenge than displaying their idiocy? So, let's see. From username Liquidsword29, interesting usernames we have here, "Disgusting liberal moms making their son's gay." Liquidsword29, really? Really? Okay, how about from Whiteboy77AGS, "People always need something to 'female dog' about." From Jeffrey Gutierrez, "OMG shut up! You just want money and attention." So, it was comments like these that really discouraged me from wanting to make change in the future because I thought, "People don't care. People think it's a waste of time. And people are going to be disrespectful to me and my family." It hurt me. And it made me think, "What's the point in making change in the future?" But then I started to realize something. Haters gonna hate. Come on, say it with me! One, two, three, Haters gonna hate! So let your haters hate, you know what! And make your change because I know you can. I look out into this crowd, and I see 400 people who came out because they wanted to know how they could make a change. And I know that you can, and all of you watching at home can, too, because you have so much that you can do and that you believe in. And you can trade it across all the social media, through Facebook, through Twitter, through YouTube, through Reddit, through Tumblr, through whatever else you can think of. And you can make that change. You can take what you believe in and turn it into a cause and change it. And that spark that you've been hearing about all day today you can use that spark that you have within you and turn it into a fire. Thank you. (Applause)

**P39 2014-01-28 Want to be an activist Start with your toys - McKenna Pope**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=39)

翻译人员: Minji Seo 校对人员: Ying Wang我是麦肯娜·波普（McKenna Pope）我14岁当我13岁的时候全球最大玩具制造商之一孩之宝（Hasbro）在我说服下改变一项热门商品的行销策略让我从头说来事情是这样的当时我弟加文(Gavin)才4岁因为酷爱烹饪总是从冰箱拿食材胡搞瞎搞不用说也知道那种杂烩是难以下咽的要不就假装在作通心粉和起司他很想当厨师对想当厨师的小孩有什么礼物会比轻松烤箱(Easy Bake Oven)更棒的对吧?我的意思是，我们儿时都有这些玩具我弟也很想要一套不过他后来发现一件事孩之宝营销轻松烤箱的广告和包装都是特别针对女孩他们的作法是这样的包装上只有女孩的照片或以女孩为广告主角外观则印满花俏图案并以粉红和紫色搭配非常女性化的颜色对吧?这彷佛透露一件事只有女孩应该下厨男孩而不应该我弟为此感到十分气馁他以为自己根本不该想当主厨因为那是女孩子家的事女孩才适合，男孩则不孩之宝当时传达的讯息就类似这样因此我有这样的想法「真是的!希望我能改变此事，让孩之宝知道我的想法，我就可请教他们，告诉他们现在用的方法不好，并要求他们改变作法。」这让我想起几个月前听说的一个网站叫Change.org那是个在线请愿平台可让人发起联署还可以用社群网络分享像脸书、推特Youtube、Reddit、Tumblr任何你想到的社群网络于是我便发起联署并附带一段Youtube影片主要诉求就是请孩之宝改变一下营销方式在包装及广告里加入男孩最重要的是用中性点的颜色这项联署随之展开进展之快超乎想象国内新闻媒体纷纷来采访我这太令人喜出望外了仅3周还是3周半内就有4万6千人联署(掌声)谢啦!这当然太疯狂了......孩之宝后来邀我到他们总公司去向我展示新增银黑蓝3色的改版「轻松烤箱」那真是我这一生最棒的时候感觉像我在《巧克力梦工厂》的电影情节里实在不可思议不过那时我还没想到自己已成为社运人士就算是小孩子，我也能造成改变也许正因为我是儿童我的意见因而重要你们的也是!我跟你们说，这种事不会轻易就可办到以我的经验来说也不是因为我经历过许多阻碍网友和生活周遭的人并没给我和家人应有的尊重而且还说这一切只不过是浪费时间令我当时真是心灰意冷实际上，我还带了实例因为公布这些愚蠢的行为就是最好的反击让我看看......有个用户名很特别的网友叫Liquidsword29的说:「把儿子搞成同性恋的自由派老妈。」Liquidsword29，你真以为如此吗?好! 接着是Whiteboy77AGS:「人通常需要话题抱怨一下!」Jeffrey Gutierrez说：「我的老天! 闭嘴吧! 不过就是要钱和炒作罢了！」就是这些评论当时让我很气馁当时让我很气馁因为我想「大家不在乎，觉得这是浪费时间，我和家人也不会因此得到他人尊重。」我为此难过不已!忍不住想：「改变未来到底有何意义?」不过我接着想到有人就是爱找碴!来吧!我们一起说!一，二，三有人就是爱找碴!随便他们想怎样! 我跟你说尽管做你的!我相信你办得到!我看到今天有400位观众出席大家之所以参与是因为想知道要如何促成改变?而我也相信你们做得到屏幕前的观众也一样因为大家能做的事太多了!能投入的改变太多了!大家可在社群媒体交流像是脸书、推特透过Youtube、Reddit和Tumblr还有其他你能想到的就能促成你要的改变挑件你认为对的事当作目标，做出改变！今天你们听到的火花各位大可把心中的火苗改变成火焰谢谢!(掌声)

**P40 2014-01-28 What percentage of your brain do you use - Richard E. Cytowic**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=40)

An enduring myth says we use only 10% of our brain, the other 90% standing idly by for spare capacity. Hucksters promised to unlock that hidden potential with methods "based on neuroscience," but all they really unlock is your wallet. Two-thirds of the public and nearly half of science teachers mistakenly believe the 10% myth. In the 1890s, William James, the father of American psychology, said, "Most of us do not meet our mental potential." James meant this as a challenge, not an indictment of scant brain usage. But the misunderstanding stuck. Also, scientists couldn't figure out for a long time the purpose of our massive frontal lobes or broad areas of the parietal lobe. Damage didn't cause motor or sensory deficits, so authorities concluded they didn't do anything. For decades, these parts were called silent areas, their function elusive. We've since learned that they underscore executive and integrative ability, without which, we would hardly be human. They are crucial to abstract reasoning, planning, weighing decisions and flexibly adapting to circumstances. The idea that 9/10 of your brain sits idly by in your skull looks silly when we calculate how the brain uses energy. Rodent and canine brains consume 5% of total body energy. Monkey brains use 10%. An adult human brain, which accounts for only 2% of the body's mass, consumes 20% of daily glucose burned. In children, that figure is 50%, and in infants, 60%. This is far more than expected for their relative brain sizes, which scale in proportion to body size. Human ones weigh 1.5 kilograms, elephant brains 5 kg, and whale brains 9 kg, yet on a per weight basis, humans pack in more neurons than any other species. This dense packing is what makes us so smart. There is a trade-off between body size and the number of neurons a primate, including us, can sustain. A 25 kg ape has to eat 8 hours a day to uphold a brain with 53 billion neurons. The invention of cooking, one and half million years ago, gave us a huge advantage. Cooked food is rendered soft and predigested outside of the body. Our guts more easily absorb its energy. Cooking frees up time and provides more energy than if we ate food stuffs raw and so we can sustain brains with 86 billion densely packed neurons. 40% more than the ape. Here's how it works. Half the calories a brain burns go towards simply keeping the structure intact by pumping sodium and potassium ions across membranes to maintain an electrical charge. To do this, the brain has to be an energy hog. It consumes an astounding 3.4 x 10^21 ATP molecules per minute, ATP being the coal of the body's furnace. The high cost of maintaining resting potentials in all 86 billion neurons means that little energy is left to propel signals down axons and across synapses, the nerve discharges that actually get things done. Even if only a tiny percentage of neurons fired in a given region at any one time, the energy burden of generating spikes over the entire brain would be unsustainable. Here's where energy efficiency comes in. Letting just a small proportion of cells signal at any one time, known as sparse coding, uses the least energy, but carries the most information. Because the small number of signals have thousands of possible paths by which to distribute themselves. A drawback of sparse coding within a huge number of neurons is its cost. Worse, if a big proportion of cells never fire, then they are superfluous and evolution should have jettisoned them long ago. The solution is to find the optimum proportion of cells that the brain can have active at once. For maximum efficiency, between 1% and 16% of cells should be active at any given moment. This is the energy limit we have to live with in order to be conscious at all. The need to conserve resources is the reason most of the brain's operations must happen outside of consciousness. It's why multitasking is a fool's errand. We simply lack the energy to do two things at once, let alone three or five. When we try, we do each task less well than if we had given it our full attention. The numbers are against us. Your brain is already smart and powerful. So powerful that it needs a lot of power to stay powerful. And so smart that it has built in an energy-efficiency plan. So don't let a fraudulent myth make you guilty about your supposedly lazy brain. Guilt would be a waste of energy. After all this, don't you realize it's dumb to waste mental energy? You have billions of power-hungry neurons to maintain. So hop to it!

**P40 2014-01-28 What percentage of your brain do you use - Richard E. Cytowic**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=40)

翻译人员: Zhou Sijia 校对人员: Angelique Wang一个经久不衰的迷思声称我们只运用大脑的十分之一剩下的百分之九十只不过是备用的存储而已某些假行家声称可以用“基于神经科学”的方法来开发那90%的隐藏潜力但他们真正打开的不过是你的钱包。三分之二的大众以及近半数的科学教师误以为人只能用十分之一大脑的声明是真的。在 19 世纪 90 年代，威廉 · 詹姆斯，美国心理学之父曾说，&quot;我们大多数人是不能开发我们全部的脑力潜能&quot;。詹姆斯的话意味着这是一项挑战，而并非控诉我们大脑较少的使用率。但这个误会一直困扰着大家。另外，在很长一段时间里科学家们想不出我们脑内大量的额叶或大面积的顶叶的用途。并且因为额叶和顶叶的损伤并不会引起运动或感觉神经的缺失，所以研究人员断定他们没有任何作用。几十年来，这些部位被称为沉默区域，他们真正的作用令人难以琢磨。我们既然已经知道他们重视执行和综合能力，所以一旦失去他们，我们几乎就失去了人类的基本能力。他们对我们抽象推理的能力、规划、做决定和是否能很快的适应环境有着至关重要的作用。那个十分之九的大脑在你的脑袋里袖手旁观的理论，在我们计算大脑怎样消耗能量时显得毫无道理。啮齿动物和犬齿动物的大脑消耗身体总能量的 5%。猴子使用其大脑的10%。成人的大脑，仅占全身质量的2%，每日却消耗20%的葡萄糖。而儿童消耗50%的葡萄糖，婴儿要消耗60%。这组数值远远超出了我们的预想，因为他们不同的大脑相对于整个身体的质量。人的大脑重 1.5 公斤，大象大脑重5 公斤，鲸鱼大脑重9 公斤，然而这每一公斤里面，人类的大脑比其他物种的大脑有更多的神经元。我们人类正是因为紧密排列的神经元才会如此聪明。在体重和神经元数量之间有一个平衡点，这就是灵长类动物（包括我们人类）可以承受的数量。一个25公斤重的猿每天要进食8个小时，才能使装有530亿个神经元的大脑正常运作。烹饪的发明，那是大约150万年前的事情，在进化方面带给了我们巨大的优势。煮熟的食物较为松软且在入口前已经过预消化。我们的内脏更容易吸收它的能量。烹饪节省时间并提供了更多的能量，相比于我们吃生食物来说。所以我们可以维持拥有860 亿密集神经元的大脑的正常运转，比猿大脑内的神经元数量多出40%。这里是它的工作原理：大脑消耗的一半卡路里都只是简单地为了保持大脑结构的完好无损用钠离子和钾离子渗透过细胞膜来保持胞内电荷平衡。要做到这一点，大脑则必须有强有力的能量。大脑每分钟都令人震惊地消耗 3.4 x 10 ^21 个三磷酸腺苷（ATP） 分子，三磷酸腺苷就好像支持我们身体燃烧的燃料。在所有 860 亿神经元里面保持（细胞的）静息电位的 高消耗，意味着只剩下很少的一点能量来把信号送到神经轴突和神经突触，实际上是神经放电这个过程在真正起作用。即使只有很少一部分的神经元在任一时间的某一区域被发射，在整个大脑内因生成峰值而产生的能量负担会使其不能长时间负荷。因此就需要高效利用能源。只让一小部分的细胞在某一时间被发射出来，这个叫做稀疏编码的过程，仅用最少的能量，但却能承载最多的的信息。因为少量的信号有成千上万种可能的路径来到达目的地。但稀疏编码在大量的神经元内却有一个缺点，那就是它的成本。更糟糕的是，如果有大量的细胞从来没有被发射出去，那他们都是多余的了自然选择在很长时间以前就应该把它们摒弃了。解决办法是要去找到可以立刻激活大脑的最佳数量比例的细胞。为使效率最大化，在任何时间1%~16%之间的细胞应该被激活。这是我们为了意识的清醒必须容忍的能量限制。为了节省资源是大部分大脑的运作必须发生在意识之外的原因。这就是为什么同时处理多项任务是很傻的差事。我们只是单纯缺乏同时做两件事情的能量更不用说三件事甚至五件事情了。当我们尝试同时处理多项任务的时候，每一项任务就会比我们全力以赴做一件事情的时候成效要差。这些数字是反对我们同时执行多任务的。你的大脑已经够聪明强大了。它需要很多的能量才能保持如此强大。大脑是如此的聪明，它已然建立了一个能源效率计划。所以不要让一个骗人的谎言让你对你据说很懒惰的大脑感到愧疚。罪恶感也是会浪费能源的。经过这一切...你难道没有意识到浪费精力是很傻的举动吗？你需要维持数十亿非常消耗能量的神经元的正常工作。所以赶快让他正常运作起来吧！

**P41 2014-01-31 How one teenager unearthed baseball's untold history - Cam Perron**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=41)

I've always collected baseball cards. I first started playing baseball when I was eight years old, and when my hometown, Red Sox won the World Series in 2004, I began meeting many of the players at autograph signings and events around Boston. But I noticed a few things in common. These players weren't very friendly, they were all quite overpaid and they acted more like celebrities. In middle school, a friend introduced me to a new way to collect autographs: writing the players through the mail. In doing so, I would write a letter, send a self-addressed stamped envelope, and send a few baseball cards. Within a few weeks, I'd often get a response. But it was never the modern players that would send back. It was always the players from the 50s and 60s, who were much friendlier, and much less recognized during their career. So, I continued to write letters to these retired ball players, and in 2007, Topps Baseball Cards came out with a set where they included a few Negro league baseball player cards. Negro league was a period from 1920 to the 1960s where blacks who were segregated from playing in the Major Leagues played in their own baseball league, often busing around the country, playing two to three games a day, under much less glamorous conditions. But over time, due to the lack of glamorization and public interest, everything just kind of faded away, leaving the history of the Negro leagues behind. So, I ended up writing to these players in this set and within a few weeks, they signed my cards. From here, I began writing to Negro leaguers who didn't have baseball cards. Guys that were, you know, even less recognized. And in my letters, I'd often include my phone number, and a few of them began reaching out to me. When I started speaking with them, I noticed they all had a few things in common. None of them had baseball cards, none of them had any documentation, no newspaper articles, no sorts of photos from their career, just nothing tying them to the game. And lastly, they had just left all their teammates behind. They hadn't stayed in touch with any of their teammates. So, I tried to change this, and I started off by making baseball cards on my home computer. Printing them out, designing them and sending them to ball players. And what I also did is I began signing up for newspaper archive websites where I'd find old newspaper articles that would give these guys the recognition that, you know, tied them to the game. And lastly, I began becoming kind of like a private investigator, tracking down their former teammates and trying to get these guys back in touch. From here, I went on and I just spoke to these players. It got to the point where I actually had players calling me up, asking me for information. And by the time I was a freshman in high school, it was no longer a hobby at all. I had gone from an autograph collector to this Negro league research obsession. I even asked for Negro league autographs and stamps for Christmas. So, going on through high school, I began to take this work in the Negro league much more seriously. I started working with adult Negro league researchers where I began working on a few different programs. The first being the Negro League Annual Reunion in Birmingham, Alabama. At the reunion, we'd have about 50 to 60 Negro league ball players from around the country, and they'd all come together, and these players would just, you know, sit in the hotel lobby for me from 8am until the late hours of the night just catching up, telling stories, and here we just had a week of events and these guys got some of this recognition and honor that they never really had before. The second program that I began working on was the Negro League Pension Program. And the Pension Program was a program that was offered by Major League Baseball, and if you played four years in the Negro league, and you can document it, these players would be entitled to 10,000 dollars a year. This meant a lot for these players. Many of these guys never really did much after baseball, they didn't make much money. So, when I was able to get these players pensions, it really made a difference. When I started doing this, I encountered a lot of difficulty. I had to go through hundreds and hundreds of newspaper articles trying to find this documentation to prove they played, and in many cases I did. Also I want to mention, when I was speaking with these players on the phone, tracking them down, it wasn't easy either. I would go through hundreds of articles trying to look for names, find information, and I encountered quite a lot of failure. I would call people up, it would be the wrong person. It would be really awkward. I'd also have a lot of times where I'd call players up, and they didn't want to speak at all to me. They would hang up. When I said the word baseball, they would just refuse to talk altogether. This was because they faced a lot of segregation during their careers. Along with the lack of glamorization that they faced, they also dealt with a lot of racism on and off the baseball field, which just lasted with them throughout their whole lives. These guys, you know, it was very emotional for them to talk about baseball, and it was really hard to kind of get these guys back, you know, talking about this game that they had kind of left behind. Lastly though, I encountered, you know, quite a lot of success as well. Some of these guys I'd call up, I'd talk to them for two to three hours, and these guys would just go on and on about their stories, telling me, like, exact baseball games and memories that they had. Nowadays, I've attended four Negro League Reunions, three of which I've actually roomed with former Negro league ball player Russell "Crazy Legs" Patterson of the Indianapolis Clowns. He actually snores at night, in case you all were wondering. I've worked on about a dozen pensions and I've tracked down over a hundred Negro league ball players, constantly finding new ball players, getting them in touch with their former teammates, bringing baseball back into these players' lives and bringing these guys back into the game. (Music) Thank you! (Applause)

**P41 2014-01-31 How one teenager unearthed baseball's untold history - Cam Perron**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=41)

翻译人员: Yuyang Zhao 校对人员: Lipeng Chen我一直都在收集棒球卡8岁的时候，我第一次开始打棒球，在2004年，我的家乡波士顿红袜获得总冠军，我开始跑红袜的签名会和活动在波士顿见到很多球员可是，我注意到很普遍的几件事这些球员都不太友善，名不符实可是都摆出名人的架式中学时，我的朋友告诉我一些收集签名的新方式：给球员写信。写信的时候，我会附上回邮信封，再附上几张棒球卡通常，几个礼拜就会收到回信但是现役球员都不会回我信一直是50、60年代老球员回信，他们人比较好但是他们的球员生涯往往很少受到关注。于是，我持续给这些退役的棒球选手写信在2007年，Topps公司推出一组棒球卡其中包含几位黑人联盟球员的卡片黑人联盟赛事从1920年代打到1960年代遭到大联盟排斥的黑人球员就到黑人联盟打球他们经常坐车到处跑，一天要打两三场球，一点也不光鲜亮丽可是，长久以来因为没有球星魅力和公众关注，一切就随风而逝了黑人联盟被历史遗忘于是，我尝试着给这些球员写信几周后他们在卡片上签了名从那以后，我开始写信给黑人联盟球员就是那些没有被印在球员卡上的那些知名度更低的球员我常常在信中附上电话号码其中几位球员就联系了我与他们聊天时我注意到他们有几个共同点这些球员都没有专属球员卡，他们也没有任何证明文件，没有上过报纸，球员生涯也没有留下照片好像从来没当过棒球选手。除此之外，他们落后所有的队友。他们与过去队友没有任何联系。于是，我想改变这种情形于是，我开始在家用自己的计算机制作棒球卡。设计，打印，再寄去给球员除此之外，我注册了几个报纸网站找到过去的新闻报导一些球员被认出，你也知道，他们曾经参加比赛。后来，我有点像私家侦探，我去找他们以前的队友尝试让他们恢复联系后来我更进一步，和这些球员直接对话这个时候，实际上球员开始主动联系我，问我一些事情那时候我高一做这些事已经不只为了好玩从原本收藏球员签名，后来一头栽进黑人联盟世界我甚至还用黑人联盟球员的签名与邮票作为圣诞礼物这样，度过了整个高中，我开始更认真的投入黑人联盟的研究我开始与与黑人联盟专家合作并开始着手于几个不同的项目第一个项目是黑人联盟年度大团圆在亚拉巴马州的伯明翰这个活动上，邀请了 50 ，60 位黑人联盟球员来自全国各地他们齐聚一堂这些球员，你也知道，和我一起坐在饭店大厅从早上 8 点坐到很晚叙叙旧，讲讲故事我们还举办了为期一周的系列活动参加的球员得到了肯定和赞赏这是以前从来没有的事情。我投身的第二个项目，叫黑人联盟退休金计划这个退休金计划由大联盟官方资助凡是在黑人联盟满4年的球员，并有文字记录证明。符合资格的球员，一年可以领 1 万美金。这对黑人联盟球员来说至关重要许多球员退役后没有稳定工作，没赚什么钱。于是，当我让这些球员能领退休金的时候，这是真的非同寻常。刚开始这个项目的时候，我碰到很多困难。我不得不翻阅几百几千篇的新闻报纸努力找到文字记录，证明某些球员的资格另外我也想说，想跟这些球员打电话，或找到他们，也真的不容易我得从几百篇文章里努力找到名字以及他们的信息，那时候我常常碰壁有时候拨了电话，可是发现找错人了。真的很尴尬。也有许多时候，我打电话给某些球员，但他们根本不想理我。直接挂我电话当我我说明来意是为了棒球，他们也拒绝谈话。那是因为，在打球的时候他们常常受到排斥。不能靠打球成名受欢迎，还要面对许多种族歧视和场内外的打压，这些在其一生之中都挥之不去。这些球员，你也知道，一讲起棒球就很激动你也知道，真正的困难是，要他们回想过去，谈论他们不愿回想的棒球。最终，你也知道，我的努力获得了不少成功。有些我联络上的球员，和我聊了两三个小时，他们一打开话匣子，就会一直讲下去，告诉我一些比赛的事，还有他们记得的事。目前为止，我已经出席过 四次黑人联盟大团圆其中三次，我还与黑人联盟球员住一个房间印城小丑队的罗素‧帕特森，绰号"疯狂快腿"他睡觉打呼声很大，如果你想知道的话。我促成了十几笔球员退休金并且找到了超过 100 位黑人联盟球员，还在不断找到新的球员，帮他们联络上老队友，让棒球重新回到他们的生活中也让他们回到棒球中。(音乐)谢谢大家(掌声）

**P42 2014-01-31 How to track a tornado - Karen Kosiba**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=42)

So, I think all good tornado talks need to start with an awesome tornado shot. And this is not that awesome tornado shot. That was the first tornado I ever saw, it was really cool, really scary, and I'm showing it to you guys because that's why I got into the field in the first place. So even though it's a bad photograph, it was really cool to be out there the first time. But now I'm taking real tornado footage. Fast forward a few years. This is a few years ago, during a field project called VORTEX2, where myself and a bunch of other scientists were out there, surrounding tornadoes with different types of instrumentation and trying to figure out how tornadoes form. It's a big question we're trying to answer. It sounds like a very basic one, but it's something we're still trying to figure out. We're also still trying to figure out what the winds are like near the surface. We know what the winds are like above building level, but we really don't know what they're like at the surface and how that relates to what we're seeing above building level. Most tornadoes form from what we call supercell thunderstorms. Supercell thunderstorms are what you commonly think of as tornado-raising storms. They're big, rotating thunderstorms that happen a lot of times in the midsection of the United States. But the problem is that even though they're rotating up above, it doesn't mean they're rotating at the surface. And when we look at these storms and at these pictures and at the data we have, they all kind of look the same. And it's really problematic if we're trying to make tornado forecasts or warnings, because we only want to warn or forecast about the storms that are going to actually make a tornado. One of the big, critical distinguishing features, we think, between these storms, is something about the rear-flank downdraft. So these big rotating thunderstorms have this downdraft that wraps around the rear edge of it, hence the "rear-flank" downdraft. But we think how warm that is, how buoyant that air is, and then also how strong the updraft it's wrapping into, makes a big difference on whether or not it's going to make a tornado. There's a lot more that goes into it -- I'll tell you about that in a second. Once you actually get a tornado, again, the problem that we have is getting measurements near the surface. It's really hard to get measurements near the surface -- most people don't want to drive into tornadoes. There are a few exceptions; you might have seen them on TV shows. But most people don't want to do that. Even getting instrumentation in the path of the tornado is pretty tricky, too. Because, again, you don't want to be that close to a tornado because sometimes the winds around the tornado are strong as well. So getting information, that critical location, is key for us because, again, we don't know if the winds that we're seeing above ground level, way above building level, actually map to the surface, if they're stronger, weaker, or about the same as what we're seeing above buildings. The way we get at answering a lot of these questions -- and I'm an observationalist; I love to get out in the field, and collect data on tornadoes -- we compile a lot of observations. I work with this group who operates mobile radars, and they're exactly what they say -- basically, a radar on the back of a big blue truck, and we drive up really close to tornadoes to map out the winds. We map out the precipitation. We map out all these different things that are going on in order to better understand the processes in these storms. And that bottom there, that's what a tornado looks like when you're looking at it with a mobile radar, and really close. Also, what we do is a lot of modeling, so we do a lot of computer models and simulations, because the atmosphere is governed by the laws of physics. So we can model the laws of physics and see where the tornado might go, where the storm might go, how strong the winds are near the surface and not actually have to go out in the field. But of course, we want to have both observations and modeling to move forward with the science. So, I showed you that video earlier that went real quick, too. This is what it looks like, looking at it with a radar. So you saw it visually, but this is what I get really excited about when I see now in the field, stuff that looks like this. The really exciting thing about looking at stuff like this is that we caught this storm from when it didn't make a tornado to when it made a tornado and intensified and when it dissipated. This is the one of the rare data sets that we have out there that were able to study the entire life cycle of a tornado. I talked about how we think that rear-flank downdraft is important because it tilts, there's a lot of spin in the atmosphere, but the problem with all this spin in the atmosphere is it needs to be oriented vertically, because that's what tornadoes are doing, and it needs to orientated vertically near the ground. So we think this rear-flank downdraft just pulses. And these pulses in this rear-flank downdraft, we think, are very important for converging that rotation, but also getting that rotation into the right place. Other things we've learned is that we have gotten a bunch of fortuitous measurements in the path of the tornadoes and very near the surface. And we found out that the winds near the surface are actually pretty comparable to what we're seeing 30, 40 meters above ground level. So there's not a big reduction in what we're seeing above the surface to what we're seeing at house level. And that was a pretty surprising finding for us, because we kind of assumed that the winds decrease pretty substantially near the surface. I'm going to end with this real quick. And this is not my last tornado I ever saw, but I really like this image, because this was taken with one of those mobile radars I was talking about. This is a tornado, not a hurricane, and this is what it looks like when you're really close to it. And I find this amazing, that we can actually take technology this close to these types of storms and see these inner workings. And for those of you who look at tornado images often, you can see there's a lot going on -- there's rain spiraling, and you can actually see the debris cloud associated with this tornado. I look forward to the future and future technologies and being able to learn a lot more about these storms, as the world advances, as you guys contribute to the science and we're able to really learn more about how tornadoes form. Thank you. (Applause)

**P42 2014-01-31 How to track a tornado - Karen Kosiba**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=42)

翻译人员: Cissy Yun 校对人员: Jenny Yang我认为所有关于龙卷风的精彩演讲都得从一张令人叹服的龙卷风照片开始好吧，那不是一张很棒的龙卷风照片其实，这是我见到的第一个龙卷风它十分炫酷，但也十分恐怖我之所以想把它展示给你们是因为它让我第一次走近龙卷风所以，这虽然是一张很烂的照片置身于龙卷风旁还是十分的酷的如今，我已经在拍摄一些专业的龙卷风视频了快进到几年前当年在一个实地项目叫做VORTEX2(漩涡2)中我与一 群科学家正处在龙卷风附近用不同的仪器尝试找出龙卷风形成的原理我们想找到 一个问题的答案这听起来是一个十分基础的问题然而，如今我们依旧在寻求其答案另一个我们想知道的问题是靠近龙卷风表层的风是怎样吹的我们已经知道的是楼层高度以上的风是如何运作的但依旧困扰我们的是龙卷风表层的风向运作以及它是如何与楼层高度之上的龙卷风 联系起来的大多数龙卷分都是由“超级单体雷暴”组成的这种“超级单体雷暴”就是你们所熟知的 引起龙卷风的风暴它们是一种十分巨大的，旋转型风暴多发生于美国中部地区但问题是即使这种风暴的上部一直在旋转并不代表它的表层风向也在旋转当我们观察这种风暴观赏这些图片并且研究这些数据时它们是十分相像的这种龙卷风存在很多不确定因素当我们想要发出龙卷风预警我们只是想要对这些风暴发出警告或是发出将会造成龙卷风的风暴预警一个十分重要的存在于这些风暴之间的区别有关一种名为后侧下环流的风这些旋转型风暴的背部被这种倒灌风包裹着所以被称为后侧下环流但当我们想到它的温度它的浮力以及它的上环流风的力量将这些总结起也许就会形成一个龙卷风当然，还有其他很多的因素我一会儿告诉你们当你真的遇见一个龙卷风时对于我们问题就是如何去测量表层的一些数据测量龙卷风表层数据是十分困难的多数是因为人们不愿意靠近龙卷风当然，也会有一些例外也许你们在电视上也看到过一些这样的例子但大多数人不会这样做即使是使用仪器研究龙卷风也会十分困难当然，你不会想离龙卷风太近因为龙卷风附近的风也是十分强劲的所以获取信息的关键的地点 对我们来说十分重要因为，我们不知道在地平线以上的风和在楼层高度以上的风是否可以表层的风是有所比对它们也许比其更强烈，也可能相对微弱它们也可能和楼层高度以上的风 有相似的强度我们拥有寻找这些问题的答案的方法我是一个观察师，所以我喜欢做实地考察我也喜欢收集有关龙卷风的数据我们编制了许多观测实例我与一组操控"车载雷达"的科学家一起工作正如其名“车载雷达”基本上就是 安装在一辆蓝色卡车上的雷达我们开着它靠近龙卷风勘察龙卷风以及规划我们的预测我们将所有的的细节都记录下来为的是更了解这些风暴的形成步骤看到左下方的这个图片这就是龙卷风在“车载雷达”中显示出的样子“车载雷达”需靠龙卷风十分近我们还会建立许多模型我们会建立许多电脑模型和拟态因为大气层是由物理定律控制的所以我们可以建立关于物理定律的模型然后预测龙卷风的走向风暴的走向以及表层风的强度这样，我们不用去到实地 就可以完成这些考察但是，我们希望建模和考察能够同时进行这样会更科学这是一段视频 我前面也给你们看过这就是通过雷达观测龙卷风时 其所呈现的形态就是你们现在看到的当时我在在实地考察中看到这个时我感到很兴奋可以以这种形态观察龙卷风这是很振奋人心的一件事这个风暴当我们捕捉到不同时期的龙卷风 有还未成形的也有逐渐形成的龙卷风我们看着它渐渐地增强然后逐渐地消散所以，这是我们拥有的一个十分少见的数据它可以让我们研究龙卷风的整个形成周期我会讲到一种后飞倒灌风它是一种对我们来说十分重要的风因为它会倾斜，并在大气层中不断旋转但问题是所以在大气层中的旋转都需要是以垂直为中心点这也是龙卷风所做的事它需要靠近地面作垂直旋转所以说，当我们想到后飞倒灌风时 我们会将它看作震动我们觉得很重要的这些震动可以收缩这些旋转也会指引龙卷风向正确的方向旋转我们学到的另一件事是我们得到了很多关于龙卷风附近龙卷风表层的一些偶然的数据我们发现靠近表层的风是比得上30，40米高度以上的风所以，表层的风并不会比楼房高度的风弱这是一个比较惊奇的发现因为，我们以前总是认定接近表层的风力会相对变弱许多我将会用这张图来结束我的演讲这并非是我见过的最后一个龙卷风但我十分喜欢这个图片因为它是由我先前提到的“车载雷达” 所记录下来的这是一个龙卷风，并非飓风这是当你十分靠近它时所呈现的样子我觉得很惊奇的地方是我们可以运用技术来接近这种风暴观察它们的内部如果你经常看龙卷风的图片你可以发现它包含许多内容雨水急骤下落， 你甚至可以看到碎片云和龙卷风共存我十分期望看到未来和新的技术我们可以运用它们来更好的研究这些风暴随着世界的进步当你们投身于科学之中我们将会获取更多关于龙卷风形成的知识谢谢！

**P43 2014-01-31 Pixar - The math behind the movies - Tony DeRose**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=43)

At Pixar, we're all about telling stories, but one story that hasn't been told very much is the huge degree to which math is used in the production of our films. The math that you're learning in middle school and high school is used all the time at Pixar. So, let's start with a very simple example. Anybody recognize this guy? (Cheers) Yeah, so this is Woody from Toy Story, and let's ask Woody to, say, walk across the stage from, say, left to right, just like that. So, believe it or not, you just saw a ton of mathematics. Where is it? Well, to explain that, it's important to understand that artists and designers think in terms of shape and images but computers think in terms of numbers and equations. So, to bridge those two worlds we use a mathematical concept called coordinate geometry, right? That is, we lay down a coordinate system with x describing how far something is to the right and y describing how high something is. So, with these coordinates we can describe where Woody is at any instant in time. For instance, if we know the coordinates of the lower left corner of that image, then we know where the rest of the image is. And in that little sliding animation we saw a second ago, that motion we call translation, the x coordinate started with a value of one, and it ended with a value of about five. So, if we want to write that in mathematics, we see that the x at the end is four bigger than x at the start. So, in other words, the mathematics of translation is addition. Alright? How about scaling? That is making something bigger or smaller. Any guesses as to what the mathematics of scaling might be? Dilation, multiplication, exactly. If you're going to make something twice as big, you need to mulitply the x and the y coordinates all by two. So, this shows us that the mathematics of scaling is mulitiplication. Okay? How about this one? How about rotation? Alright, spinning around. The mathematics of rotation is trigonometry. So, here's an equation that expresses that. It looks a little scary at first. You'll probably get this in eighth or ninth grade. If you find yourselves sitting in trigonometry class wondering when you're ever going to need this stuff, just remember that any time you see anything rotate in one of our films, there's trigonometry at work underneath. I first fell in love with mathematics in seventh grade. Any seventh graders? A few of you? Yeah. My seventh grade science teacher showed me how to use trigonometry to compute how high the rockets that I was building was going. I just thought that was amazing, and I've been enamored with math ever since. So, this is kind of old mathematics. Mathematics that's been known and, you know, developed by the old dead Greek guys. And there's a myth out there that all the interesting mathematics has already been figured out, in fact all of mathematics has been figured out. But the real story is that new mathematics is being created all the time. And some of it is being created at Pixar. So, I'd like to give you an example of that. So, here are some characters from some of our early films: Finding Nemo, Monsters Inc. and Toy Story 2. Anybody know who the blue character in the upper left is? It's Dory. Okay, that was easy. Here's a little harder one. Anybody know who's the character in the lower right? Al McWhiggin from Al's Toy Barn, exactly. The thing to notice about these characters is they're really complicated. Those shapes are really complicated. In fact, the toy cleaner, I have an example, the toy cleaner there in the middle, here's his hand. You can imagine how fun it was to bring this through airport security. His hand is a really complicated shape. It's not just a bunch of spheres and cylinders stuck together, right? And not only is it complicated, but it has to move in complicated ways. So, I'd like to tell you how we do that, and to do that I need to tell you about midpoints. So, here's a couple of points, A and B, and the line segment between them. We're going to start out first in two dimensions. The midpoint, M, is the point that splits that line segment in the middle, right? So, that's the geometry. To make equations and numbers, we again introduce a coordinate system, and if we know the coordinates of A and B, we can easily compute the coordinates of M just by averaging. You now know enough to work at Pixar. Let me show you. So, I'm going to do something slightly terrifying and move to a live demo here. So, what I have is a four-point polygon here, and it's going to be my job to make a smooth curve out of this thing. And I'm going to do it just using the idea of midpoints. So, the first thing I'm going to do is an operation I'll call split, which adds midpoints to all those edges. So, I went from four points to eight points, but it's no smoother. I'm going to make it a little bit smoother by moving all of these points from where they are now to the midpoint of their clockwise neighbor. So, let me animate that for you. I'm going to call that the averaging step. So, now I've got eight points, they're a little bit smoother, my job is to make a smooth curve, so what do I do? Do it again. Split and average. So, now I've got sixteen points. I'm going to put those two steps, split and average, together into something I'll call subdivide, which just means split and then average. So, now I've got 32 points. If that's not smooth enough, I'll do more. I'll get 64 points. Do you see a smooth curve appearing here from those original points? And that's how we create the shapes of our charcters. But remember, I said a moment ago it's not enough just to know the static shape, the fixed shape. We need to animate it. And to animate these curves, the cool thing about subdivision. Did you see the aliens in Toy Story? You know that sound they make, "Ooh"? Ready? So, the way we animate these curves is simply by animating the original four points. "Ooh." Alright, I think that's pretty cool, and if you don't, the door is there, it doesn't get any better than that, so. This idea of splitting and averaging also holds for surfaces. So, I'll split, and I'll average. I'll split, and I'll average. Put those together into subdivide, and this how we actually create the shapes of all of our surface characters in three dimensions. So, this idea of subdivision was first used in a short film in 1997 called Geri's Game. And Geri actually made a cameo apperance in Toy Story 2 as the toy cleaner. Each of his hands was the first time we ever used subdivision. So, each hand was a subdivision surface, his face was a subdivision surface, so was his jacket. Here's Geri's hand before subdivision, and here's Geri's hand after subdivision, so subdivision just goes in and smooths out all those facets, and creates the beautiful surfaces that you see on the screen and in the theaters. Since that time, we've built all of our characters this way. So, here's Merida, the lead character from Brave. Her dress was a subdivision surface, her hands, her face. The faces and hands of all the clansman were subdivision surfaces. Today we've seen how addition, multiplication, trigonometry and geometry play a roll in our films. Given a little more time, I could show you how linear algebra, differential calculus, integral calculus also play a roll. The main thing I want you to go away with today is to just remember that all the math that you're learning in high school and actually up through sophomore college we use all the time, everyday, at Pixar. Thanks.

**P43 2014-01-31 Pixar - The math behind the movies - Tony DeRose**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=43)

翻译人员: Fen Guan 校对人员: Peipei Xiang在皮克斯动画，我们一直在讲故事，但有一个故事一直没怎么讲，那就是数学在我们的电影生产中的巨大应用。大家在初中、高中学的数学在皮克斯动画中无处不在。让我们从一个简单的例子开始。有人认识这个人物么？（欢呼声）对，这是《玩具总动员》里的胡迪。现在让胡迪穿过舞台荧幕，从左到右，就像这样。你信不信，你刚刚看到了很多很多的数学。在哪儿呢？要解释这一点，很重要的一点是明白艺术家和设计者是用形状和图案来构思，而电脑则是通过数字和方程来工作。所以，要连接这两个世界，我们要用一个叫做坐标几何的概念，对吧？就是说，我们制定一个坐标系统，用 x 形容物体在右边的距离，用 y 形容物体的高度。这样，通过这些坐标我们就可以形容任意时刻胡迪的位置。比如，如果我们知道图形左下角的坐标，我们就知道整个图形的位置。在之前看到的短动画中，那个动作我们叫做平移，x 坐标从 1 开始以 5 结束。所以，如果我们用数学书写，我们看到 x 最后比起始位置大了 4 个单位。换句话说，数学平移是加法，对吧？那么什么是比例缩放？比例缩放是把物体放大或缩小，那么缩放用数学怎么表达？扩大，乘法，完全正确。如果你想把物体放大两倍，需要把 x 和 y 坐标都乘以 2。这就是说比例缩放用数学表示就是乘法。好。那这个呢？旋转呢？这样，转圈。旋转的数学是三角学。这是描述旋转的方程。第一眼看起来有些吓人，你可能会在八或九年级的时候学到这个。如果你怀疑你在三角学的课上学的那些东西到底什么时候能用到，就想想我们的电影，你看到的每一次旋转都是利用三角学的知识。我在七年级的时候爱上了数学。这里有七年级学生么？有一些？有。我的七年级科学老师告诉我怎么用三角学计算我做的火箭可以飞行的高度。我当时就觉得太不可思议了，从那开始我就被数学迷住了。那么这些是相对较老的数学，就是我们所知道的由古希腊人发明的数学。有传言说所有的有趣的数学计算都已经被发现，甚至所有的数学都已经被研究完了。但事实是新的数学在不断地被创造出来。皮克斯就创造了一些。我可以给你一个例子。这里有一些我们早期电影的一些人物：海底总动员，怪兽电力公司，玩具总动员 2。有人知道左上方的蓝色人物么？是多利。好，这个很简单。来一个难点的，有人知道左下方的人物么？艾尔玩具仓的主人艾尔，非常正确。值得注意的是，这些人物其实很复杂。那些形状真的很复杂。事实上，那个玩具清理工，我有个模型，中间的玩具清理工，这是他的手。你可以想象带这个过机场安检是怎样的情形。他的手是一个非常复杂的结构。它不仅仅是一些球体和圆柱体粘在一起那么简单，是吧？它不仅复杂，它还有很复杂的移动。我想告诉你我们是怎么移动它的，在这之前，我得告诉你中点的定义。这是两个点，A 和 B，和连接两点的线段。我们从二维平面开始。中点 M 是把线段均分为两段的点，对吧？这是几何学。要用方程和数字表达，我们需要建立坐标系统，如果我们知道 A 和 B 的坐标，我们可以通过求平均很容易算出M 点的坐标。大家现在已经具备足够在皮克斯工作的知识了。让我证明给你看。接下来我会做一个让人稍微有些紧张的现场示范。看屏幕上，我有一个四点的多边形，接下来我的工作就是将它变成一段光滑曲线。我只需要通过取中点就可以做到。所以第一件事就是进行一个分裂的操作，就是在所有边上加中点。这样，我从四个点得到八个点，但这并没有让图形更光滑。我将把所有点从当前位置移到它们的顺时针相邻中点，把它变得更光滑。就如这个动画展示。我称这一步为平均步骤。现在我有八个点，有一点光滑了，我的目标是做成光滑曲线，那接下来该做什么呢？重复以上步骤。分裂、平均。这样，我得到了16个点。把上面两个步骤，分裂和平均，合在一起我称之为“细分”，就是分裂再平均的意思。现在我有32个点。如果还不够光滑，那就再重复。现在变成64个点。看到如何从最初四点得到一段光滑曲线了么？这就是我们创造我们的人物外形的方法但记住我之前说的，仅仅知道静态图形、固定图形是不够的，我们需要让它动起来。要让这些曲线动起来，这也是细分厉害的地方。看过玩具总动员的外星人吧？记得他们的声音“哇喔”吗？准备好了么？让这些曲线动起来的方法很简单，就是移动最初的四个点，“哇喔”。好了，我觉得这非常了不起。如果你不这么觉得，你可以离开了，因为没有比这更酷的了。分裂和平均的方法对于三维表面也成立。分裂，平均。分裂，平均。不断细分，这就是我们创造所有三维人物外形的方法。细分的方法最先用在1997年的一个叫做《棋逢对手》的短片里。里面的格里在玩具总动员 2 里特别演出了玩具清理工一角。他的双手是我们的第一个运用细分的案例。每只手都是一个细分的表面，他的脸也是细分表面，还有他的外套。这是细分前格里的手，这是细分后的手，所以细分让所有表面更光滑，细分创造了你在屏幕和电影院看到的漂亮外形。从那开始，我们用这种方法创造了我们的所有人物。这是《勇敢传说》里的主要人物，梅丽达。她的连衣裙是细分的表面，她的手，她的脸也是。所有族人的脸和手都是细分表面。今天我们看到了，加法，乘法，三角学和几何学在我们电影里的作用。如果再给我一点时间，我还可以告诉大家线性代数，微分，积分发挥的作用。今天想让大家记住的最主要的就是，你在高中到大二所学的所有数学，我们在皮克斯一直在用，每天都在用。谢谢

**P44 2014-02-03 The Pangaea Pop-up - Michael Molina**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=44)

Once upon a time, South America lived harmoniously alongside Africa until a crack in the Earth drove the two continents apart. This breakup began about 200 million years ago during the separation of the supercontinent known as Pangaea. Their proximity back then explains why the same plant fossils and reptile fossils, like the Mesosaurus, can be found on the South American east coast and African west coast. However, this evidence does not account for how the continents moved apart. For that, we'll need to take a close look at the earth below our feet. Though you may not realize it, the ground below you is traveling across the Earth at a rate of about 10 cm/year, or the speed at which your fingernails grow. This is due to plate tectonics, or the large-scale movement of Earth's continents. The motion occurs within the top two layers of the Earth's mantle, the lithosphere and asthenosphere. The lithosphere, which includes the crust and uppermost mantle, comprises the land around you. Beneath the lithosphere is the asthenosphere the highly viscous but solid rock portion of the upper mantle. It's between 80 and 200 km below the Earth's surface. While the asthenosphere wraps around the Earth's core as one connected region, the lithosphere is separated on top into tectonic plates. There are seven primary tectonic plates that compose the shape of the planet we know today. Like the other smaller tectonic plates, the primary plates are about 100 km thick and are composed of one or two layers: continental crust and oceanic crust. Continental crust forms the continents and areas of shallow water close to their shores, whereas oceanic crust forms the ocean basins. The transition from the granitic continental crust to the basaltic oceanic crust occurs beyond the continentel shelf, in which the shore suddenly slopes down towards the ocean floor. The South American Plate is an example of a tectonic plate made of two crusts: the continent we know from today's map and a large region of the Atlantic Ocean around it. Collectively comprising the lithosphere, these plates are brittler and stiffer than the heated, malleable layer of the asthenosphere below. Because of this, the tectonic plates float on top of this layer, independently of one another. The speed and direction in which these tectonic plates move depends on the temperature and pressure of the asthenosphere below. Scientists are still trying to nail down the driving forces behind this movement, with some theories pointing towards mantle convection, while others are examining the influence of the Earth's rotation and gravitational pull. Though the mechanics have not been sorted out, the scientific community agrees that our tectonic plates are moving and have been for billions of years. Because these plates move independently, a fair amount of pushing and pulling between the plates occurs. The first type of interaction is a divergent boundary, in which two plates move away from one another. We see this in the Mid-Atlantic Ridge between South America and Africa. The next interaction is when two plates collide, known as a convergent boundary. In this instance, the land is pushed upward to form large mountain ranges, like the Himalayas. In fact, the Indian Plate is still colliding with the Eurasian Plate, which is why Mount Everest grows one cm/year. Finally, there's the transform boundaries, where two plates scrape past one another. The grinding of the transform boundary leads to many earthquakes, which is what happens in the 810 mile-long San Andreas Fault. The moving Earth is unstoppable, and, while a shift of 10 cm/year may not seem like a lot, over millions of years our planet will continue to dramatically change. Mountains will rise, shorelines will recede, islands will pop up. In fact, one projected map shows the cities of Los Angeles and San Francisco on top of each other. Maybe South America and Africa will come together again, too. Only time will tell.

**P44 2014-02-03 The Pangaea Pop-up - Michael Molina**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=44)

翻译人员: 静宁 张 校对人员: Chenwei CAO很久以前南美洲和非洲紧邻着直到地球上出现一道裂缝把两个大陆分开这次分裂发生在大约 2 亿年前当时被称为泛大陆的超级大陆开始分裂两块大陆曾紧紧相邻解释了为什么相同的植物化石和爬行动物化石比如中龙化石会出现在南美东海岸和非洲西海岸然而, 这个证据无法解释大陆是如何分离的因此, 我们需要更加仔细地看看我们脚下的地球虽然你可能没有意识到但你脚下的陆地 正在地球上漂移大约以每年十厘米的速度漂移也就是你指甲生长的速度这是由于板块构造或大陆的大规模移动这种运动发生在地幔的最上面两层中也就是岩石圈和软流层岩石圈包括地壳和上地幔顶部也就是你脚下的陆地在岩石圈以下是软流层它是上地幔中粘稠度高但又为固态岩石的部分它在地表以下80千米到200千米之间的地方软流层包裹着地核使之成为一个连续的整体最上方的岩石圈被分为不同的板块如今我们知道 地球表面是由七个主要板块构成的和其他小板块一样主要板块大约有100公里厚由一或两层地壳组成：陆壳和洋壳陆壳构成陆地和靠近海岸的浅水地区而洋壳形成洋盆从花岗岩的陆壳到玄武岩质的洋壳的转变发生在大陆架以外的地方在那里 海岸骤然下降到洋底南美洲板块就是这样一个由陆壳和洋壳构成板块的例子：我们从如今的地图中知道, 它由南美洲大陆和周围大部分的大西洋地区组成这些板块构成岩石圈比下面高温、粘稠的软流层更脆、更硬正因为如此构造板块互相独立的浮在软流层上这些板块移动的速度和方向取决于下方软流层的温度和压强科学家们仍在努力研究造成这一运动的驱动力是什么一些理论认为是地幔的对流而其他一些认为是由于地球自转还有引力作用的影响虽然力学原因没有弄清但科学界一致同意我们的构造板块在正移动而且已经进行了数十亿年因为这些板块各自移动板块之间就会产生大量的推和拉的相互作用其中第一种相互作用是分离型板块边界两个构造板块 向相反方向背离运动比如 南美洲和非洲之间的大西洋洋中脊就是这样第二种相互作用类型是板块碰撞被称为 汇聚型板块边界在这个例子中, 陆地被抬升形成大山脉比如喜马拉雅山事实上, 印度板块与欧亚板块至今仍在对撞这就是为什么珠穆朗玛峰每年升高一厘米最后一种类型, 是转换型板块边界两个板块在水平方向相对滑动这种转换型边界的摩擦造成了地震的频发这就是发生在810 英里长的圣安德烈斯断层中的情况地球的运动是不可阻挡的虽然每年移动十厘米 看起来不大而我们星球数百万年来的持续运动将带来沧海桑田的变化山峦会上升海岸线会消退岛屿会露出海面事实上, 一幅预期的地图显示洛杉矶和旧金山两个城市彼此将十分靠近也许南美洲和非洲还会再次走到一起只有时间能够证明

**P45 2014-02-04 Why is glass transparent - Mark Miodownik**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=45)

Take a look out your window, put on your glasses if you wear them. You might want to grab a pair of binoculars, too, or a magnifying lens. Now, what do you see? Well, whatever it is, it's not the multiple layers of glass right in front of you. But have you ever wondered how something so solid can be so invisible? To understand that, we have to understand what glass actually is, and where it comes from. It all begins in the Earth's crust, where the two most common elements are silicon and oxygen. These react together to form silicon dioxide, whose molecules arrange themselves into a regular crystalline form known as quartz. Quartz is commonly found in sand, where it often makes up most of the grains and is the main ingredient in most type of glass. Of course, you probably noticed that glass isn't made of multiple tiny bits of quartz, and for good reason. For one thing, the edges of the rigidly formed grains and smaller defects within the crystal structure reflect and disperse light that hits them. But when the quartz is heated high enough the extra energy makes the molecules vibrate until they break the bonds holding them together and become a flowing liquid, the same way that ice melts into water. Unlike water, though, liquid silicon dioxide does not reform into a crystal solid when it cools. Instead, as the molecules lose energy, they are less and less able to move into an ordered position, and the result is what is called an amorphous solid. A solid material with the chaotic structure of a liquid, which allows the molecules to freely fill in any gaps. This makes the surface of glass uniform on a microscopic level, allowing light to strike it without being scattered in different directions. But this still doesn't explain why light is able to pass through glass rather than being absorbed as with most solids. For that, we need to go all the way down to the subatomic level. You may know that an atom consists of a nucleus with electrons orbiting around it, but you may be surprised to know that it's mostly empty space. In fact, if an atom were the size of a sports stadium, the nucleus would be like a single pea in the center, while the electrons would be like grains of sand in the outer seats. That should leave plenty of space for light to pass through without hitting any of these particles. So the real question is not why is glass transparent, but why aren't all materials transparent? The answer has to do with the different energy levels that electrons in an atom can have. Think of these as different rows of seats in the stadium stands. An electron is initially assigned to sit in a certain row, but it could jump to a better row, if it only had the energy. As luck would have it, absorbing one of those light photons passing through the atom can provide just the energy the electron needs. But there's a catch. The energy from the photon has to be the right amount to get an electron to the next row. Otherwise, it will just let the photon pass by, and it just so happens that in glass, the rows are so far apart that a photon of visible light can't provide enough energy for an electron to jump between them. Photons from ultraviolet light, on the other hand, give just the right amount of energy, and are absorbed, which is why you can't get a suntan through glass. This amazing property of being both solid and transparent has given glass many uses throughout the centuries. From windows that let in light while keeping out the elements, to lenses that allow us to see both the vast worlds beyond our planet, and the tiny ones right around us. It is hard to imagine modern civilization without glass. And yet for such an important material we rarely think about glass and its impact. It is precisely because the most important and useful quality of glass is being featureless and invisible that we often forget that it's even there.

**P45 2014-02-04 Why is glass transparent - Mark Miodownik**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=45)

翻译人员: Nan Hu 校对人员: Dong Mao向窗外张望一下有必要的话 戴上眼镜也许你还想拿副望远镜或是放大镜现在 你看到了什么无论你看到了什么答案都可能不是那一层层近在咫尺的玻璃但是你是否想知道为什么有如此固态的东西却看不见呢要明白这点我们首先要知道玻璃究竟是什么以及它是怎样形成的所有一切都始于地壳在它其中最基本的两种元素:硅和氧它们相互作用形成二氧化硅二氧化物的分子自动排列形成晶体状物被称为石英石英通常在沙中被发现沙大多由颗粒组成而颗粒是多数玻璃的主要原料当然 你可能注意到玻璃并不是由许多石英粒组成的这点显而易见一方面 晶体结构内部严格形成的颗粒边缘或者很小的瑕疵反射及散射照向它们的光但是当石英加热到足够热时产生的热量就会让分子产生震动直到它们打破以前的链结进而形成流动的液体就和冰融化成水一样但是和水不同的是 液态的二氧化硅冷却之后不会形成固态晶体相反 当分子失去能量后它们就更不太可能移动形成一个有秩序的状态这样的结果就是人们所说的非晶型固体一种具有混乱液体结构的固态物质使得分子可以自由填补任何缝隙这样就让玻璃表面在微观层面上是一致的光可以穿透它但不会散射出去但是这还是不能解释为什么光可以穿透玻璃而不是像其他大多固体那样被吸收关于这个 我们需要进一步谈论到亚原子层面上你或许知道原子是由原子核以及围绕着它的电子共同形成的但是你有可能很意外的发现它的大部分体积都是空的事实上 如果把一个原子比作一座体育场那么大那么原子核可能就是体育场中心的一颗豆子而中子就像是沙粒环绕于四周的座位上这样一来，就会留有大量的缝隙让光可以穿过它却不会碰到其他颗粒所以真正的问题并不是为什么玻璃是透明的而是为什么所有物质都不透明？答案可以归结于与原子内中子所拥有的不同能级有关若把它们视为体育场里一排排的座位一个电子首先被安排到一个固定的座位但是它可以跳到另一个更好的座位只要它有足够的能量如果幸运吸收一个穿过这个原子的光子刚好可以提供电子所需要的能量但有个问题来自光子的能量必须正好合适才能使得电子跳到下一排否则 光子就会穿过这些电子就像光穿过玻璃一样排与排分开的太远以至于可见光的光子不能提供足够能量让电子在两排之间跳动但另一方面 紫外线光子刚好可以提供足够能量进而被吸收这就是为什么透过玻璃你不会被晒黑的原因这种既是固体又是透明状的特性让玻璃在几个世纪以来得到了大量的应用从可以让光照入却又能把其他物质挡在外面的窗户到能让我们同时看到地球以外的广袤星空以及眼前的微小世界的镜片很难想象没有玻璃的现代文明会是怎样但是对于这样如此重要的物质我们却很少思考它以及它的作用这恰恰是因为玻璃最重要的以及最有用的特质是使其变得无特征并不可见以至于我们都忘了它的存在

**P46 2014-02-07 Eli the eel - A mysterious migration - James Prosek**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=46)

Transcriber: Jessica Ruby Reviewer: Caroline Cristal They're long and slithery, and they're not very colorful. But they do have a strange beauty of their own. Their sinuous, nocturnal movements through the water are mesmerizing to watch. And though they may resemble underwater snakes, eels are, in fact, a very interesting type of fish. There are several things about eels that make them unique besides their elongated shape and limbless bodies. For one thing, eels have the ability to breathe through their skin. Some can even leave the water and move over land for short periods. And, unlike most migratory fish, such as salmon, which spawn in fresh water but live their adult lives in salt water, eels of the genus Anguilla migrate in the opposite direction, spawning and breeding in oceans and seas, while spending most of their intervening time in fresh water. If we were to take one such fresh water eel and follow its life story, it would be born in the middle of the North Atlantic Ocean, about a thousand miles east of Bermuda. This area, called the Sargasso Sea, forms the western part of a subtropical gyre, a giant whirlpool in the middle of the ocean. Our eel, let's call it Eli, would begin as one of ten to twenty million tiny eggs, carried by a female eel, hatching into a transparent leaf-shaped thing that looks nothing like an adult eel. Eli starts to drift in ocean currents, predominantly the Gulf Stream towards either Europe or North America, depending on its particular species. Upon reaching the coast, Eli is about two inches long, looking more eely but still transparent, known at this stage as a glass eel. But within a couple of days in fresh water, Eli's skin becomes pigmented a brownish-black, now looking more like that of an adult eel. You might notice that we haven't mentioned anything about Eli's gender yet. That's because this is only determined once an eel enters fresh water, though nobody is sure exactly how that happens. Most of the eels that stay in the estuaries and brackish water become males, while those that go upstream become females, growing up to two to three times bigger than their future mates. In this case, it turns out that Eli was actually short for Elaine. As a female eel, Elaine will be quite solitary for most of her life in the stream, eating whatever falls in the water: grasshoppers, crickets, small fish, insect larvae, frogs, baby birds, almost anything she can get her mouth around. And she will grow quite big, up to four feet long and weighing as much as thirteen pounds. We don't know exactly how fresh water eels know when it's time to return to the ocean, but something calls to them. And their fall migration is one of the largest unseen migrations on the planet. As Elaine leaves fresh water for the ocean, she undergoes a shocking metamorphosis. Her eyes enlarge by about ten times, her skin gets thicker, and her fins get larger. These are most likely adaptations for their upcoming ocean travel, and Elaine seamlessly makes the transition from fresh to salt water, which would be toxic for most other fish. Once Elaine leaves the mouth of the fresh water streams, she will disappear completely from human view. No one has witnessed, or been able to follow, an adult eel on their migration, nor do we know how deep they spawn. But it's assumed that they can follow some signs that they can detect, such as a thermal barrier between ocean currents or a salinity front, in order to return to the same area of the ocean where they were born. Because we don't even know exactly what happens during an eel's migration, we can only imagine what the actual breeding looks like. But the common hypothesis is that Elaine and thousands, or hundreds of thousands, of other eels gather in large, intertwined masses and release their eggs and sperm in a giant orgy known as panmixia. A couple of days after the eggs are laid, they hatch, and the cycle begins again. And because we've never seen the adult eels returning up the fresh water rivers, we must assume that, having completed their long and roundabout journey, these amazing and mysterious creatures finally die there, in the same place where they were born. Goodbye, Elaine! It was a pleasure knowing you.

**P46 2014-02-07 Eli the eel - A mysterious migration - James Prosek**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=46)

翻译人员: Xiaoou Chen 校对人员: Liang Chen他们（体态）修长并且（皮肤）黏滑，但不是非常色彩斑斓。但是它们有其独特的魅力。它们夜间蜿蜒从水中游过看起来让人着迷。即使他们像水下的蛇，但事实上鳗鱼是一种非常有趣的鱼。除了它们修长无四肢的身体有几个特征让鳗鱼独具一格。第一个，鳗鱼可以透过它们的皮肤来呼吸。有些鳗鱼甚至可以离开水在陆地上存活一小段時間。不像大多数迁徙性鱼类，比如三文鱼，它们在淡水中产卵但是成年鳗鱼生活在盐水中，安圭拉属的鳗鱼以相反的方向迁徙，它们在海洋中产卵和繁殖而大部分的时间生活在淡水中。如果我们那这样一条淡水鳗鱼并跟随它的生活故事，它将会出生于北大西洋中间，位于百慕达东侧约一千英里。这块叫马尾藻海的地域形成了副热带环流西部的一个部分。副热带环流是海洋中一个巨大的漩涡。让我们叫我们的鳗鱼伊莱它的生命从那两千万分之一的一枚被雌性鳗鱼携带的卵开始，雌性鳗鱼将它们孵化成为透明叶状的东西，看起来一点也不像成年鳗鱼。伊莱开始随着海浪漂流，主要位于通向欧洲或被没的墨西哥湾暖流，其去向取决于其物种。快要到岸边时，伊莱大概有两英尺长（约5厘米），看上去更像鳗鱼了，但还是透明的，这个阶段叫做鳗鱼鱼苗。但是在几天的淡水生活中，伊莱的皮肤被色素变成了棕黑色，现在就看上去就更像成年鳗鱼了。你可能会注意到我们还没有提及关于伊莱的性别。那是因为性别是在它进入到淡水区所决定的，没有人知道那是怎么发生的。大部分生活在河口和盐水区的鳗鱼成为了雄性，上流的鳗鱼成为了雌性，会找到比她们未来的配偶大两到三倍。在这种情况下，我们就知道伊莱是伊莱恩的简称。作为一条雌性鳗鱼，伊莱恩在细流中的大部分的生活都是非常孤独的，吃仍何掉入水中的东西：蚱蜢，蟋蟀，小鱼，昆虫幼虫，青蛙，幼鸟，几乎任何到她嘴边的东西。她可以长得非常大直到有四英寸长（约1.2米）重三十磅。我们不明确知道淡水鳗鱼是如何知道何时返回海洋的，但有东西在召唤它们。它们秋季的迁徙是这个星球上规模最大的不可见的迁徙之一。当伊莱恩离开淡水前往海洋时她会经历令人震惊的变异。她的眼睛增大十倍，皮肤变厚，她的鳍也变大。这些非常有可能是他们为了未来海洋旅行的适应，伊莱恩在从淡水到海洋的过程中完美地完成了这个转变，而这盐水对别的鱼是有害的。一旦伊莱恩离开了淡水溪流的河口她将会永远的从人类的视野中消失。没有人可以目睹或追踪成年鳗鱼的迁徙，我们也不知道他们在多深的地方产卵。他们被认为可以顺着他们可以探测到的标识（找到路线）比如洋流间的热障或是盐度，以这样的方式返回到海洋中他们出生的地方。因为我们压根就不知道在鳗鱼的迁徙中发生了什么，我们只能去想象他们繁殖的方式。但是一个普遍的假说是伊莱恩和数以千计的，成千上万的其它鳗鱼聚集在巨大的交错的鱼群中在一个巨大的随即交配的宴会中释放出卵和精子。在卵被产出几天后它们孵化了这样一个循环再一次开始了。因为我们从未目睹过成年鳗鱼回到淡水中我们必须假设在完成它们长而曲折的时，这些神奇并且神秘的生物最终消逝在了海里，在它们出生的地方。再见，伊莱恩！认识你是我的荣幸。

**P47 2014-02-07 How one piece of legislation divided a nation - Ben Labaree, Jr.**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=47)

Today when people complain about the state of American politics, they often mention the dominance of the Democratic and Republican Parties, or the sharp split between red and blue states. But while it may seem like both of these things have been around forever, the situation looked quite different in 1850, with the Republican Party not yet existing, and support for the dominant Democrats and Whigs cutting across geographic divides. The collapse of this Second Party System was at the center of increasing regional tensions that would lead to the birth of the Republican Party, the rise of Abraham Lincoln as its leader, and a civil war that would claim over half a million lives. And if this collapse could be blamed on a single event, it would be the Kansas-Nebraska Act of 1854. The story starts with the Missouri Compromise of 1820. To balance the number of slave states and free states in the Union, it allowed slavery in the newly admitted state of Missouri, while making it off limits in the remaining federally administered Louisiana Territory. But compromises tend to last only as long as they're convenient, and by the early 1850s, a tenacious Democratic Senator from Illionis named Stephen A. Douglas found its terms very inconvenient. As an advocate of western expansion, he promoted constructing a transcontinental railroad across the Northern Plains with an eastern terminus in Chicago, where he happened to own real estate. For his proposal to succeed, Douglas felt that the territories through which the railroad passed, would have to be formally organized, which required the support of Southern politicians. He was also a believer in popular sovereignty, arguing that the status of slavery in a territory should be decided by its residents rather than Congress. So Douglas introduced a bill designed to kill two birds with one stone. It would divide the large chunk of incorporated land into two new organized territories: Nebraska and Kansas, each of which would be open to slavery if the population voted to allow it. While Douglas and his Southern supporters tried to frame the bill as protecting the political rights of settlers, horrified Northerners recognized it as repealing the 34-year-old Missouri Compromise and feared that its supporters' ultimate goal was to extend slavery to the entire nation. Congress was able to pass the Kansas-Nebraska Act, but at the huge cost of bitterly dividing the nation, with 91% of the opposition coming from Northerners. In the House of Representatives, politicians traded insults and brandished weapons until a Sargent at Arms restored order. President Pierce signed the bill into law amidst a storm of protest, while Georgia's Alexander Stephens, future Confederate Vice President, hailed the Act's passage as, "Glory enough for one day." The New York Tribune reported, "The unanimous sentiment of the North is indignant resistance." Douglas even admitted that he could travel from Washington D.C. to Chicago by the light of his own burning effigies. The political consequences of the Kansas-Nebraska Act were stunning. Previously, both Whigs and Democrats had included Northern and Southern lawmakers united around various issues, but now slavery became a dividing factor that could not be ignored. Congressmen from both parties spoke out against the act, including an Illinois Whig named Abraham Lincoln, denouncing "the monstrous injustice of slavery" in an 1854 speech. By this time the Whigs had all but ceased to exist, irreparably split between their Northern and Southern factions. In the same year, the new Republican Party was founded by the anti-slavery elements from both existing parties. Although Lincoln still ran for Senate as a Whig in 1854, he was an early supporter of the new party, and helped to recruit others to its cause. Meanwhile the Democratic Party was shaken when events in the newly formed Kansas Territory revealed the violent consequences of popular sovereignty. Advertisements appeared across the North imploring people to emigrate to Kansas to stem the advance of slavery. The South answered with Border Ruffians, pro-slavery Missourians who crossed state lines to vote in fraudulent elections and raid anti-slavery settlements. One northern abolitionist, John Brown, became notorious following the Pottawatomie Massacre of 1856 when he and his sons hacked to death five pro-slavery farmers with broad swords. In the end, more than 50 people died in Bleeding Kansas. While nominally still a national party, Douglas's Democrats were increasingly divided along sectional lines, and many Northern members left to join the Republicans. Abraham Lincoln finally took up the Republican Party banner in 1856 and never looked back. That year, John C. Fremont, the first Republican presidential candidate, lost to Democrat, James Buchanan, but garnered 33% of the popular vote all from Northern states. Two years later, Lincoln challenged Douglas for his Illinois Senate seat, and although he lost that contest, it elevated his status among Republicans. Lincoln would finally be vindicated in 1860, when he was elected President of the United States, defeating in his own home state, a certain Northern Democrat, who was finally undone by the disastrous aftermath of the law he had masterminded. Americans today continue to debate whether the Civil War was inevitable, but there is no doubt that the Kansas-Nebraska Act made the ghastly conflict much more likely. And for that reason, it should be remembered as one of the most consequential pieces of legislation in American history.

**P47 2014-02-07 How one piece of legislation divided a nation - Ben Labaree, Jr.**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=47)

翻译人员: sherry lee 校对人员: Francis Ma如今当人们抱怨 美国的政治制度时他们总是能提及 民主党和共和党轮流执政的格局或者红州与蓝州旗帜鲜明的对立局面这两件种现象 好像从一开始就存在一样但在 1850 年，实际情况与现在大不相同当时还没有共和党占主导地位的是民主党和辉格党支持者依据其所在的地理位置分为明显的两派而第二党系的瓦解使当时局势日益紧张也促成了共和党的诞生也使阿伯拉罕林肯脱颖而出，成为领袖同时使南北战争爆发，造成了超过 50 万人的死亡而如果这个体系的崩塌 要归咎于一场事件的话那便是 1854 年通过的堪萨斯—内布拉斯加法案事件的起因是 1820 年的密苏里妥协案为了使合众国里的畜奴州 和自由州的数量达到平衡该妥协案于新成立的密苏里州允许奴隶制但是在联邦政府管辖的路易斯安那地区禁止奴隶制但是该妥协法案只是权宜之计，不是长久之策到了 19 世纪 50 年代早期有一位来自伊利诺伊州的十分强势的民主党参议员名叫史蒂芬道格拉斯他认为该法案极不合理他主张向西部扩张并建立跨洲铁路横跨北部平原并把东部终点站设在芝加哥他在那里恰好有自己的不动产为了使自己的提案获得通过道格拉斯认为所有铁路穿过的地区 都要实行统一的制度这就意味着他需要得到南部的支持他同时信奉人民主权论提出一个州是否实行奴隶制应由其居民决定而非国会决定所以道格拉斯提出了一个法案旨在实现一石二鸟这会使大部分本已实现统一的区域分裂成两个新成立的地区：内布拉斯加和肯萨斯两者都可以实现奴隶制只要人民投票通过即可道格拉斯和他在南部的支持者试图把该法案描述为保护当地居民的政治权利但这也在北部引起恐慌，北方人认为这等于是要废除实行了 34 年的密苏里妥协案并担心支持者的最终目的是使奴隶制在全国扩张后来国会通过了堪萨斯-内布拉斯加法案但代价是惨痛的，它造成了国家的分裂91% 的反对派来自北方在众议院政客们相互谩骂，剑拔弩张直到警卫官恢复秩序才停下来皮尔斯总统签署该法案通过尽管周围尽是反对的声音来自乔治亚州的亚历山大·斯蒂芬斯也就是后来美利坚联盟国副总统把法案的通过盛赞为「充满荣耀光辉的一天」但纽约论坛报报道称「北方民众一致坚决反对」道格拉斯也承认他能顺着燃烧的自己的人像 一路从华盛顿走到芝加哥堪萨斯-内布拉斯加法案的政治后果极为严重在此之前，辉格党和民主党还可以让南北方的立法委员在不同议题上统一意见，但如今奴隶制问题使两派分裂到已不容小觑的程度来自两党的国会议员都站出来反对该法案其中包括一位来自伊利诺斯州的 辉格党人—阿伯拉罕·林肯他在 1854 年皮奥里亚演说中 谴责道「奴隶制本身便是巨大的不公」在当时，辉格党已近乎式微并已无法挽回地使党内分裂成南北两派同年，一个新的政党——共和党成立了由来自原有的两个党派 反对奴隶制的人士组建虽然林肯在 1854 年仍旧担任辉格党参议员他在新政党成立之初就是其支持者也为其招募了一批成员而同时民主党也受到了冲击因为在新成立的肯萨斯州境内由于「人民主权」的实行引发了暴力冲突在北部到处都有广告宣传呼吁人民到堪萨斯去阻止奴隶制的推行而南部以边界的暴动回应此举支持奴隶制的密苏里人穿过州界来操控投票结果并声讨反奴隶制的居民一位来自北部的废奴主义者，名叫约翰·布朗由于 1856 年的波特瓦托米大屠杀而名声扫地当时他和他的儿子们用宽剑 刺死了五名支持奴隶制的农民最后，超过 50 人 死于当时的堪萨斯内战虽然名义上仍旧是一个全国性政党道格拉斯领导的民主党 内部已经逐渐分成南北两派许多在北部的成员退出并加入了共和党阿伯拉罕林肯最终在 1856 成为了共和党的领袖并在余生一直身居此位同年，约翰·查理·弗里蒙特也是第一位来自共和党的总统候选人败给来自民主党的詹姆斯·布坎南但赢得了 33%的选票全部支持都来自北部各州两年后，林肯与道格拉斯在伊利诺斯州的参议员选举中展开激辩虽然林肯输掉了竞选但他在共和党的地位大大提升然而在 1860 年 林肯转败为胜这一次，他被选举为美国总统在他的家乡击败了那位来自北部的民主党人，道格拉斯他最终也由于自己亲自策划的法案所带来的灾难性后果而饱尝苦果美国人如今依旧在争论南北战争是否无法避免但毫无疑问的是堪萨斯-内布拉斯加法案 加剧了双方可怕的冲突而正是因为这点该法案也应作为美国历史上 最重要法案之一而被永远铭记

**P48 2014-02-12 The history of marriage - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=48)

There have been many different things written and said about marriage. From the sweetly inspirational to the hilariously cynical. But what many of them have in common is that they sound like they express a universal and timeless truth, when in fact nearly everything about marriage, from its main purpose to the kinds of relationships it covers to the rights and responsibilities involved, has varied greatly between different eras, cultures and social classes. So, let's take a quick look at the evolution of marriage. Pair bonding and raising children is as old as humanity itself. With the rise of sedentary agricultural societies about 10,000 years ago, marriage was also a way of securing rights to land and property by designating children born under certain circumstances as rightful heirs. As these societies became larger and more complex, marriage became not just a matter between individuals and families, but also an official institution governed by religious and civil authorities. And it was already well established by 2100 B.C. when the earliest surviving written laws in the Mesopotamian Code of Ur-Nammu provided many specifics governing marriage, from punishments for adultery to the legal status of children born to slaves. Many ancient civilizations allowed some form of multiple simultaneous marriage. And even today, less than a quarter of the world's hundreds of different cultures prohibit it. But just because something was allowed doesn't mean it was always possible. Demographic realities, as well as the link between marriage and wealth, meant that even though rulers and elites in Ancient Mesopotamia, Egypt and Israel had multiple concubines or wives, most commoners could only afford one or two tending towards monogamy in practice. In other places, the tables were turned, and a woman could have multiple husbands as in the Himalayan Mountains where all brothers in a family marrying the same woman kept the small amount of fertile land from being constantly divided into new households. Marriages could vary not only in the number of people they involved but the types of people as well. Although the names and laws for such arrangements may have differed, publicly recognized same-sex unions have popped up in various civilizations throughout history. Mesopotamian prayers included blessings for such couples, while Native American Two-Spirit individuals had relationships with both sexes. The first instances of such arrangements actually being called "Marriage" come from Rome, where the Emperors Nero and Elagabalus both married men in public ceremonies with the practice being explictly banned in 342 A.D. But similar traditions survived well into the Christian era, such as Adelphopoiesis, or "brother-making" in Orthodox churches, and even an actual marriage between two men recorded in 1061 at a small chapel in Spain. Nor was marriage even necessarily between two living people. Ghost marriages, where either the bride or groom were deceased, were conducted in China to continue family lineages or appease restless spirits. And some tribes in Sudan maintain similar practices. Despite all these differences, a lot of marriages throughout history did have one thing in common. With crucial matters like property and reproduction at stake, they were way too important to depend on young love. Especially among the upperclasses, matches were often made by families or rulers. But even for commoners, who had some degree of choice, the main concern was practicality. The modern idea of marriage as being mainly about love and companionship only emerged in the last couple of centuries. With industrialization, urbanization and the growth of the middle class more people became independent from large extended families and were able to support a new household on their own. Encouraged by new ideas from the Enlightenment, people began to focus on individual happiness and pursuits, rather than familial duty or wealth and status, at least some of the time. And this focus on individual happiness soon led to other transformations, such as easing restrictions on divorce and more people marrying at a later age. So, as we continue to debate the role and definition of marriage in the modern world, it might help to keep in mind that marriage has always been shaped by society, and as a society's structure, values and goals change over time, its ideas of marriage will continue to change along with them.

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翻译人员: SiYan Yao 校对人员: Liang Chen已经有各种不同文字记录和讨论着关于婚姻的话题。从甜蜜励志的到诙谐讽刺的。但是他们的共同點是他们听上去像在表达着一个横贯中西，纵横古今的真理。而事实上，几乎所有关于婚姻从她的主要意图，到其中牵涉的各种关系，再到与之相关的义务，在不同的时代、文化和社会阶级间都大相径庭。那么，就让我们快速浏览一下婚姻的演变。成家立室和养育子女就和人类本身一样历史悠久。随着定居型的农耕社会的兴起，大约一万年前，婚姻也是一种确保土地权和财产权的方式，（这种方式）通过指定在某些情况下出生的孩子为合法继承人（来实现）。随着这些社会变得更大更复杂，婚姻已不仅仅成为个人和家庭间的事情，她也成为了由宗教和民事行政机构管辖的一种官方制度。至公元前2100年，这种制度已经被完善地建立起来。那个时候订立了现存最早的成文法并记录在美索不达米亚的乌尔纳姆法典中，该法律规定了许多细节来制约管理婚姻，从对通奸的处分到出身于奴隶家庭孩子的合法身份。许多古代文明允许多重婚姻制度。甚至到今日，在全世界几百种不同的文化中，只有四分之一的文化是禁止多重配偶制。但是，有些事情存在并不代表它总是可行的。人口的现实问题，以及婚姻和财富的连带关系，意味着即使在古代的美索不达米亚，埃及和以色列的统治者和精英贵族妻妾成群，但大部分的老百姓只负担得起一个或者两个妻子，所以实际情况是更趋向于一夫一妻制。在其他一些地区，情况正好相反，一位女性可以有多位丈夫，比如在喜马拉雅山地区，那里有一个家庭中的所有男性与同一名女性结了婚，他们用婚姻保护着一小片有限而肥沃的土地，以防止它被新成立的家庭不断分割。婚姻可以多种多样，不仅是其参与其中的人数也包括人的性别类型。虽然关于同性婚姻的名称和法律可能有所不同，但是公开承认同性婚姻已经在历史长河中的各种文明裡出现。美索不达米亚的祷文中包括了为同性夫妻进行祝福，而美洲印第安的双灵人与两种性别的人都会发生关系。首例同性婚姻被实际称作为“婚姻”的情况出现在罗马，皇帝尼禄和埃拉伽巴路斯二人都以公开典礼的形式与男性结婚，这种行为在公元342年被明令禁止。但是，类似的传统在进入公元后幸免于难，比如滴血为盟，或者传统教会中的兄弟结拜，甚至是两个男人之间实质的婚姻，在1061年西班牙某个小礼堂的记录中都有所记载。婚姻甚至都不一定需要发生在两个活人之间。冥婚，就是新娘或新郎已经过世，它曾在中国出现过，主要是为了延续家族香火或者安抚死不瞑目的灵魂。另外，苏丹的一些部落延续了相似的情况。尽管有这些五花八门的差异，但古今历史中的许多婚姻也的确有一个共同点。一些决定性的因素比如财产和至关重要的传宗接代的问题，这些因素都太重要了以致于婚姻无法只取决于脆弱的爱情。尤其在上流社会，配偶的人选常常由家庭或者统治者来决定。即使对于有一定选择权的普通百姓，主要的考量还是实用性。现代婚姻的理念，主要围绕着爱和友谊，这种观念仅仅是在过去的几个世纪才出现的。随着工业化，城市化以及中产阶级的涌现，越来越多的人从庞大的家族中独立出来，并且有能力自己负担一个新的家庭。受到来自于启蒙运动中新思想的鼓舞，（对于婚姻）人们开始更加注重个人的幸福和诉求，而不是家庭责任或财富地位，至少有些时候是这样的。而这种对个人幸福的放大很快导致了其他方面的转变，比如放宽对离婚的束缚以及晚婚率的增加。所以，随着我们进一步讨论婚姻在现代社会的角色和定义时，也许我们应谨记婚姻始终都是社会的产物，而随着社会的结构，价值观和目标的不断改变，其对于婚姻的定位也会随之不断进行着调整。

**P49 2014-02-14 Poison vs. venom - What's the difference - Rose Eveleth**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=49)

Would you rather be bitten by a venomous snake or touch a poisonous frog? Wait, what's the difference between poison and venom, anyway? Let's say you have the misfortune to be bitten by a venomous rattlesnake. When it bites you, the snake will eject venom from little sacks behind its eyes, through its hollow fangs and into your flesh. That venom will then travel through your bloodstream and all over your body. In most cases, snake venom contains neurotoxins, proteins that can do all sorts of nasty stuff like make your muscles fire uncontrollably, burst your blood cells, and make you go completely numb. But you might get lucky! Snakes don't always decide you're worth wasting venom on. In fact, between 20 and 80% of snake bites are so-called "dry bites," where the snake is just trying to send a message without actually killing you. You see, venom takes energy and resources for the snake to make, and they don't want to waste it on a warning shot. When it comes to poison, on the other hand, there's no warning shot. If you pick up a poisonous dart frog to admire its beautiful colors, you've already gotten deadly poison all over your hands. As it seeps into your skin and travels through your blood, the poison starts to interfere with your nerves, preventing your muscles from contracting. If the frog's poison reaches your heart, it can cause it to stop. The distinction between venom and poison is purely in the method of delivery. Poison has to be inhaled, ingested, or absorbed. Venom has to be injected into a wound. Chemically, venoms and poisons are both considered toxins, so a snake bite is venomous. A poison dart frog is poisonous. Brown recluse spiders are venomous. Lionfish and pufferfish are poisonous. And some compounds can be poisons in one animal and venoms in another. Tetrodotoxin, a chemical 10,000 times more toxic than cyanide, is found in pufferfish, where it makes them poisonous. It's also found in the deadly blue-ringed octopus, where it's a venom delivered by bite. Some animals can even be both poisonous and venomous. Take the Asian tiger snake, for example. Not only does it have venom in its fangs but it also absorbs the toxins from the poisonous toads it eats, and then secretes those toxins from special glands on its neck, rendering it poisonous, too. Scientists are constantly finding new animals that employ toxins in weird, interesting ways. Recently, researchers discovered the very first venomous crustacean. Out of 70,000 species of crustaceans, only this one little remipede is venomous. Speleonectes tulumensis has figured out how to create a cocktail of toxins that it delivers through its tiny fangs. Scientists aren't totally sure how this venom works yet, but they think that it causes the unwitting victims' neurons to fire over and over and over again until it becomes paralyzed. Then, the little remipede closes in, dissolving away the exoskeleton of its prey and sucking out the juices. But poisons and venoms aren't always all bad. For thousands of years, humans have looked for ways to harness the power of these toxic compounds for good. Today, we have all sorts of medicines that come from toxins. The poison from cone snails is used as a painkiller. Many poisonous plants have been used to treat everything from malaria to irregular heartbeats. And scorpion venom might one day be used to treat heart disease. So, what should you do if something bites or poisons you? Don't try any of the things you've seen on the internet or in movies! Don't try to capture and kill the animal that bit you, and don't use a tourniquet or knife on your wound. Most importantly, don't panic! Stay calm, and seek medical attention. Treatment will mostly depend on what species you encountered. But if you forget the distinction between poison and venom, and tell the parademics that you were poisoned by a viper, they'll probably forgive you and treat you anyway.

**P49 2014-02-14 Poison vs. venom - What's the difference - Rose Eveleth**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=49)

翻译人员: Frank Chen 校对人员: Ying Wang你想要被毒蛇 咬一口，还是想要摸一下毒蛙？等等, 这两者有什么区别？都是有毒的，不是么？假如你杯具的让一条有毒的响尾蛇咬到了，假如你杯具的让一条有毒的响尾蛇咬到了，它张口咬你的时候，毒液将会从蛇的眼睛后面的毒囊里毒液将会从蛇的眼睛后面的毒囊里通过中空的毒牙进入到你的肌肉里然后毒液会随着你的血液循环流动直到全身大多数情况下，蛇的毒液含有神经毒素，里面包的蛋白质能产生许多让人讨厌的事情比如令你的肌肉抽搐或者令你的血细胞破裂，最后甚至会令你全身彻底麻木不过有些时候你会很走运蛇并非总是觉得你值得它吐出毒液实际上，在所有的蛇咬案例中，有百分之二十到八十都是所谓的“干咬”蛇只是想跟你说“滚开”而不是想干掉你你看，蛇制造毒液是需要能量和资源的它们不想将其随便浪费而另一方面“带毒”的生物可就没有警告的机会了如果你捧起一只箭毒蛙想要欣赏一下美丽的颜色你的手上就已经全部沾满了致命的毒素这些毒素会渗透到你的皮肤里面在血液里游走并且开始干扰你的神经系统运作令到你的肌肉不受控制，不能收缩活动。如果蛙的毒素到达你的心脏它将会让你的心脏停止跳动这两种不同有毒生物的区别仅仅是在于毒素输送的方法不同。Poison 必须是通过呼吸，进食或者接触来感染的，而Venom 必须是通过伤口来进入人体的。从化学的角度上看两者都是由毒素组成的。所以毒蛇咬人是 venomous，箭毒蛙则是 poisonous。棕色遁蛛是venomous，狮子鱼和河豚则是poisonous。某些化学成分在poison 和venom 的动物体内都有存在某些化学成分在poison 和venom 的动物体内都有存在河豚毒素，比氰化物还要厉害一万倍，这种毒素存在于河豚体内，河豚是poisonous的。这种毒素存在于河豚体内，河豚是poisonous的。在篮圈章鱼体内同样也存在这种毒素，但篮圈章鱼是venomous的有些动物甚至可以同时是poisonous 和venomous 的。举个例子——亚洲虎蛇它的腺囊里有毒液，(venomous)但虎蛇在捕食蟾蜍时，也会吸收蟾蜍的毒素，然后在颈部周围再把毒素分泌出来，然后在颈部周围再把毒素分泌出来，令自己变成带毒的，碰不得。 (poisonous)科学家们一直都在寻找一些有趣的新动物，它们使用毒素的方法古怪而有趣。最近研究人员发现了第一种有毒的甲壳动物,(venomous)在所有的七万种甲壳动物里面，只有这一种多足甲壳类动物remipede是有毒的。这种居住在深海没有眼睛的动物知道如何创造一些毒素然后通过它细小的尖牙传递出去科学家也不是十分肯定这种毒液的作用方法，他们估计毒液会令猎物的神经不断发出信号，他们估计毒液会令猎物的神经不断发出信号，最后猎物变得瘫痪。然后，小Remipede游过去溶解掉猎物的外壳，然后，小Remipede游过去溶解掉猎物的外壳，以便吸掉里面的汁液但是，毒素并不一定只有坏处。几千年来，人类一直在尝试利用毒素来做一些好事。几千年来，人类一直在尝试利用毒素来做一些好事。在现代，我们有很多的药物都是来自于毒素。在现代，我们有很多的药物都是来自于毒素。芋螺体内的毒素可以作为止痛药，许多带毒的植物被用来治病，从疟疾到心律不齐都有效许多带毒的植物被用来治病，从疟疾到心律不齐都有效蝎子的毒素将来有可能被用来治疗心脏病。蝎子的毒素将来有可能被用来治疗心脏病。那么，如果你被咬了或者摸了不该摸的东西，该怎么办？千万不要学电影里或者网络上面看到的千万不要学电影里或者网络上面看到的不要尝试杀捕捉或者杀掉那些咬过你的动物不要在伤口上用止血带或者刀最重要的是，不要慌张。冷静下来，立刻寻求医务治疗。根据咬你的动物种类不同，治疗方法也不一样。根据咬你的动物种类不同，治疗方法也不一样。如果你搞错了poison 和venom 的区别，如果你搞错了poison 和venom 的区别，并告诉医务人员“我被蛇毒到了” (应该是venom)没关系，他们还是会给你治疗的啦。

**P50 2014-02-18 An athlete uses physics to shatter world records - Asaf Bar-Yosef**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=50)

In the early 1960s, Dick Fosbury tried his hand at almost every sport, but never excelled at anything, until, at the age of 16, he turned to the high jump. But when he couldn't compete against the strong athletes at his college using the standard high jump techniques of the time, Fosbury tried to jump a different way: backwards. Instead of jumping with his face towards the bar, bringing each leg over in the traditional straddle method, he jumped with his back towards the bar. Fosbury improved his record by over half a foot, and left his coaches amazed by this strange new style of high jumping. During the next few years, Fosbury perfected his high jump style, won the U.S. National trials, and assured his place in the 1968 Olympics in Mexico. In the Olympic Games, Fosbury amazed the world with his new technique, winning a gold metal with an Olympic record leap of 2.24 meters. By the next Olympic Games, almost all of the competing of high jumpers had adopted what came to be known as the Fosbury Flop. What's the secret behind the technique? It lies in a physics concept called the center of mass. For every object, we can locate the average position of all of its mass by taking into account how the mass is spread around the object. For instance, the center of mass of a flat, rectangular object of uniform density will be in the intersection of both diagonals, in equal distance from each corner. We can find the center of mass for other objects by similar calculations, or by finding the object's balancing point, which lies right underneath its center of mass. Try balancing a broom by holding it and slowly bringing your hands together until they meet. This balancing point lies right underneath the broom's center of mass. We humans also have a center of mass. When most people stand up, their center of mass is around the belly, but what happens to your center of mass when you lift your hands in the air? Your center of mass moves upwards. It moves all the time as you move through the day, based on how your body is positioned. It can even move outside of your body. When you bend forward, your center of mass is located below your bent belly in a place where there is no mass at all. Weird to think about, but that's the average position of all your mass. Many objects' center of mass are outside their bodies. Think of doughnuts or boomerangs. Now look at the Fosbury Flop, and follow the position of the center of mass of the jumper. The jumper runs very fast, so he can divert his horizontal velocity to vertical velocity, and jumps. Wait for it...there. Look at the jumper's center of mass as his body bends backward. It's below the bar. That is the secret behind the jump. With the old, pre-Fosbury techniques, the jumper had to apply enough force to lift his center of mass above the bar by a few inches in order to clear it. The Fosbury Flopper doesn't have to do that. The genius of the Fosbury Flop is that the jumper can apply the same amount of force, but raise his body much higher than before. That means he can raise the bar so high that even when his center of mass can't go any higher, his arching body can. Fosbury's technique brought the high jump to new heights by splitting the jumper's body away from his center of mass, giving it that much more room to clear higher and higher bars. So the Fosbury Flop may be sports history's only great leap forward, that is also a great leap backward.

**P50 2014-02-18 An athlete uses physics to shatter world records - Asaf Bar-Yosef**

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翻译人员: Minji Seo 校对人员: Thunder Song1960 年代初Dick Fosbury 遍尝各种体育项目，却始终没在哪一项出头直到 16 岁那年，他试了跳高运动开始，当他无法击败学院中的优异选手使用当时的标准式跳法，Fosbury 尝试与众不同的方法：背跃不像一般选手般面向杆子翻转（两脚依次翻过的剪刀式（straddle）跳法）而Fosbury 背向横杆越过如此，他的成绩跃进了 15.24 公分，教练也折服在这诡异的新跳法面前。往后数年，Fosbury 完成了他的背跃绝技，通过了美国的国手选拔，并在 1968 年墨西哥城奥运会 挣得了历史定位在奥运会上，Fosbury 惊艳了全世界并以他的独门绝活一举夺下金牌，还顺便推进了奥委会记录，由 2.22 到 2.24 公尺。于是下一届奥运会中几乎所有选手都使用了新的背跃式跳法Fosbury 的鱼跃 （一名记者，认为以弯曲的背部坠落软垫， 像上岸的鱼乱跳 ）这个招式背后的秘密是什么？答案藏在一个物理概念里：称为质量中心（质心）。对任何物体我们都可以藉由考虑物体质量 在三维空间中的分布情形来确定其质量的平均位置。例如，一个扁平、长方形、密度均一的物体，其质心会落在两对角线的交点，与其它角落等距。对于别的物体 我们可以透过类似的方法来寻找其质量中心。或是直接找物体的平衡点，平衡点会落在质心的正下方。试试用双手托着扫把的柄，并轻轻用力让两手往内滑动，直到手掌合十。这时平衡点就在扫把的质心下这时平衡点就在扫把的质心下人体自然也有一个质心。大多数人站直时，质心位在肚脐附近。当你举起双手，你的质心会有啥变化？质心会向上移动在你一天的活动中，你的质心据你的姿势四处动来动去。甚至有些姿势，会让 你的质心位在身体的外部。例如腰向前仰质心会在你的腹部下方，即使那一点空无一物。想起来似乎怪怪的，但它确实是这时你身体所有部分的平均位置。还有许多物品的质心处在物品外面，例子有甜甜圈，和回飞镖。现在我们能回来看 Fosbury 的后跃了，注意动作中运动员的质心位置。选手首先高速助跑，将一部分的水平速度转移成垂直起跳的速度，于是跳！留神......就这儿。注意到选手身体往后弓起时质心所在位置吗？事实上它还在横杆之下！这就是背跃绝技的奥秘。在 Fosbury 登场以前，跳高的技术全仰赖选手拼命使劲为了将他们的质心抬到杆子以上数吋才能避免越过时把杆子撞掉。但背跃式跳法回避了这个瓶颈。Fosbury 方法的天才之处在于，选手花同样力气，其质心和原本一样高，身体却能处在更高位。这代表杆子能继续往上摆，即使质心的高度再也提升不了弯曲的身体却可以由上方跳过去。Fosbury 的新招式让跳高的世界纪录连创新高，原理是尽量弯曲身体，使选手的质心离身体越远越好，因此有更多空间能运用于闪过不断加高的横杆。因此可以说，Fosbury 绝技是运动史上的一次向前大飞跃，并且是向后飞跃。

**P51 2014-02-24 From the top of the food chain down - Rewilding our world - George Mo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=51)

We all know about the dinosaurs that once roamed the planet, but long after they went extinct, great beasts we call the megafauna lived on every continent. In the Americas, ground sloths the size of elephants pulled down trees with their claws. Saber-toothed cats the size of brown bears hunted in packs, but they were no match for short-faced bears, which stood thirteen feet on their hind legs, and are likely to have driven these cats away from their prey. There were armadillos as big as small cars, an eight foot beaver, and a bird with a 26 foot wingspan. Almost everywhere, the world's megafauna were driven to extinction, often by human hunters. Some species still survive in parts of Africa and Asia. In other places, you can still see the legacy of these great beasts. Most trees are able to resprout where their trunk is broken to withstand the loss of much of their bark and to survive splitting, twisting and trampling, partly because they evolved to survive attacks by elephants. The American pronghorn can run so fast because it evolved to escape the American cheetah. The surviving animals live in ghost ecosystems adapted to threats from species that no longer exist. Today, it may be possible to resurrect those ghosts, to bring back lost species using genetic material. For instance, there's been research in to cloning woolly mammoths from frozen remains. But even if it's not possible, we can still restore many of the ecosystems the world has lost. How? By making use of abandoned farms. As the market for food is globalized, infertile land becomes uncompetitive. Farmers in barren places can't compete with people growing crops on better land elsewhere. As a result, farming has started to retreat from many regions, and trees have started to return. One estimate claims that two-thirds of land in the US that was once forested but was cleared for farming has become forested again. Another estimate suggests that by 2030, an area in Europe the size of Poland will be vaccated by farmers. So even if we can't use DNA to bring back ground sloths and giant armadillos, we can restore bears, wolves, pumas lynx, moose and bison to the places where they used to live. Some of these animals can reshape their surroundings, creating conditions that allow other species to thrive. When wolves were reintroduced to the Yellowstone National Park in 1995, they quickly transformed the ecosystem. Where they reduced the numbers of overpopulated deer, vegetation began to recover. The height of some trees quintupled in just six years. As forests returned, so did songbirds. Beavers, which eat trees, multiplied in the rivers, and their dams provided homes for otters, muskrats, ducks, frogs and fish. The wolves killed coyotes, allowing rabbits and mice to increase, providing more food for hawks, weasels, foxes and badgers. Bald eagles and ravens fed on the carrion that the wolves abandoned. So did bears, which also ate the berries on the returning shrubs. Bison numbers rose as they browsed the revitalized forests. The wolves changed almost everything. This is an example of a trophic cascade, a change at the top of the food chain that tumbles all the way to the bottom, affecting every level. The discovery of widespread trophic cascades may be one of the most exciting scientific findings of the past half century. They tell us that ecosystems that have lost just one or two species of large animals can behave in radically different ways from those that retain them. All over the world, new movements are trying to catalyze the restoration of nature in a process called rewilding. This means undoing some of the damage we've caused, reestablishing species which have been driven out, and then stepping back. There is no attempt to create an ideal ecosystem, to produce a heath, a rainforest or a coral reef. Rewilding is about bringing back the species that drive dynamic processes and then letting nature take its course. But it's essential that rewilding must never be used as an excuse to push people off the land. It should happen only with the consent and enthusiasm of the people who work there. Imagine standing on a cliff in England, watching sperm whales attacking shoals of herring as they did within sight of the shore until the 18th century. By creating marine reserves in which no commerical fishing takes place, that can happen again. Imagine a European Serengeti full of the animals that used to live there: hippos, rhinos, elephants, hyenas and lions. What rewilding reintroduces, alongside the missing animals and plants, is that rare species called hope. It tells us that ecological change need not always proceed in the same direction. The silent spring could be followed by a wild summer.

**P51 2014-02-24 From the top of the food chain down - Rewilding our world - George Mo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=51)

翻译人员: Max Wang 校对人员: Geoff Chen我们都知道恐龙曾经一度称霸这个星球不过在它们灭绝很久之后仍然有我们称之为“巨型动物”的大怪物遍布每一块大陆在美洲，跟大象一般大的地獭能用它们的爪子拉倒大树像棕熊一样大的剑齿虎能成群结队地狩猎不过跟巨型短面熊比起来它们都弱爆了这些熊站起来有十三英尺高 (注：约四米）而且它们很容易就能把剑齿虎从它们的猎物旁边吓走还有像汽车一样大的犰狳八尺长的海狸（注：约2.5米）还有翼展为26尺（注：约八米）的大鸟不过几乎世界各地所有的巨型动物都已经绝种了，这通常 要归咎于人类的狩猎不过在亚洲和非洲还有一些得以幸存但在其他地方 你只能看到这些巨兽留下的遗迹树木如果被折断的话往往会再次发出新芽从而弥补造成的损失这样可以经受各种灾难的考验也许这是因为树木为了经受 大象的摧残而进化出来的功能美洲麋鹿跑得很快因为它们得逃出美洲猎豹的魔爪这些得以存活的动物生活 在幽灵创造的生态系统中因为这个生态系统 是由已经灭绝的物种开创的如今，我们有可能使这些幽灵复活用基因材料让它们重归于世比如说，有研究已经着眼于利用猛犸象被冰封的遗体碎片复活它不过就算最终难以成行我们还是能重现当时世界上的生态系统怎么弄？ 利用废弃的农场目前的食物市场已经全球化贫瘠的土地已经没啥用了不毛之地的农民们无法和在富饶土地上耕种的农民去竞争结果就是，很多地方的农耕退化森林重现一项研究表明，美国三分之二由森林变耕地的土壤现在又重新变回森林了另一项研究提出，可能在2030年时一块有欧洲波兰那么大的农场可能将被荒废所以就算我们不能用DNA去复原那些巨型地獭和巨型犰狳我们仍然可以找回熊、狼、美洲狮山猫、驼鹿和北美野牛让它们回到曾经生存过的地方这些动物会重塑它们的生存环境创造出得以让 它们种族繁衍生息的环境1995年，当狼群再次出现在黄石国家公园时它们很快地就改变了生态系统它们降低了鹿过多的种群数量植物又重新长出来了有一些树木的高度 在六年内增长了五倍跟随森林一起回来的，还有唱歌的小鸟以树木为食的海狸 其数量在河流中成倍增长它们筑起的水坝也养育了水獭、麝鼠、青蛙和鱼野狼杀死了郊狼让兔子和老鼠的数量得以增长因此老鹰、鼬鼠、狐狸，和臭鼬有了更多的食物秃鹫和乌鸦吃被狼遗弃了的腐肉秃鹫和乌鸦吃被狼遗弃了的腐肉熊呢，可以从重新回来的灌木丛里找到更多野莓越来越多的穿梭的北美野牛让森林重现活力狼群改变了几乎所有的东西这只是营养级联方面的一个例子而已食物链顶端的某个改变会一路影响到食物链的最底端会一路影响到食物链的最底端这个关于营养级联的发现可能是过去半个世纪里最令人兴奋地科学发现之一了这个发现证明了我们的生态系统其实只丢失了一两种 非常不同的大型动物其他的大部分行为方式其实跟现在的这些都差不多世界各地都有被称为 “重现荒野”的运动催化了大自然的复苏催化了大自然的复苏这说明对于我们 曾经造成的破坏进行补救事实上重新唤回了 曾被我们赶走的许多物种让他们重回自然舞台这并非是尝试重建一个理想的生态系统比如重建荒野、雨林，或珊瑚礁“重现荒野”只是把曾经被驱逐的物种带回来的一个动态过程剩下的就靠大自然天然去造化了不过重点是“重现荒野”不是一个驱逐人类的借口它应当得到当地人的默许和支持它应当得到当地人的默许和支持想象一下，直到18世纪的时候你还能站在英格兰的海边悬崖看到抹香鲸捕食鲱鱼群的景象看到抹香鲸捕食鲱鱼群的景象通过建立不允许 商业捕捞的海洋保护区通过建立不允许 商业捕捞的海洋保护区这景象还能重现想象一下，曾经的欧洲草原上曾经遍布着各种各样的动物河马、犀牛、大象、鬣狗和狮子“重现荒野”带回的不仅仅是丢失的动物和植物还有一种稀有物种叫“希望”它告诉了我们生态变迁并不一定总是朝着一个方向的寂静的春天之后 也可能是狂野的夏天

**P52 2014-02-24 What is the universe made of - Dennis Wildfogel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=52)

All the material objects around you are composed of submicroscopic units we call molecules. And molecules in turn are composed of individual atoms. Molecules frequently break apart and then form new molecules. On the other hand, virtually all the atoms you come in to contact with through the course of your life, the ones in the ground beneath you, the air you breath, the food you eat, those that make up every living thing, including you, have existed for billions of years and were created in places very unlike our planet. How those atoms came about is what I want to share with you. It all started 14 billion years ago with an event we call The Big Bang, which resulted in a universe consisting of gas alone. There were no stars and no planets. The gas was made up only of atoms belonging to the simplest elements. It was about 75 percent hydrogen and almost all the rest was helium. No elements like carbon, oxygen or nitrogen existed. No iron, silver or gold. In some places, the density of this gas was slightly higher than in others. Due to gravity, those places attracted even more gas, which further strengthened the pull of gravity, which then drew more gas in, and so on. Eventually, large dense gas balls formed, shrinking under their own gravity and consequently heating up on the inside. At some point, the core of such a ball gets hot enough that nuclear fusion occurs. Hydrogen atoms smash together to form helium, accompanied by a great release of energy, strong enough to counteract the shrinking force of the gravity. When the energy pushing out from the fusion reactions matches the gravity pulling all the gas inwards, an equilibrium occurs. From this a star is born. Over its lifetime, the fusion reactions in the core of a massive star will produce not only helium, but also carbon, oxygen, nitrogen and all the other elements in the periodic table up to iron. But eventually, the core's fuel runs out, leaving it to collapse completely. That causes an unbelievably powerful explosion we call a supernova. Now there are two things to note about how supernovas create elements. First, this explosion releases so much energy that fusion goes wild forming elements with atoms even heavier than iron like silver, gold and uranium. Second, all the elements that had been accumulating in the core of the star, like carbon, oxygen, nitrogen, iron, as well as all of those formed in the supernova explosion, are ejected in to interstellar space where they mix with the gas that's already there. History then repeats itself. Gas clouds, now containing many elements besides the original hydrogen and helium, have higher density areas that attract more matter, and so on. As before, new stars result. Our sun was born this way about 5 billion years ago. That means that the gas it arose from had itself been enriched with many elements from supernova explosions since the universe began. So that's how the sun wound up with all the elements. It's still mostly hydrogen at 71 percent, with most of the rest being helium at 27 percent. But bear in mind that while the first stars were made up of hydrogen and helium alone, the remaining elements in the periodic table make up two percent of the sun. And what about Earth? Planets form as an incidental process to star formation out of the same gas cloud as the star itself. Small planets like ours don't have enough gravity to hold on to much hydrogen or helium gas since both of those are very light. So, even though carbon, nitrogen, oxygen and so on made up only two percent of the gas cloud from which Earth was formed, these heavier elements form the bulk of our planet and everything on it. Think about this: with the exception of hydrogen and some helium, the ground you walk on, the air you breath, you, everything is made of atoms that were created inside stars. When scientists first worked this out over the first half of the 20th Century, the famous astronomer Harlow Shapley commented, "We are brothers of the boulders, cousins of the clouds."

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=52)

翻译人员: Jake Hong 校对人员: Zhiting Chen围绕在你周围的所有物质都是由极小的单位体构成的我们叫它们分子同时分子又是由单独的原子构成分子常常分裂然后构成新的分子换句话说我们一生中接触的所有原子你脚下的土地你所呼吸着的空气，你吃着的食物包括你在内，构成所有生命体的原子已经存在了数十亿年并由与地球大为不同的空间组成今天我就要与你们分享这些原子是如何产生的这些是都从140亿年前我们所称之为的宇宙大爆炸时开始大爆炸形成了只有气体的宇宙没有任何恒星和行星而气体只由原子组成这些原子属于最简单的元素其中大约有75%的氢气剩下的大约24%则都是氦气像碳，氧，氮等元素都是不存在的也没有铁，银或金在某些地方，这些气体的密度会比别的地方稍高由于重力因素，密度高地方就会吸引更多的气体并且使重力增加于是更多的气体被吸引，并以这种形式一直循环下去渐渐地，形成了体积大且密度高的气体球它们依靠自身的重力在内部产生热量从某种角度来看，是这种球体中心的原子核结合产生的炙热氢气聚集形成氦气释放出巨大的能量足够抵消使球体缩小的重力从这种反应开始释放出的能量与进入内部的气体重力相同的话即形成了球形体因此一个恒星也就诞生了这颗恒星存在期间从巨大的恒星中心引起的融合反应不仅产生了氦气还有碳，氧气及氮气以及元素周期表中诸如铁等所有元素但是随着中心燃料的逐渐减少最后将消耗殆尽那时，将引起难以置信的大爆炸那就是我们所说的超新星现在我们要了解两件关于超新星如何制造的元素事首先，这种爆炸会释放巨大的能量继而形成游离的比铁更重的元素如银，金和铀原子等其次，聚集在恒星中心的所有元素如碳，氧，氮，铁它们不仅是由那些超新星爆炸形成的而且包括宇宙空间喷涌而出的这些元素与已存在的气体混合以这种形式循环往复气体云，现在除了原始的氢气和氦气以外已包含着许多元素并有更高密度的空间去吸引更多的物质因此，一颗新的恒星诞生了我们的太阳就是在50亿年前以这种方式诞生的可以说形成太阳的气体的状态自宇宙形成以来从超新星爆炸开始就已经形成了所以太阳中拥有所有的元素不过其中占最大比例的是71%的氢气以及27%的氦气然而要知道的是即使最初的恒星仅由氢气和氦气构成元素周期表中的剩余元素还是组成了太阳的其余2%我们的地球又如何呢？行星是依照恒星形成的过程由同样的气体云聚合产生的像地球这样的小行星由于重力不够无法留住过多的氢气和氦气毕竟氢气和氦气太轻了因此，即使碳，氮气，氧气等只组成了形成地球的气体云的2%但这些元素却构成了地球的地面和地上的所有东西想一想除了一些氢气和氦气你脚下的土地你呼吸的空气，以至于你本身全都由形成恒星内形成的原子所构成因此当二十世纪前期科学家们刚得出这个结论时著名的天文学哈洛沙普利说：“我们都是岩石的兄弟，云朵的表亲。”

**P53 2014-02-26 Why do we cry The three types of tears - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=53)

Our story is about a girl named Iris. Iris is very sensitive. (Bird cawing) So much that she is always in tears. She cries when she's sad, when she's happy, (Godzilla roars) and even tears up when things just get to her. She has special lacrimal glands to make new tears and special tubes, called lacrimal puncta, to drain old ones away. And she cries so much that she goes through ten ounces of tears per day, thirty gallons a year! In fact, if you look closely, you'll see that she's crying a little bit all the time. The basal tears that Iris constantly produces form a thin coating of three layers that cover her and keep dirt and debris away. Right next to Iris is the mucus layer, which keeps the whole thing fastened to her. On top of it is the aqueous layer, which keeps Iris hydrated, repels invasive bacteria, and protects her skin, or cornea, from damage. And, finally, there is the lipid layer, an oily outer film that keeps the surface smooth for Iris to see through, and prevents the other layers from evaporating. Normally, Iris goes about her day without really noticing the basal tears doing their thing. That's kind of their whole point. But one day, she meets a girl named Onion. Iris is immediately smitten. Onion looks gorgeous in her bright purple jacket, and she smells terrific. So, Iris invites Onion to her house for dinner. But when she comes in and takes off her jacket, something terrible happens. You see, when Onion's jacket is removed, a chemical reaction happens, converting the sulfoxides that make her smell so great into sulfenic acid, which then becomes a nasty substance with a long name: syn-Propanethial S-oxide. The gas stings Iris, and suddenly, she can't help it, she starts weeping uncontrollably. These reflex tears are different from the basal tears that Iris is used to. Because they're designed to wash away harmful substances, or particles, they're released in much larger amounts, and their aqueous layer contains more antibodies to stop any microorganisms that may be trying to get in, as well. Both Iris and Onion are devastated. They know they can't continue their relationship if Iris is going to hurt and cry every time Onion takes off her jacket. So, they decide to break up. As Onion walks out the door, Iris stops crying. And immediately starts again. Only now, she's not crying reflex tears but emotional tears. When someone is either too sad or too happy, it feels like a loss of control, which can be dangerous. So, emotional tears are sent in to stabilize the mood as quickly as possible, along with other physical reactions, such as an increased heart rate and slower breathing. But scientists still aren't sure exactly how or why the tears themselves are helpful. They may be a social mechanism to elicit sympathy or show submission. But some studies have also found that emotional tears contain higher levels of stress hormones, such as ACTH and enkephalin, an endorphin and natural pain killer. In this case, emotional tears are also directly calming Iris down, as well as signaling her emotional state to others. Sorry things didn't work out with Onion, Iris, but don't worry. As long as you have all three kinds of tears working to keep you balanced and healthy, it will get better. You'll see.

**P53 2014-02-26 Why do we cry The three types of tears - Alex Gendler**

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翻译人员: Wenbo Li 校对人员: Keke Gu我们的故事是关于一个名叫虹膜的女孩.虹膜很敏感。以至于总是以泪洗面。她难过的时候会哭，她开心的时候也会哭，甚至被惹恼了，还是会哭。她特殊的泪腺可以分泌新的泪水，还有特殊的管道，叫做泪道，用来排走眼泪。她哭得很厉害，每天会流掉十盎司的泪水， （注：盎司，重量单位，1盎司相当28.35克。）一年三十加仑！ （注：加仑，容积单位，1加仑大约4L）事实上，如果你仔细观察，你会发现她无时不刻都流点眼泪。虹膜不断产生一点基底眼泪形成薄薄的三层外膜以防止她接触灰尘、碎屑。紧挨着虹膜外面的是粘液层。给她固定整个组织。在她上面的是眼房水层，用来保持虹膜湿润，排斥侵入性细菌，并保护她的皮肤，也叫角膜，保护她免受侵害。并且，最后，还有脂质层，一层保持表面平滑的油性外膜方便虹膜透视也防止其他层的蒸发。通常情况下，虹膜整天也没有注意过基底眼泪在默默的工作。某种程度上说，这是它们的存在价值。直到有一天，她遇到了一个叫做“洋葱”的女孩。虹膜倍受打击。洋葱在她明亮的紫色外套的烘托下看起来很华丽并且闻起来棒极了。于是，虹膜邀请洋葱来家里吃晚餐，当洋葱进屋，并且脱下外套，可怕的事情发生了，你看，当洋葱脱下外套，一个化学反应发生了，把让她闻起来有浓烈味道的亚砜，转化成次磺酸，进而变成一个有巨长名字的讨厌的物质：丙硫醛-S-氧化物。这种气体刺激着虹膜，来势汹汹，她无力阻止，于是她开始控制不住地大哭。这种反应性的眼泪与虹膜经常流的基底眼泪不同。因为，它们是为了冲掉有害的物质或颗粒。它们的流量更大，并且水层中包含大量抗体也为了阻止可能进入眼睛的微生物。虹膜和洋葱都震惊了。她们知道将无法继续做好朋友了如果虹膜会受到伤害和哭泣在每次洋葱脱下外套的时候。于是，她们决定绝交。当洋葱走出房门时，虹膜停止了哭泣，紧接着她又开始哭，但是这次，她并不是反射性流泪，而是动情落泪。当一个人太难过或是太开心的时候，就会感到失控这是很危险的。因此，留下动情的泪水可以稳定情绪，尽快地，和其他物理反应一起作用，比如加快心率和减缓呼吸。但是科学家们仍无法确定眼泪是为什么或如何起到效用的。可能是一种社会机制来博取同情，或者表达意见。但是某些研究也发现动情留下的泪水中包含较高浓度的应激激素，比如促肾上腺皮质激素和脑啡肽，一种内啡肽，可以自然止痛。在这种情况下，情感泪水也可以让虹膜冷静下来，以及向别人传递她的情绪，很抱歉，虹膜，你不能和洋葱做朋友了，但是别担心，只要你拥有这三种泪水来保持你的健康均衡，一切都会好起来。你会看到的。

**P54 2014-02-27 What we can learn from galaxies far, far away - Henry Lin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=54)

Here are some images of clusters of galaxies. They're exactly what they sound like. They are these huge collections of galaxies, bound together by their mutual gravity. So most of the points that you see on the screen are not individual stars, but collections of stars, or galaxies. Now, by showing you some of these images, I hope that you will quickly see that galaxy clusters are these beautiful objects, but more than that, I think galaxy clusters are mysterious, they are surprising, and they're useful. Useful as the universe's most massive laboratories. And as laboratories, to describe galaxy clusters is to describe the experiments that you can do with them. And I think there are four major types, and the first type that I want to describe is probing the very big. So, how big? Well, here is an image of a particular galaxy cluster. It is so massive that the light passing through it is being bent, it's being distorted by the extreme gravity of this cluster. And, in fact, if you look very carefully you'll be able to see rings around this cluster. Now, to give you a number, this particular galaxy cluster has a mass of over one million billion suns. It's just mind-boggling how massive these systems can get. But more than their mass, they have this additional feature. They are essentially isolated systems, so if we like, we can think of them as a scaled-down version of the entire universe. And many of the questions that we might have about the universe at large scales, such as, how does gravity work? might be answered by studying these systems. So that was very big. The second things is very hot. Okay, if I take an image of a galaxy cluster, and I subtract away all of the starlight, what I'm left with is this big, blue blob. This is in false color. It's actually X-ray light that we're seeing. And the question is, if it's not galaxies, what is emitting this light? The answer is hot gas, million-degree gas -- in fact, it's plasma. And the reason why it's so hot goes back to the previous slide. The extreme gravity of these systems is accelerating particles of gas to great speeds, and great speeds means great temperatures. So this is the main idea, but science is a rough draft. There are many basic properties about this plasma that still confuse us, still puzzle us, and still push our understanding of the physics of the very hot. Third thing: probing the very small. Now, to explain this, I need to tell you a very disturbing fact. Most of the universe's matter is not made up of atoms. You were lied to. Most of it is made up of something very, very mysterious, which we call dark matter. Dark matter is something that doesn't like to interact very much, except through gravity, and of course we would like to learn more about it. If you're a particle physicist, you want to know what happens when we smash things together. And dark matter is no exception. Well, how do we do this? To answer that question, I'm going to have to ask another one, which is, what happens when galaxy clusters collide? Here is an image. Since galaxy clusters are representative slices of the universe, scaled-down versions. They are mostly made up of dark matter, and that's what you see in this bluish purple. The red represents the hot gas, and, of course, you can see many galaxies. What's happened is a particle accelerator at a huge, huge scale. And this is very important, because what it means is that very, very small effects that might be difficult to detect in the lab, might be compounded and compounded into something that we could possibly observe in nature. So, it's very funny. The reason why galaxy clusters can teach us about dark matter, the reason why galaxy clusters can teach us about the physics of the very small, is precisely because they are so very big. Fourth thing: the physics of the very strange. Certainly what I've said so far is crazy. Okay, if there's anything stranger I think it has to be dark energy. If I throw a ball into the air, I expect it to go up. What I don't expect is that it go up at an ever-increasing rate. Similarly, cosmologists understand why the universe is expanding. They don't understand why it's expanding at an ever-increasing rate. They give the cause of this accelerated expansion a name, and they call it dark energy. And, again, we want to learn more about it. So, one particular question that we have is, how does dark energy affect the universe at the largest scales? Depending on how strong it is, maybe structure forms faster or slower. Well, the problem with the large-scale structure of the universe is that it's horribly complicated. Here is a computer simulation. And we need a way to simplify it. Well, I like to think about this using an analogy. If I want to understand the sinking of the Titanic, the most important thing to do is not to model the little positions of every single little piece of the boat that broke off. The most important thing to do is to track the two biggest parts. Similarly, I can learn a lot about the universe at the largest scales by tracking its biggest pieces and those biggest pieces are clusters of galaxies. So, as I come to a close, you might feel slightly cheated. I mean, I began by talking about how galaxy clusters are useful, and I've given some reasons, but what is their use really? Well, to answer this, I want to give you a quote by Henry Ford when he was asked about cars. He had this to say: "If I had asked people what they wanted, they would have said faster horses." Today, we as a society are faced with many, many difficult problems. And the solutions to these problems are not obvious. They are not faster horses. They will require an enormous amount of scientific ingenuity. So, yes, we need to focus, yes, we need to concentrate, but we also need to remember that innovation, ingenuity, inspiration -- these things come when we broaden our field of vision when we step back when we zoom out. And I can't think of a better way to do this than by studying the universe around us. Thanks. (Applause)

**P54 2014-02-27 What we can learn from galaxies far, far away - Henry Lin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=54)

翻译人员: Qingqing Mao 校对人员: Qiwen Lu这里有一些星系团的图片。正如它们的名字，它们是成团的星系，依靠互相之间的引力集合在一起。你在屏幕上看到的大部分亮点都不是一颗颗的恒星，而是星系——成群的恒星。看着这些图片，我希望你很快能看出星系团非常地漂亮。然而更重要的是，我认为星系团是神秘的，令人诧异的，而且是有用的。它们可以用作宇宙中质量最大的实验室。作为实验室来说，描述星系团即是描述我们可以用它们来做些什么实验。我认为有四类主要的实验。我想说的第一种是探测极大。多大？这里有一个星系团的图片。它的质量如此之大，以至于穿过它的光线会被弯折，光线被这个星系团的极大引力所扭曲。事实上，如果你仔细看你能看到环绕着星系团的环状影像。用数字来说，这个星系团的质量超过一千万亿个太阳的质量。这些系统的质量之大令人难以想象。但是不仅是它们的质量，它们还有其他特征。它们本质上是孤立的系统。我们可以把它们想象为一个缩小版的宇宙。我们对于宇宙在大尺度上的很多问题——比如说，引力如何工作？——都有可能通过研究这些系统来得到解答。以上是关于极大。第二点是极热。如果我们拍摄一个星系团的照片，然后我把所有恒星光都移除，剩下的是这么一团蓝色。这个是假彩色影像。我们所看到的其实是X光影像。问题是，如果不是星系，那这些光是由什么所发出的呢？答案是炙热的气体，百万度的气体。实际上，那是等离子体。它们如此炙热的原因需要从上一张幻灯片里找。这些系统中极强的引力极大地加速了气体粒子，高速意味着高温。这是主要的想法，但是其中的科学还是一个草稿。这些等离子的很多基本性质依然困扰着我们，依然是难题，依然推动着我们对于极高温物理的认识。第三点：探测极小。为了解释这一点，我需要告诉你们一个令人不安的事实。宇宙中的大部分物质都不是原子构成的。你们都被骗了。大部分物质都是由非常神秘得东西构成的，我们称其为暗物质。暗物质很不喜欢相互作用，除了引力作用。当然我们想知道更多。如果你是一个粒子物理学家，你想知道当我们把东西对撞在一起时会发生什么。暗物质也不例外。那么我们要如何做？为了回答这个问题，我先要提另一个问题：星系团对撞会发生什么？这里有一幅图片。由于星系团是宇宙的一个缩影，一个缩小版的宇宙。它们大部分是由暗物质构成的，这是你们在图中所见的蓝紫色部分。红色部分代表了高温气体。当然，你还能看到很多星系。这里所发生的是一个在超大尺度上的“粒子加速器”。这一点非常重要，因为这意味着，实验室里很难探测到的一些极小的效应可能不断累积到了我们可以观测到的东西里。这个非常有趣。为什么星系团能告诉我们暗物质的知识？为什么星系团能告诉我们极小尺度上的物理？正是因为它们如此巨大。第四种：极其怪异的物理学。我刚才所说的已然很疯狂了。要是还有更奇怪的东西，我认为那一定是暗能量。如果我把一个球扔向空中，我预料它会向上走，但是我不会期待它向上走得越来越快。类似地，宇宙学家明白为什么宇宙在膨胀，但是他们不明白为什么宇宙膨胀会加速。他们给引起这种加速膨胀的原因取了一个名字，称其为暗能量。同样，我们想要知道更多。一个问题是，暗能量如何在大尺度上影响宇宙？取决于暗能量的强度，结构可能会形成得更快或更慢。问题是，宇宙的大尺度结构是非常复杂的。这里有一个计算机模拟。我们需要一个方法来简化它。我喜欢用一个类比来思考这个问题。如果我想要了解泰坦尼克号的沉没过程，最重要的事情不是去找出船体的每一块小碎片的位置。最重要的是追踪最大的那两块。同样，我可以通过追踪宇宙中最大的碎片来学到大尺度上的宇宙的很多知识。这些最大的碎片就是星系团。随着我快要讲完了，你可能略有上当受骗的感觉。我的意思是，在一开始我说星系团是有用的，而且我已经给出了一些理由。但是他们的用处到底是什么？为了回答这个，我想引用亨利·福特的一句话。当他被问及汽车的时候，他曾说过：“如果我当年去问顾客他们想要什么，他们会说：“更快的马”。”今日，我们社会面临着很多很多的难题。这些问题并无明显的答案。答案不是更快的马。解答它们将会需要大量科学的巧思。所以，我们需要集中，我们需要专注，但是我们也需要记得，创新、巧思、灵感这些东西的出现需要我们开拓视野，需要我们重新审视，需要我们纵观全局。而研究我们周围的宇宙正是最好的方法。谢谢。（掌声）

**P55 2014-02-28 Getting started as a DJ - Mixing, mashups and digital turntables - Co**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=55)

(Music) Aw, thank you, thank you. As you can probably tell, I'm an astronaut. No, I'm a DJ/Producer, as it says on the screen. I am also a high school student, just like many of you guys. How many high school students do we have out here? (Cheers) Oh, okay! A good amount. I'm a proud member of my school's marching band, and I run track, as well, so if any of you guys are into that, it's one of my other passions. I have been DJing and producing for a little over three years now, and I've worked with artists that you may know, like Avicii, Skrillex, Major Lazer, Krewella, Porter Robinsion, Carnage, and many others. How many of you guys like dance music? Show off hands, dance music, oh okay. How many of you guys like rap or trap hip hop? Okay, good amount. Jazz? Classical? That's good, you guys have smart minds, that's good. What's great about DJing is that you can combine all these genres into one idea, and what I like to do is combine dance, hip hop, trap, dubstep, even movie samples, and kind of combine them into one set. DJing creates this, sort of, combined culture that really unites many fans. A good example of this is Skrillex and A$AP Rocky's collaboration "Wild for the Night" or, most recently, Avicii and Ella Black's "Wake Me Up." How many of you guys know that song? It's a great track. Now, what exactly does a DJ do? Well, as you just saw earlier, they mix tracks. What I just did was mix a Kanye West intro from "Black Skinheads" with a track called "LRAD." One of the main goals is to really trigger samples, tracks, or clips and kind of create this long journey. I'm going to do another little example for you guys right now of what DJs call a "mashup," which is taking two or more tracks and combining them into one. This mashup was made famous by a Hungarian duo Myon & Shane 54, and it takes the vocals from Krewella's "Alive." How many of you guys know that song? "Alive"? Yeah, okay. I'm going to take the vocals from that track and the song "Language" by Porter Robinson. So, let me just play you the vocals first. (Music) So, that's the vocals, and here's the actual track. (Music) So, what I'm going to do is I'm going to fill these vocals on top of the track and create a new song, a kind of combined song, with the two vocals. (Music) If you turn it down, you can just hear I'm playing it a capella or just the song by itself. (Music) Now, what I'm going to do after this drops is change it into another song. One of the most important things about dance music is really the drop, so I'm going to change it into another song and really catch you by surprise. (Music) And that's one example right there. (Applause) So, as you saw, I took three different songs and kind of combined them into one new idea, which is something plenty of DJs do out there on the professional circuit. There are plenty of ways to get started DJing. One of the main things I did was really take the time to study DJs that inspired me. Whether it was watching podcasts, watching live sets, or just really looking them up online. I really tried to take in what it meant to be a fantastic DJ. One of the best ways to really learn is to ask a friend, you know, a friend who knows how to DJ. Just go over there, ask him a few questions. If no that, thankfully we have a lot of great online resources. One of the things you can do is check out YouTube, check out some demonstrations. Now, many DJs, a high percentage of them, check out Beatport or Soundcloud to find a lot of the tracks. There are also many other blog sites, such as Billboard's CODE, EDMTunes, EDM Sauce, or Dancing Astronaut. Now, there are multiple ways to DJ, and what could originally only be done on turntables and vinyl, by legends such as Larry Levan, Grandmaster Flash, and Paul Oakenfold, can now be done with many more pieces of equipment, such as CDJs, which are, sort of, digital turntables and what I learned on and what I still use to this day. There are many other amazing programs now, such as Ableton, Traktor Pro, Serato, or even apps for tablets and touchscreens. There are many hardware systems just like my APC40 here that can launch samples, clips and tracks. You can also just use turntables, CDJs, an S4 controller, or an Novation Launchpad. And all of these really kind of do the same thing, and that's mix tracks. So, what I'm going to do now is show you guys another mix demonstration. I'm going to start with one of my own songs that I did with my friend Matt Dzyacky, and from there I'm going to go in a sort of medley of different tracks and show you the different styles of mixing that you can do. (Music) So I'll show you guys when I start mixing the new track, so you can hear it coming in. (Music) You can hear in the back, a new song is mixing in. (Music) Now, another thing that DJs use is what's called a mixer, and a mixer has many different effects, such as a beat roll, filter effects, and any other different ones. There's plenty of effects to use. (Music) So, now I'm going into a new song, and after this drops, I'm going to drop it in another song and kind of change it up. (Music) And that's a new song bite. (Music) So I'm just going to straight mash up another song right when this one breaks down. (Music) Now, if I want to change up the music, let's say, throw in some new beats, I can just choose a trap beat I want to throw over the breakdown. (Music) So, I get ready to throw in my new beats now. (Music) And that is the end of that demo. (Applause) Thank you, thank you! Now, the great thing about technologies now is whether it's a two dollar app or a couple hundred dollar equipment, which I'm sure most parents won't want to buy for their child, is that almost anyone who has a passion for DJing and a passion for the music and who might want to pursue a career in it really has the ability to, well, pursue it, such as myself. You can start with an app on a tablet or an app on your phone, even, an app on your iPad, and then move on to bigger equipment. The opportunities are endless, and, as you saw, you can mix many different styles of music. So, thank you!

**P55 2014-02-28 Getting started as a DJ - Mixing, mashups and digital turntables - Co**

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翻译人员: Becky Zhao 校对人员: xu chao(音乐）谢谢大家。大家可能看得出来，我是一个宇航员。不是的，我是一个DJ/制作人，正如屏幕上写的。我还是一个高中生。正如你们中的许多人一样。我们当中有多少高中生？（掌声）哦，好的！有不少人。我很骄傲成为学校乐队的一员。同时我也赛跑，如果你们中有人也热爱这个，那是我的另一个爱好所在。我做DJ和制作人已经有三年多一些了，并且和一些你们可能听说过的艺术家合作过，比如艾维奇(Avicii，知名瑞典DJ及音乐制作人）,史奇雷克斯（Skrillex，是一位美国DJ）, Major Lazeran ,Kreewlla, Porter Robinsion, Carnage, 还有好多。你们中间有多少人喜欢舞曲？举起手来，舞曲，好的。你们中间多少人喜欢饶舌和嘻哈音乐？好的，不少人。爵士乐？古典乐？很好，你们思想很合潮流，这很好。DJ的奇妙之处在于你可以把所有流派合至一处，我喜欢做的就是去合并舞曲，嘻哈，饶舌，甚至是电影插曲，然后把它们结合在一起。DJ 就是做这个的，就像某种，合并文化它也汇聚了许多爱好者。举个栗子是史奇雷克斯（Skrillex） 和洛奇（ Rocky） 的合作“狂燥之夜”和最近期的艾维奇（Avicii） 和艾拉布莱克（Ella Black）的“唤醒我”。你们中的多少人听过那首歌？那是一首很棒的歌。那么，DJ 到底是做什么的呢？就像我刚刚提到的，他们混合各种音轨。我刚才做的是将Kanye West 的“暴力少年”与叫做LRAD的音轨混合。主要目的之一是将样片、音轨或者剪辑并制造出这样的歌曲。我现在你们面前要做一个小小的示范这个在DJ里叫做“混搭”，就是提取两种音轨把它们合并成一个。这种混搭的出名是由一个叫 Myon & Shane 54 的匈牙利二人组从 Krewella 的 “活着” 中提取的声乐部分。你们中有多少人听过 “活着 ”这首歌？好的。我现在要从那个音乐中提取声乐部分，然后由Porter Robinson“演唱”。首先我向你们播放声乐部分。（音乐）这个就是音乐，这个是真实音轨。（音乐）那么，我现在要做的就是把这些声乐部分附到音轨上用这个两个乐曲的声乐部分创造出一个新的汇合的的歌曲（音乐）如果你把声音关了你会只能听到我在演奏竖琴或者只有歌曲本身（音乐）现在，我要做的事在这之后转换到另一首歌。舞曲中很重要的一点是它的结束曲，所以我要换成另一首歌并且让你们吃惊。（音乐）这就是一个例子。（鼓掌）所以，正如大家听到的，我把三个不同的音乐汇成了一段新的旋律，这是DJ的工作之一在专业层面讲。有很多尝试做DJ的途径我做的最主要的是是花时间去学习启发我的DJ。不管它是看播客，看现场，或者是在网上听。我真的努力吸取其中精华去成为一个出彩的DJ.这其中最好的方法之一就是去向一个了解DJ的朋友学习。就是那边，问些问题如果没有，感谢上帝，我们还有许多在线资源。这里面你可以访问YouTube，找到一些示范。现在，很多DJ，占他们大部分的访问 Beatport 或者 soundcloud 去获得音轨。也有很多其他的博客网站，例如 Billboard's CODE, EDMTunes, EDM Sauce,或者Dancing Astronaut.现在通往DJ有很多种途径，而且之前只可以在转盘上和黑胶唱片完成的，通过刻印像Larry Levan, Grandmaster Flash, Paul Oakenfold,现在可以用更多的装备完成，例如CDJs,是一种电子唱片是我学会并现在一直使用的。还有一些其他的奇妙的的程序，比如专用控制器，专业混音，Serato，甚至是平板上的应用。有许多硬件系统就像这个APC40可以录制样片和卡碟。你也可以就用转盘，CDJs,S4控制器，或者Novation发射台。这些基本上都是做相似的事情，就是混音。所以，我现在要展示给你们另一种混音。我将从一首我自己的歌开始这首歌是我和朋友Matt一起做的，从这里我将要混进不同的音轨并给你们展示不同的风格。（音乐）我现在要展示当我混进新的音轨，你可以听出它的进入。（音乐）你可以听到，新音乐被加进去了。（音乐）现在，DJ们用的另一个东西叫混合器，它有很多不同的效果，像一个飞刀辊，过滤效果，等等。有许多效果可以使用。（音乐）所以，现在我要开始一首新歌，在它结束后，我会接上另一首歌并且给它变速。（音乐）这是一个新的旋律。（音乐）我将要直接混合另外一首歌刚这首结束。（音乐）现在，如果我想加快音乐，并加入新的节拍，我可以选择一个我想要用的节拍。（音乐）我现在要把新的节奏加进去了。（音乐）这个就是那个片段的结束。（掌声）谢谢。现在，技术的好处在于它是或者是个几元钱的应用，或者是个几百元钱的设备，我相信大多数家长不想给孩子买，对于大多数对DJ有兴趣的人和对音乐有兴趣的人还有那些想从事这一事业的人他们有能力去购买它，就像我这样。你可以从平板上的应用开始，或者从你的手机应用，甚至平板电脑应用，然后在尝试更大的设备。机会是无限的，并且，你可以混合多种音乐。谢谢。

**P56 2014-03-06 The science of spiciness - Rose Eveleth**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=56)

Why does your mouth feel like it's on fire when you eat a spicy pepper? And how do you soothe the burn? Why does wasabi make your eyes water? And how spicy is the spiciest spice? Let's back up a bit. First, what is spiciness? Even though we often say that something tastes spicy, it's not actually a taste, like sweet or salty or sour. Instead, what's really happening is that certain compounds in spicy foods activate the type of sensory neurons called polymodal nociceptors. You have these all over your body, including your mouth and nose, and they're the same receptors that are activated by extreme heat. So, when you eat a chili pepper, your mouth feels like it's burning because your brain actually thinks it's burning. The opposite happens when you eat something with menthol in it. The cool, minty compound is activating your cold receptors. When these heat-sensitive receptors are activated, your body thinks it's in contact with a dangerous heat source and reacts accordingly. This is why you start to sweat, and your heart starts beating faster. The peppers have elicited the same fight-or-flight response with which your body reacts to most threats. But you may have noticed that not all spicy foods are spicy in the same way. And the difference lies in the types of compounds involved. The capsaicin and piperine, found in black pepper and chili peppers, are made up of larger, heavier molecules called alkylamides, and those mostly stay in your mouth. Mustard, horseradish, and wasabi are made up of smaller molecules, called isothiocyanates, that easily float up into your sinuses. This is why chili peppers burn your mouth, and wasabi burns your nose. The standard measure of a food's spiciness is its rating on the Scoville scale, which measures how much its capsaicin content can be diluted before the heat is no longer detectable to humans. A sweet bell pepper gets 0 Scoville heat units, while Tabasco sauce clocks in between 1,200-2,400 units. The race to create the hottest pepper is a constant battle, but two peppers generally come out on top: The Trinidad Moruga Scorpion and the Carolina Reaper. These peppers measure between 1.5 and 2 million Scoville heat units, which is about half the units found in pepper spray. So, why would anyone want to eat something that causes such high levels of pain? Nobody really knows when or why humans started eating hot peppers. Archaeologists have found spices like mustard along with human artifacts dating as far back as 23,000 years ago. But they don't know whether the spices were used for food or medication or just decoration. More recently, a 6,000 year old crockpot, lined with charred fish and meat, also contained mustard. One theory says that humans starting adding spices to food to kill off bacteria. And some studies show that spice developed mostly in warmer climates where microbes also happen to be more prevalent. But why we continue to subject ourselves to spicy food today is still a bit of a mystery. For some people, eating spicy food is like riding rollercoasters; they enjoy the ensuing thrill, even if the immediate sensation is unpleasant. Some studies have even shown that those who like to eat hot stuff are more likely to enjoy other adrenaline-rich activities, like gambling. The taste for spicy food may even be genetic. And if you're thinking about training a bit, to up your tolerance for spice, know this: According to some studies, the pain doesn't get any better. You just get tougher. In fact, researchers have found that people who like to eat spicy foods don't rate the burn any less painful than those who don't. They just seem to like the pain more. So, torment your heat receptors all you want, but remember, when it comes to spicy food, you're going to get burned.

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翻译人员: Daixin Neill-Quan 校对人员: Sherry Chen为什么吃辣椒时嘴里像是着了火一样？怎样才能缓解这种灼烧感？为什么山葵酱能让人流泪？最辣的辛香料究竟有多辣？让我们从头说起首先想一个问题：什么是辣味？我们常说一些食物很辣但实际上辣并不是一种味道它不同于甜、咸、酸这些可以尝到的味道之所以会感到辣是因为辛辣食物中的一些复合物激活了人体中一种叫“伤害性感受器”的感觉神经元这种神经元遍布全身嘴和鼻中就有这种神经元值得一提的是，当身体接触到热烫物体时也能激活这种神经元当你吃辣椒时嘴里之所以像是着了火是因为大脑的确认为嘴里起火了而如果这时再吃一些含薄荷醇的食物嘴里就会有相反的感觉，灼烧感会缓解很多这是因为凉凉的薄荷味复合物激活了你的冷觉感受器当热敏感受器被激活大脑会认为你贴近了危险的热源身体会做出一定的反应因此这时你会开始流汗心跳加速吃辣椒引起的身体本能反应跟身体应对危险状况的本能反应是一样的你可能已经发现不同辣食的辣味各有不同食物中的不同复合物形成了不同的辣味比如，黑胡椒和红辣椒中含有的辣椒素和胡椒碱是由一种叫“烷基胺”的分子组成这种分子较大、较重能滞留在嘴中而芥末酱、辣根酱、山葵酱中含有一种叫“异硫氰酸盐”的分子这种分子较小能轻松扩散到鼻窦处所以，吃红辣椒时，嘴里会有灼烧感而吃山葵酱时，鼻子里会有灼烧感食物辣度的标准计量方法是借助史高维尔辣度单位测量方法是不断稀释被测物中的辣椒素直到人感觉不到辣为止 稀释液体的总和即是被测物的史高维尔辣度单位甜椒的史高维尔辣度单位是0塔巴斯科辣沙司的辣度单位在1200-2400之间现在，培植最辣辣椒俨然成为一种国际竞赛目前公认最辣的两种辣椒是千里达莫鲁加毒蝎椒和 卡罗来纳死神辣椒这两种辣椒的史高维尔辣度单位在150-200万之间相当于一半的辣椒喷雾剂辣度单位为什么有人愿意吃能造成如此巨大痛苦的食物呢？我们无法得知人类最早食用辣椒的时间和原因考古学家从两万三千多年前的古人类器皿中发现了类似芥末的香料但尚不明确这些香料是用作调味、治病，还是仅仅作为装饰最近，考古学家还发现一个六千多年前的瓦罐罐旁有烤鱼和烤肉的遗迹罐内有芥末有观点认为古人类从这时开始在食物中加入香料以此杀菌一些研究显示，在古代，香料主要生长在气候较热的地区而这些地方也更容易滋生细菌至于为什么人类到了今天仍对辛辣食物欲罢不能还是个解不开的谜团对一些人来说吃辛辣的食物就像坐过山车虽然当时最直接的感受并不舒服但他们非常享受随之而来的刺激感还有研究显示喜欢吃辣食的人也更乐于从事其他能激起肾上腺素的活动比如赌博对辛辣食物的喜好程度甚至也有遗传的因素如果你想训练得自己更能吃辣有这么几条信息跟您分享：一些研究显示辣带来的灼烧感从不会减轻只是吃辣的人的忍耐力提高了研究人员发现喜欢吃辣食的人跟不喜欢吃辣食的人体验到的辛辣感是一样的只是喜欢吃辣的人更享受那种灼烧感所以，尽情磨练你的热觉感受器吧不过要记住，当你吃辣食的时候大脑会认为你被灼烫了

**P57 2014-03-13 Grammar's great divide - The Oxford comma - TED-Ed**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=57)

Say you're helping plan a friend's party, and he sends you a text asking you to "bring Bob, a DJ and a clown." You're pretty impressed. You had no idea Bob was so multitalented. But when the day arrives, it turns out that he's not, and you were supposed to bring three different people. As you and Bob sit at the silent, clownless party, it occurs to you that the confusion could've been avoided simply by using another comma after DJ. This final comma in a list, placed directly before the main conjunction, such as and, or, or nor, is called the serial comma, or Oxford comma. And it has long driven grammar nerds crazy because even major language institutions can't agree on whether it should be used. Ironically, the Oxford comma is more common in the United States, where it's recommended by the MLA, the Chicago Style Manual, and the US Government Printing Office, though not by the AP Style Book. In the UK and other English-speaking countries, most style guides do not support the comma's use, with the exception of its namesake, the Oxford University Press. Why not use the serial comma? One of the main arguments is that the conjunction is usually enough to denote a separate entity. And where it's not, like in your ill-fated invite list, changing the order of terms will usually do the job. Journalists also dislike the comma because it takes up precious space and can make text look cluttered. Sometimes, it can even create confusion of its own. For example, if your friend had asked for "Bob, a DJ and a puppy," you'd probably figure out that they're three separate beings. Puppies are cute, but they don't make great DJs. With the comma, you may think Bob is the DJ, and all you need is him and the puppy. The argument over the Oxford comma has raised such strong passions over the years that a sort of truce has been reached. The common wisdom is that its use is optional, and depends on whether it will help to avoid confusion. For one thing, you're supposed to keep your use or avoidance of the Oxford comma consistent throughout a whole piece of writing. So, using it only where necessary is not an option. And the very idea of a grammatical rule being optional is a bit odd. Imagine that you hadn't messed up the party planning, and read the next day that "everyone had a great time - ninjas, pirates, vikings, old and young." If the Oxford comma were standard, you would notice it missing and conclude that old and young must describe the awesome guests already listed. But as things stand, you will always wonder whether it means that a bunch of regular, boring kids and old people showed up as well. Ultimately, the serial comma may be useful or annoying, but your opinion on it, as for many optional things, probably has something to do with whichever style you were raised on. Your high school teachers favored it? It's likely you're still using it. Your first editor hated it? You probably do, too. And maybe so much hairsplitting over a tiny squiggle on a page is a bit silly. After all, there are so many bigger problems to worry about. But sometimes, little things can make a big difference.

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翻译人员: 晨 黄 校对人员: Zhiting Chen假设你准备帮你的朋友组织一个聚会你朋友给你发了一条短信要你记得叫上鲍勃，一个DJ和一个小丑你感到好惊讶你感叹于鲍勃这个人可以如此多才多艺不过当那天到来时你发现并不是这样的你应该叫上三个不同的人，当你和鲍勃在这个无音乐， 无小丑的聚会中尴尬着你意识到，其实这样的尴尬是本可以避免的那条短信中，只要在DJ后面加上一个逗号， 误会就消除了那个直接放在主要连词，比如and 和 or之前的句子最后一个逗号我们称之为连续逗号或者是牛津逗号这个玩意对于语法的痴迷分子的折磨由来已久因为即使是那些权威的语言机构对于它是否应该正式被使用， 也无法给出统一意见讽刺的是，牛津逗号反而在美国使用的更加普遍因为它被一些主流机构推荐， 如现代语言协会，芝加哥文体手册还有美国政府印刷办公室但是美国联合印刷手册不在其中在英国以及一些英语国家很多的文体指南并不是很支持逗号使用在除了人名的表达之外的地方如牛津大学出版社为什么不使用连续逗号呢？论据之一就是连词的本身已经可以足够可以分割不同的名词实体了其实非也就拿张倒霉的party邀请卡来说改变几个名词的次序也于事无补新闻工作者也不待见逗号除了占用宝贵的空格空间之外它还会使文章看上去杂乱无章有时候，它还会带来理解上的误会比如如果你朋友要你叫上鲍勃，一个DJ和一条狗你可能会认为他们是三个东西狗狗即便可爱但是它们也不能是DJ加了逗号之后你可能会以为鲍勃就是DJ而你要叫上的是两样事物， DJ鲍勃和狗关于牛津逗号的争论在很长一段日子里引起过大家热烈关注直至后来大家达到共识，同意停战。通常的观念是认为如果逗号可以帮你在一句话里避免歧义你可以自由选择是否用它你要做到在一篇文章里面，无论你使用它或是不使用它无论你使用或是不使用逗号你都要做到前后一致，要么你就通篇用，要么反之所以，能不用，还是尽量不用而任何关于我们可以选择性的去遵从语法规则这样的论调多少有点奇怪想象一下，如果你顺利策划了那个party，第二天，你朋友给你发了一条短信，说昨晚个个都开心，忍者啦， 海盗啦，维京人啦，老的小的如果牛津逗号是要规范使用的你会发现它在这里缺失了你推断老的和小的指的就是之前提到很酷的忍者什么的但是还有一个可能性你会质疑这老的和小的是不是是指另外一个在party上出现过人群，无趣的小孩和老人归根结底，连续逗号可以是有用的，或是烦人的对待它，就像对待别的可选择的规则一样要和你打算使用的文体和格式，保持一致你高中老师喜欢它？那么你可能也会一直用它你第一个编辑上司痛恨它？你可能也一样吧在一篇字迹难辨的手稿文章里，那么多的吹毛求疵未必让人觉得大可不必毕竟这个世界上充满了更多更大的烦心事但有时候，小小的改变可以造成大不同。

**P58 2014-03-13 The case of the vanishing honeybees - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=58)

There is an environmental mystery afoot, and it begins with a seemingly trivial detail that reveals a disaster of global proportions. One day, you notice that the honey you slather on your morning toast is more expensive. Instead of switching to jam, you investigate the reason for the price hike. What you find is shocking. The number of domesticated honeybees in the US has been decreasing at an alarming rate. This decline appears too big to be explained by the usual causes of bee death alone: disease, parasites or starvation. A typical crime scene has almost no adult bees left in the hive, except, perhaps, a lonely queen and a few other survivors. It's full of untouched food stores and a brood of unborn larvae, suggesting that the adults vacated without waiting for them to hatch. But what's particularly eerie is that there's no tell-tale mass of dead or dying bees nearby. Either they have forgotten their way back to the hive, or they have simply disappeared. These mysterious disappearances aren't new. Humans have been collecting honey for centuries. But it wasn't until European settlers in the 1600's introduced the subspecies, Apis mellifera, that we domesticated bees. Since the 19th century, beekeepers have reported occasional mass disappearances, giving them enigmatic names like disappearing disease, spring dwindle disease and autumn collapse. But when in 2006 such losses were found to affect more than half of all hives in the US, the phenomenon got a new name: colony collapse disorder. The most frightening thing about this mystery isn't that we'll have to go back to using regular sugar in our tea. We farm bees for their honey, but they also pollinate our crops on an industrial scale, generating over 1/3 of America's food production this way. So, how can we find the culprit behind this calamity? Here are three of the possible offenders. Exhibit A: Pests and Disease. Most infamous is the varroa mite, a minuscule red pest that not only invades colonies and feeds on bees, but also transfers pathogens that stunt bee growth and shortens their life span. Exhibit B: Genetics. The queen is the core of a healthy hive. But nowadays, the millions of queen bees distributed in commercial hives are bred from just a few original queens, which raises the worry about a lack of genetic diversity which could weaken bees' defenses against pathogens and pests. Exhibit C: Chemicals. Pesticides used both on commercial beehives and agricultural crops to ward off parasites could be getting into the food and water that honeybees consume. Researchers have even found that some pesticides damage the honeybees' homing abilities. So we have a file full of clues but no clear leads. In reality, scientists, the actual detectives on this case, face disagreement over what causes colony collapse disorder. For now, we assume that several factors are the cause. Honeybees aren't necessarily in danger of extinction, but fewer bees overall means less pollination and higher food costs, so it's crucial that scientists solve the case of the vanishing bees. Because while having less honey might be a buzzkill, crop shortages are something that would truly sting.

**P58 2014-03-13 The case of the vanishing honeybees - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=58)

翻译人员: Thunder Song 校对人员: Phillip Feng有一个匪夷所思的自然现象正在进行，这一切看似都源于一些琐碎的细节，它们揭示了全球均衡的灾难。某一天，你发现你抹在面包上的蜂蜜变得更贵。于其改用果酱，你开始调查价格上涨的原因。你所得出的结论令人震惊。美国家养蜜蜂的数量正在以一个惊恐的速度下降。这样的一种减少程度太大以至于不能用普通的理由去解释蜜蜂自身的死亡比如疾病、寄生虫、或者缺少食物。一个典型的犯罪场景使得几乎没有成年蜜蜂留在蜂房，除了可能留下了一个蜂后和其它一些幸存者。里面放满了没有触碰过的食物以及一些还未出生的幼虫，就好像一些成年蜜蜂并未等到它们孵化就辞职了。但是最怪异的是附近并没有任何已经死去或是正在死去的蜜蜂的迹象。要不就是是它们忘记回蜂房的路，要不就是它们纯粹的消失了。这样的神秘失踪并不是第一次。几个世纪以来人们都在收集蜂蜜。但是是从1600年欧洲的移民者开始才引进了蜜蜂的亚种，意大利蜜蜂，也就是我们家养的蜜蜂。从19世纪开始，养蜂人发现时而会有大量的蜜蜂消失，因此赋予了它们一些神奇的名字比如“消失的疾病”、’“春天会减少的疾病”，以及”秋天的衰减“。 （这三个名字为译者直译。在这种疾病未规范前，因为各地均有这种疾病发生但叫法不同，最后美国统一了标准，称之为蜂群崩坏综合症）但是到了2006年，人们发现这样的一种减少影响了美国超过一半的蜂房，人们给这样的现象一个新的名字，蜂群崩坏综合症。这种不明的自然现象最恐怖的地方，并不是我们必须回到只能在茶里放普通糖的时期。我们为了蜂蜜而养殖蜜蜂，它们同时对我们种植的农作物进行授粉，美国超过三分之一的食物是通过这样的方式生长的。所以，怎样才能找到灾难背后的凶手？这里提供三个可能的凶手。第一种：害虫和疾病。最声名狼藉的是瓦螨，一种小型的红色害虫，不仅寄生在蜜蜂、以蜜蜂为食物，而且还传播一种能阻碍蜜蜂生长的病原体，缩短它们的寿命。第二种：遗传问题。蜂后是整个健康的蜂房的核心。但是如今，分布在商业蜂房的成千上万的蜂后都是由很少的一些蜂后哺育出来的。这种方式直接影响了遗传的多样性，并且可能直接降低了蜜蜂对害虫 和病原体的抵抗力。第三种：化学药品。在进行商业蜜蜂养殖和大规模农作物种植时， 被用来消灭寄生虫的农药有可能参入蜜蜂所摄入的水和食物中。研究者已经发现一些农药破坏了蜜蜂的归巢能力。所以我们有这样的一些线索，但并没有明确的证据。事实上，科学家们，也就是寻找真相的侦探们，在蜂群崩坏综合症的原因上有着不同的见解。我们暂时假设这些因素就是原因。蜜蜂并不一定面临绝种的危险，但是蜜蜂数量的减少意味着授粉的减少， 以及食物价格的提高，所以科学家们能否解开蜜蜂消失之谜 是至关重要的。虽然蜂蜜的减少可能只是一件令人扫兴的事， （“buzz”同蜜蜂所发出的声音）但是粮食的短缺就事关重大了。

**P59 2014-03-14 The fundamentals of space-time - Part 1 - Andrew Pontzen and Tom Whyn**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=59)

Space: it's where things happen. Time: it's when things happen. We can measure where things are and when things take place, but in modern physics, we realize when and where are actually part of the same question. Because when it comes to understanding the universe, we need to replace three-dimensional space plus time with a single concept: four-dimensional space-time. We'll explore and explain space-time in this series of animations. Animations? Yeah. Well, we're not very animated are we? Sure we are! Look, I can go from here to here. Whoa! How'd you get from here to there? How fast did you go? Did you run? Walk? Did you even go in a straight line? Ah! To answer that, you'll need to make our cartoon physics look more like physics physics. You'll need more panels. More panels, please! Okay, in each panel, Andrew's in a slightly different place. So I can see each one records where Andrew is at a different time. That's great. But it would be easier to see what's going on if we could cut out all the hundreds of panels and stack them up like a flip book. Right, now let's flip through the book so that we can see one panel after another getting through 24 in every second. See! I told you it was an animation. Now you can see me walking along. Drawing all those panels and putting them into a flip book is just one way of recording the way I'm moving. It's how animation, or even movies, work. As it turns out, at my walking speed, it takes two seconds to get past each fence post, and they're spaced four meters apart. So we can calculate my velocity -- how fast I'm moving through space - - is two meters per second. But I could've worked that out from the panels without flipping through them. From the edge of the flip book, you can see all of the copies of the fence posts and all of the copies of Andrew and he's in a slightly different place in each one. Now we can predict everything that will happen to Andrew when we flip through 24 pages every second, including his speed of motion, just by looking. No need to flip through at all. The edge of this flip book is known as a space-time diagram of Andrew's journey through, you guessed it, space and time. We call the line that represents Andrew's journey his world line. If i jog instead of walking, I might be able to get past a fence post every second. He's not very athletic. Anyway, when we look at this new flip book from the edge, we can do the same analysis as before. The world line for Andrew jogging is more tilted over than the world line for Andrew walking. We can tell he's going twice as fast as before without flipping the panels. But here's the clever bit. In physics, it's always good to view things from other perspectives. After all, the laws of physics should be the same for everyone or no one will obey them. So let's rethink our cartoon and have the camera follow Andrew jogging along as the fence posts approach and pass behind him. Still viewing it as a flip book of panels, we don't need to redraw anything. We simply move all of the cutout frames slightly until Andrew's tilted world line becomes completely vertical. To see why, let's flip it. Yes, now I'm stationery, just jogging on the spot, in the center of the panel. On the edge of the flip book, my world line was going straight upwards. The fence posts are coming past me. It's now their world lines that are tilted. This rearrangement of the panels is known as a Galilean transformation, and it lets us analyze physics from someeone else's perspective. In this case, mine. After all, it's always good to see things from other points of view, especially when the viewers are moving at different speeds. So long as the speeds aren't too high. If you're a cosmic ray moving at the speed of light, our flip book of your point of view falls apart. To stop that from happening, we'll have to glue panels together. Instead of a stack of separate panels, we'll need a solid block of space-time, which we'll come to in the next animation.

**P59 2014-03-14 The fundamentals of space-time - Part 1 - Andrew Pontzen and Tom Whyn**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=59)

翻译人员: Fen Guan 校对人员: Qingqing Mao空间描述事情在哪里发生时间描述事情什么时候发生我们可以度量事情在哪儿在什么时间发生但是在现代物理学我们发现时间和地点事实上是同一个问题的不同方面因为当要了解宇宙我们需要用一个概念来代替三维空间加时间四维时空在这个动画系列里我们将探索解释四维时空用动画？是的好吧，但我们并没有怎么动，不是么？我们当然在动，看，我从这儿到了那儿哇！你怎么从这儿到那儿的？你动得多快？你跑的还是走的？你是走的直线么？啊哈！要回答这个，你需要把我们的卡通物理变得更像真实的物理你需要更多图画请给更多图画好了，在每个图中，安德鲁在一个稍微不同的地方每一张图记录了安德鲁不同时间的位置非常好，不过如果我们剪开数以百计的图画然后堆在一起看就能更简单地看清发生了什么就像手翻书一样好，来让我们快速翻这本书我们看到一个接一个的图画每秒24张看！我说过这是个动画现在你能看到我是怎么走过去的画出所有图然后放在手翻书里是记录我移动的一种方法这就是动画片，甚至电影的工作原理结果发现，以我的步行速度每两秒经过一个篱笆桩桩子间距4米我们可以计算我的速度我在空间移动的速度就是两米每秒但事实上不需要翻动画面我也可以从那些画面里面算出速度从手翻书的侧面你可以看到篱笆桩的所有副本还有安德鲁的所有副本他在每个里面处在稍微不同的位置现在我们可以预测以每秒24页翻动时安德鲁将会发生的事包括他的运动速度仅仅通过看不需要翻动这个手翻书的侧面就叫做安德鲁的行程的时空图你猜到了时间和空间我们把代表安德鲁的行程的线叫做他的世界线如果我用慢跑代替步行我可能每秒通过一个桩他不是那么有运动细胞无论如何，当我们看这个新手翻书的侧边我们可以做和之前相同的分析安德鲁慢跑的世界线比他步行的世界线更加倾斜我们不用翻画就可以知道他的速度是原来的两倍但再机智点在物理学中，多从其他角度看事情总是好的毕竟，物理基本定律对每个人都一样或者说没有人能违背重新审视这个卡通让镜头跟随安德鲁一起慢跑篱笆桩一一接近又被超过同样将其看做手翻书我们不用重新画所有图画只是略微移动所有的画面直到安德鲁的倾斜的世界线变成竖直的为什么呢？来翻起来对的，现在我是不动的，在固定点慢跑一直在图画的中间在手翻书的侧边图里我的世界线是竖直的篱笆桩经过了我现在桩的世界线是倾斜的了这种图画的重新放置叫做伽利略变换它让我们从其他人的角度分析物理在这个例子里，我的角度总之，多从其他角度看事物总是好的尤其当观察者在以不同速度移动的时候只要速度不是太快如果你是一束以光速移动的宇宙射线你看到的手翻书就跟不上了为了阻止这样的事发生我们不得不把所有画面粘在一起我们需要一个整块的时空来取代画面的堆积我们将在下一个动画里解释这一点

**P60 2014-03-19 Dead stuff - The secret ingredient in our food chain - John C. Moore**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=60)

If someone called you scum, you'd probably be offended, but scientifically, they might not be far off. Have you ever thought about where your food comes from? You might say it comes from plants, animals, or even fungi, but you'd probably rather not think about the rotting organisms and poop that feed those plants, animals, and fungi. So really, you and most of the matter in your body are just two or three degrees of separation from things like pond scum. All species in an ecosystem, from the creatures in a coral reef to the fish in a lake to the lions on the savannah, are directly or indirectly nourished by dead stuff. Most of the organic matter in our bodies, if we trace it back far enough, comes from CO2 and water through photosynthesis. Plants use the energy from sunlight to transform carbon dioxide and water from the environment into glucose and oxygen. That glucose is then transformed into more complex organic molecules to form leaves, stems, roots, fruit, and so on. The energy stored in these organic molecules supports the food chains with which we're familiar. You've probably seen illustrations like this or this. These green food chains start with living plants at their base. But in real-life terrestrial ecosystems, less than 10% of plant matter is eaten while it's still alive. What about the other 90? Well, just look at the ground on an autumn day. Living plants shed dead body parts: fallen leaves, broken branches, and even underground roots. Many plants are lucky enough to go their whole lives without being eaten, eventually dying and leaving remains. All of these uneaten, undigested, and dead plant parts, that 90% of terrestrial plant matter? That becomes detritus, the base of what we call the brown food chain, which looks more like this. What happens to plants also happens to all other organisms up the food chain: some are eaten alive, but most are eaten only when they're dead and rotting. And all along this food chain, living things shed organic matter and expel digestive waste before dying and leaving their remains to decay. All that death sounds grim, right? But it's not. All detritus is ultimately consumed by microbes and other scavengers, so it actually forms the base of the brown food chain that supports many other organisms, including us. Scientists are learning that this detritus is an unexpectedly huge energy source, fueling most natural ecosystems. But the interactions within an ecosystem are even more complex than that. What a food chain really represents is a single pathway of energy flow. And within any ecosystem, many of these flows are linked together to form a rich network of interactions, or food web, with dead matter supporting that network at every step. The resulting food web is so connected that almost every species is no more than two degrees from detritus, even us humans. You probably don't eat rotting things, poop, or pond scum directly, but your food sources probably do. Many animals we eat either feed directly on detritus themselves, like pork, poultry, mushrooms, shellfish, or catfish and other bottom feeders, or they are fed animal by-products. So, if you're thinking nature is full of waste, you're right. But one organism's garbage is another's gold, and all that rotting dead stuff ultimately provides the energy that nourishes us and most of life on Earth, as it passes through the food web. Now that's some food for thought.

**P60 2014-03-19 Dead stuff - The secret ingredient in our food chain - John C. Moore**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=60)

翻译人员: Jing Littlejohn 校对人员: Xiaoou Chen如果有人叫你废物，你或许会觉得他冒犯了你。但从科学角度来看，他们可能没完全说错。你可否想过你每天吃的食物从何而来？你或许会说这些食物来自植物、动物、或者真菌类植物，但你可能不愿想到，腐烂的有机物和粪便是植物、动物和真菌类植物的食物。所以事实上， 你以及你的身体的大多数物质同池塘中的淤泥也不过是两三个食物链级的分别。生态系统内的所有物种，从珊瑚礁里的生物到湖里的鱼，再到大草原的狮子，都直接或间接地由死去的东西喂养。我们身体内大多数有机物质，如果我们追根究底，都来自由光合作用产生的二氧化碳和水。植物用来自光照的能量将环境中的二氧化碳和水转化为葡萄糖和氧气。葡萄糖又转换为结构更加复杂的有机分子，成为叶、茎、根、果实等形成的基础。这些储存在有机分子中的能量维持着我们所熟悉的食物链的运转。你或许见过与此相似的图表，或者这个。这些绿色食物链以活体植物作为它们的基础。但在现实的陆地生态系统中，不到10%的植物体在它们依然活着的时候被吃掉。那么剩下的90%去哪了呢？好吧，那我们就在某个秋天低头看看地上。活着的植物枯萎死去的部分会掉落：败叶、枯枝，甚至是地下的根茎。很多植物足够幸运能够度过整个生命周期而不被吃掉，最终死去，尸体保留了下来。那所有那些没有被吃掉，被消化 并且已经死去的植物部分，我们前面所提到的90%的陆地植物呢？它们变成了腐质，是我们称之为“棕色食物链” （腐食食物链）的基础，看起来更像这个。发生在植物上的一切，也同样发生在食物链上端的 其他所有生物身上：有些在活着的时候就被吃了，但大多数在死掉腐烂之后才被吃掉。并且沿着整个食物链，有机物质会从活体上脱落，活体在死之前排出可分解的废弃物并留下它们的遗体，直至腐烂。所有这些死亡听起来很残酷，是吧？但事实并非如此。所有腐质最终会被微生物及其他食腐动物吃光，所以说，腐质事实上是 形成“棕色食物链”的基础，支撑了许多其他生物的生存，包括我们。科学研究发现，出人意料的是，这些腐质是巨大的能量来源，为大多数自然生态系统提供燃料。但一个生态系统内的相互作用要比这个复杂的多。一条食物链真正代表的是一个单独的能量流动的途径。并且，在任一生态系统中，许多像这样的流动途径彼此交错连结，形成一个强大的相互联系的网络，或称食物网，死了的东西支撑了这个网络的 每一个环节。由于食物网各个环节如此紧密相连，以至于食物网中几乎每个物种同腐质的联系都不超过两个消费级，甚至我们人类也包括在内。你或许不直接吃腐烂的东西，如粪便或者塘泥，但你所吃的食物或许是以这些为生。很多我们所吃的动物，要么是直接由腐质喂养的，比如说猪肉、家禽、蘑菇、贝类，或者鲶鱼及其他底层动物；要么就是以动物的副产品为生。所以说， 如果你认为大自然充满了废物，你算是说对了。但你认为是垃圾的东西 别人可能认为是金子，并且所有这些腐烂的死了的东西，随着在食物网中的层层传递，最终提供了喂养我们及地球上大多数生命所需的能量。这的确是让人回味无穷的事实。

**P61 2014-03-26 How many ways can you arrange a deck of cards - Yannay Khaikin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=61)

Pick a card, any card. Actually, just pick up all of them and take a look. This standard 52-card deck has been used for centuries. Everyday, thousands just like it are shuffled in casinos all over the world, the order rearranged each time. And yet, every time you pick up a well-shuffled deck like this one, you are almost certainly holding an arrangement of cards that has never before existed in all of history. How can this be? The answer lies in how many different arrangements of 52 cards, or any objects, are possible. Now, 52 may not seem like such a high number, but let's start with an even smaller one. Say we have four people trying to sit in four numbered chairs. How many ways can they be seated? To start off, any of the four people can sit in the first chair. One this choice is made, only three people remain standing. After the second person sits down, only two people are left as candidates for the third chair. And after the third person has sat down, the last person standing has no choice but to sit in the fourth chair. If we manually write out all the possible arrangements, or permutations, it turns out that there are 24 ways that four people can be seated into four chairs, but when dealing with larger numbers, this can take quite a while. So let's see if there's a quicker way. Going from the beginning again, you can see that each of the four initial choices for the first chair leads to three more possible choices for the second chair, and each of those choices leads to two more for the third chair. So instead of counting each final scenario individually, we can multiply the number of choices for each chair: four times three times two times one to achieve the same result of 24. An interesting pattern emerges. We start with the number of objects we're arranging, four in this case, and multiply it by consecutively smaller integers until we reach one. This is an exciting discovery. So exciting that mathematicians have chosen to symbolize this kind of calculation, known as a factorial, with an exclamation mark. As a general rule, the factorial of any positive integer is calculated as the product of that same integer and all smaller integers down to one. In our simple example, the number of ways four people can be arranged into chairs is written as four factorial, which equals 24. So let's go back to our deck. Just as there were four factorial ways of arranging four people, there are 52 factorial ways of arranging 52 cards. Fortunately, we don't have to calculate this by hand. Just enter the function into a calculator, and it will show you that the number of possible arrangements is 8.07 x 10^67, or roughly eight followed by 67 zeros. Just how big is this number? Well, if a new permutation of 52 cards were written out every second starting 13.8 billion years ago, when the Big Bang is thought to have occurred, the writing would still be continuing today and for millions of years to come. In fact, there are more possible ways to arrange this simple deck of cards than there are atoms on Earth. So the next time it's your turn to shuffle, take a moment to remember that you're holding something that may have never before existed and may never exist again.

**P61 2014-03-26 How many ways can you arrange a deck of cards - Yannay Khaikin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=61)

翻译人员: Biyue碧玥 Wang王 校对人员: Lanfu Zhang选一张牌，任何牌。事实上，把它们全部拿起来看一看标准的 52 张牌已经延用了几个世纪之久。每天成千上万像这样的扑克牌在世界各地的赌场中洗牌每一次排列组合都会改变事实上， 每一次你从洗过的牌堆里抽一张牌像这样，几乎可以肯定你拥有的牌的排列组合顺序在历史上从未出现过为什么是这样？答案藏在这52张牌有许多可能的排列组合现在，52 看起并不是一个大数字让我们从一个更小的数字开始研究。假设有四个人要坐四个带编号的椅子。有多少种方法？一开始，四个人中的任何一个人都可以坐第一把椅子。一旦选定其中一个人只剩下三个人站着在第二个人坐下后谁坐第三把椅子只有两个选择。第三人坐了下来，最后一个站的人已别无选择只能坐在第四把椅子上。如果我们手写出所有可能的安排，或置换，会出现24 种方法让四人可以坐满四把椅子，但当处理较大的数字，这可能会需要相当长的一段时间。所以让我们看看是否有更快的方法。我们再一次从头开始为第一把椅子我们有四个初始选项这样第二把椅子，我们有三个选项每一个选项使得第三把椅有两个选项替换费时的累加每一种可能性我们可以将每个椅子的可选择数相乘4乘3乘2乘1得出一样的得数,24。一个有意思的模式出现了我们从要安排的个体数开始在这个例子中是四然后乘以比这个数小一位的整数直到一。这是一个令人兴奋的发现。数学家们如此兴奋以至于已经决定讲这种据算象征性的取名为阶乘并随的一个感叹号。一般规则: 任何正整数的阶乘都是这个整数本身和每一个比这个整数小的直到一的整数的乘积。在我们的简单示例中，四个人被安排坐入椅子的不同可能性被写作四的阶乘这等于 24。所以让我们先前的纸牌例子正如我们有4种乘积的方法来安排4个人就坐我们有52种阶乘的方法来排列52张牌幸运的是，我们不需要手动计算只要把公式输入进计算器计算器会告诉你排列的不同方法一共是8.07 x 10 ^67，大约是8后面的67个零。这个数字有多大？如果一种52张牌的排列用掉1秒钟来写出从138亿年前公认的宇宙大爆炸之时开始我们可以一直写到今天并且继续写上数百万年事实上，这一副扑克牌的安排方式要比地球上原子的数量多。所以在下一次轮到你洗牌时花一点时间来记住你拿着的这副牌可能以前并不存在而且可能永远也不会再出现。

**P62 2014-03-28 Sugar - Hiding in plain sight - Robert Lustig**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=62)

Sugar is playing hide and seek with you. You'd think it would be pretty easy for you to win, considering all the sugar in sodas, ice cream, candy, and big white bags labeled sugar. People get about half of their added sugars from those drinks and treats, so it might seem like sugar is hiding in plain sight, but like someone in the witness protection program, the other half is hidden in places you'd least suspect. Check the ingredients on ketchup, bologna, spaghetti sauce, soy milk, sports drinks, fish sticks, and peanut butter. You'll find sugar hiding in most of those products. In fact, you'll find added sugars in three-quarters of the more than 600,000 items available in grocery stores. But how is sugar hiding? Can't you just look on food labels? It's not that easy. Just like your friend Robert might go by Bob, Robby, Rob, Bobby, or Roberto, added sugar has a lot of aliases. And by a lot, we don't mean five or six, try fifty-six. There's brown rice syrup, barley malt, demerara, Florida Crystals, muscovado, and, of course, high fructose corn syrup, sometimes called HFCS, or corn sugar. Even sugar's tricky nicknames have nicknames. Grape or apple concentrate has the same effects on your body as its 55 sugary twins. And even though organic evaporated cane juice sounds healthy, when you evaporate it, you get sugar! Chemically speaking, it's all the same. And even trickier, when multiple added types of sugars are used in one type of product, they get buried down in a long list of ingredients, so the sugar content might appear to be okay, but when you add them all together, sugar can be the single biggest ingredient. Currently, the FDA doesn't suggest a recommended daily limit for sugar, so it's hard to tell if this 65 grams in a bottle of soda is a little or a lot. But the World Health Organization recommends limiting sugar to just 5% of your total calories, or about 25 grams per day. So, 65 grams is well over twice that amount. But just what is sugar? What's the difference between glucose and fructose? Well, both are carbohydrates with the same chemical composition of carbon, hydrogen, and oxygen. But they have very different structures and behave quite differently in our bodies. Glucose is the best source of energy for nearly all organisms on Earth. It can be metabolized by all organs in the body. Fructose, on the other hand, is metabolized primarily in the liver, and when your liver gets overloaded with sweet, sweet fructose, the excess is metabolized to fat. Fresh fruits actually contain fructose, but it's naturally occurring and doesn't cause an overload because the fiber in fruit slows its absorption. This gives your liver the time it needs to do its job. It's sugar that makes cookies chewy and candy crunchy. It even turns bread crust a beautiful, golden brown. It's also a great preservative; it doesn't spoil or evaporate, so the foods it's added to are easier to store and ship long distances and tend to be cheaper. That's why sugar is hiding everywhere. Actually, it might be easier to list the foods that added sugar isn't hiding in, things like: vegetables, eggs, meats, fish, fruit, raw nuts, even your kitchen sink. Simply choosing water over soda, juices, and sports drinks is a great way to avoid hidden added sugar. At the very least, try to pay attention to food labels, so you can keep your sugar intake at a healthy level. Because in this game of hide and seek, every time you don't find added sugar, you win!

**P62 2014-03-28 Sugar - Hiding in plain sight - Robert Lustig**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=62)

翻译人员: Thunder Song 校对人员: Danling Yan食物中的糖喜欢和你捉迷藏你可能认为找到它非常容易因为所有的糖都可以在苏打水，冰激凌，糖果以及贴了糖分标签的白色食品包装带中发现。人类大概有一半的添加糖来源于这些饮料以及零食，所以看起来糖份藏在我们可见的范围内，但是就像显而易见反而容易被忽略一样，他们就藏在你的眼皮底下。查看番茄酱,波隆那熏肠,意大利面条酱,豆浆,功能饮料鱼条和花生酱的原材料。你会发现糖分大部分隐藏在这些食物当中。事实上，你会发现在超过60多万种的杂货店食物中，三分之二都含有添加糖。那么糖分是如何藏起来的呢？难道不可以只看标签吗？其实没有那么容易。就像你的朋友罗伯特可能被叫做鲍勃，罗比，罗博，鲍比，或者是罗伯托，添加糖有很多不同的名字。而且这种很多，并不是说5，6种，而是56种。像是糙米糖浆，大麦芽，德梅拉拉蔗糖，佛罗里达晶体，黑砂糖，以及玉米糖浆，有时简称为 HFCS（果葡糖浆），或者是玉米葡萄糖。甚至糖分这些种类繁多的名字也有小名。葡萄或者苹果果汁对身体有着相同的影响与它的55个相似糖一样。尽管有机浓缩甘蔗汁听着很健康，但是当你对它脱水后，你就能得到糖分！化学意义上来说，它们是一样的。更加棘手的是，当不同种类添加糖用在同一类产品中时，它们被藏在长长的原料名单中，所以含糖量看起来是低的，但是当你把它们全部加起来，糖分会变成最多的原料。如今，FDA（食品药品监督管理局）并没有建议适当的每日糖分摄入量，所以不好判断一瓶苏打水中65克的糖是多还是少。但是世界卫生组织建议糖分控制在一天摄入的所有卡路里中的5%，或者25克每天。所以，65克远超过了这个数值的两倍。但是什么是糖？葡萄糖和果糖的差别是什么？他们都是碳水化合物有着相同的化学元素，比如碳，氢，氧。但是它们的结构却大不同，并且在人体内产生的作用也不一样。葡萄糖是提供能量的最好来源，对地球上所有的生物来说。它能被在生体内的所有器官吸收代谢。另一方面，果糖，主要是在肝脏中进行新陈代谢，并且当你的肝脏中有过多甜甜的果糖，超出的部分便会转化为脂肪。事实上，新鲜的水果含有果糖，但是这是自然形成的不会导致过多的果糖存在于肝脏中，因为水果中的纤素维会减缓它的吸收。并让你的肝脏有足够的时间去完成它的工作。是糖分让曲奇有嚼劲，并让糖果香脆。它甚至让面包皮呈现出漂亮的金黄色。它同时也是很好的保卫者；它既不会被破坏也不会蒸发，所以添加的食物能够更加容易的储存并且可以远距离运送，并且更加便宜。这就是为什么糖分藏在各个地方。事实上，标记不含添加糖的食物或许会更容易一些，比如：蔬菜，鸡蛋，肉，鱼，水果，生坚果，甚至你厨房的水池。简单来说，选择喝水代替苏打，果汁以及运动饮料是一种更好的方法避免摄入添加糖。最后，尝试去关注食物的标签，这样你就可以保持糖分摄取量在一个健康的标准。因为在这场捉迷藏中每当你找到不含添加糖的食物的时候，你就赢了！

**P63 2014-03-31 Nature's smallest factory - The Calvin cycle - Cathy Symington**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=63)

You're facing a giant bowl of energy packed Carbon Crunchies. One spoonful. Two. Three. Soon, you're powered up by the energy surge that comes from your meal. But how did that energy get into your bowl? Energy exists in the form of sugars made by the plant your cereal came from, like wheat or corn. As you can see, carbon is the chemical backbone, and plants get their fix of it in the form of carbon dioxide, CO2, from the air that we all breath. But how does a plant's energy factory, housed in the stroma of the chloroplast, turn a one carbon gas, like CO2, into a six carbon solid, like glucose? If you're thinking photosynthesis, you're right. But photosynthesis is divided into two steps. The first, which stores energy from the sun in the form of adenosine triphosphate, or ATP. And the second, the Calvin cycle, that captures carbon and turns it into sugar. This second phase represents one of nature's most sustainable production lines. And so with that, welcome to world's most miniscule factory. The starting materials? A mix of CO2 molecules from the air, and preassembled molecules called ribulose biphosphate, or RuBP, each containing five carbons. The initiator? An industrious enzyme named rubisco that welds one carbon atom from a CO2 molecule with the RuBP chain to build an initial six carbon sequence. That rapidly splits into two shorter chains containing three carbons each and called phosphoglycerates, or PGAs, for short. Enter ATP, and another chemical called nicotinamide adenine dinucleotide phosphate, or just NADPH. ATP, working like a lubricant, delivers energy, while NADPH affixes one hydrogen to each of the PGA chains, changing them into molecules called glyceraldehyde 3 phosphates, or G3Ps. Glucose needs six carbons to form, made from two molecules of G3P, which incidentally have six carbons between them. So, sugar has just been manufactured, right? Not quite. The Calvin cycle works like a sustainable production line, meaning that those original RuBPs that kicked things off at the start, need to be recreated by reusing materials within the cycle now. But each RuBP needs five carbons and manufacturing glucose takes a whole six. Something doesn't add up. The answer lies in one phenomenal fact. While we've been focusing on this single production line, five others have been happening at the same time. With six conveyor belts moving in unison, there isn't just one carbon that gets soldered to one RuBP chain, but six carbons soldered to six RuBPs. That creates 12 G3P chains instead of just two, meaning that all together, 36 carbons exist: the precise number needed to manufacture sugar, and rebuild those RuBPs. Of the 12 G3Ps pooled together, two are siphoned off to form that energy rich six carbon glucose chain. The one fueling you via your breakfast. Success! But back on the manufacturing line, the byproducts of this sugar production are swiftly assembled to recreate those six RuBPs. That requires 30 carbons, the exact number contained by the remaining 10 G3PS. Now a molecular mix and match occurs. Two of the G3Ps are welded together forming a six carbon sequence. By adding a third G3P, a nine carbon chain is built. The first RuBP, made up of five carbons, is cast from this, leaving four carbons behind. But there's no wastage here. Those are soldered to a fourth G3P molecule, making a seven carbon chain. Added to a fifth G3P molecule, a ten carbon chain is created, enough now to craft two more RuBPs. With three full RuBPs recreated from five of the ten G3Ps, simply duplicating this process will renew the six RuBP chains needed to restart the cycle again. So the Calvin cycle generates the precise number of elements and processes required to keep this biochemical production line turning endlessly. And it's just one of the 100s of cycles present in nature. Why so many? Because if biological production processes were linear, they wouldn't be nearly as efficient or successful at using energy to manufacture the materials that nature relies upon, like sugar. Cycles create vital feedback loops that repeatedly reuse and rebuild ingredients crafting as much as possible out of the planet's available resources. Such as that sugar, built using raw sunlight and carbon converted in plant factories to become the energy that powers you and keeps the cycles revolving in your own life.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=63)

翻译人员: Becky Zhao 校对人员: Jenny Yang你面前放着一只大碗盛满了活力碳素早餐脆片。一勺，两勺，三勺很快，你的身体就充满了能量这些能量来源于你的食物。但是那些能量是如何进入你的碗里呢？能量以糖的形式存在那些糖分来自谷物，比如小麦和玉米。如你所知，碳是非常重要的化学元素，植物们固定碳是以二氧化碳（CO2）的形式，由我们呼吸的空气中获得。但存在于叶绿体基质中的植物的能量工厂是如何将气态的碳，像CO2，转换为像葡萄糖这样 有六个碳原子的固体？如果你想到是光合作用， 那就对了。但是光合作用是分为两步。第一步，是把来自太阳的能量转化为三磷酸腺苷，或称为ATP.第二步，是卡尔文循环，吸收碳并将其转化为糖。这第二步代表了自然界最可持续的生产线之一。因此现在， 欢迎来到世界上最微小的工厂。原材料？空气中含CO2分子的混合物，预先安装的分子称为二磷酸核酮糖，即RuBP，每个分子含五个碳原子。引发剂？是勤劳的加氧酶它催化CO2分子中的碳原子与RuBP结合形成初始的六碳原子序列。很快又分裂成两部分每一部分有三个碳原子这个叫做磷酸甘油酸盐， 简称PGAs。加入ATP, 和另一种叫做磷酸酰胺腺嘌呤二核苷酸的物质，简称NADPH。ATP就像个润滑剂传递能量，NADPH将每个PGA链上 沾上一个氢，把它变成甘油醛三磷酸分子， 或叫G3Ps.葡萄糖需要六个碳组成，从两个G3P分子中来，这样他们每个都有六个碳。所以，糖就这样产生了，是吗？还没呢。卡尔文循环就像一个 可持续的生产线，意味着那些原始的RuBPs在开始出现的，需要被用重用材料重新创造在一个周期内。但是每个RuBP需要五个碳。制造葡萄糖需要六个碳。这看起来不太对。原因是一个惊人的事实。虽然我们关注这个单一生产线，另外还有五个在同时进行。六个传送带一起移动，不仅仅是一个碳被焊接到RuBP链，而是六个碳焊到了六个RuBP链上。这样就创建了12个G3P链 而不是两个，意味着36个碳同时存在：制造糖需要准确的数量，并重建RuBPs。12个G3P放到一起，两个被抽走来形成六碳葡萄糖链的丰富能量。通过你的早餐加到身上。 成功！但回到生产线，糖生产的副产品迅速组装来重新组成六个RuBP。这需要30个碳，这个精确的数字就是十个G3PS。现在发生分子混合和匹配。两个G3P焊接到一起形成一个六碳序列。通过添加一个第三G3P 构建成一个九碳链结构。第一个RuBP由五个碳组成，形成后，留下了四个碳。但是这里没有浪费。那些被焊接到第四个G3P分子，成了七碳链。添加到第五个G3P上，形成了一个十碳链，这样就足够做成两个RuBPs。当三个RuBPs被创建好从十个里面的五个G3P中，简单的重复过程将更新六RuBP链去重启这个循环。所以卡尔文循环产生了 确切的数量的元素和过程需要让这个生化产线一直工作着。并且这仅仅是一百多个 循环中的一个在自然界中。为什么有那么多？因为如果生物生产过程 是线性的，他们就不会如此的高效或成功在使用能源生产材料自然是依赖的，就像糖。循环创造了重要的反馈循环重复使用和重建材料制作尽可能多的可用地球资源，就像糖，使用原始阳光和碳在植物中的转换形成让你强壮的能量从而保证你自己生活周而复始的需求。

**P64 2014-04-02 What is Alzheimer's disease - Ivan Seah Yu Jun**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=64)

Every four seconds, someone is diagnosed with Alzheimer's disease. It's the most common cause of dementia, affecting over 40 million people worldwide, and yet finding a cure is something that still eludes researchers today. Dr. Alois Alzheimer, a German psychiatrist, first described the symptoms in 1901 when he noticed that a particular hospital patient had some peculiar problems, including difficulty sleeping, disturbed memory, drastic mood changes, and increasing confusion. When the patient passed away, Alzheimer was able to do an autopsy and test his idea that perhaps her symptoms were caused by irregularities in the brain's structure. What he found beneath the microscope were visible differences in brain tissue in the form of misfolded proteins called plaques, and neurofibrillary tangles. Those plaques and tangles work together to break down the brain's structure. Plaques arise when another protein in the fatty membrane surrounding nerve cells gets sliced up by a particular enzyme, resulting in beta-amyloid proteins, which are sticky and have a tendency to clump together. That clumping is what forms the things we know as plaques. These clumps block signaling and, therefore, communication between cells, and also seem to trigger immune reactions that cause the destruction of disabled nerve cells. In Alzheimer's disease, neurofibrillary tangles are built from a protein known as tau. The brain's nerve cells contain a network of tubes that act like a highway for food molecules among other things. Usually, the tau protein ensures that these tubes are straight, allowing molecules to pass through freely. But in Alzheimer's disease, the protein collapses into twisted strands or tangles, making the tubes disintegrate, obstructing nutrients from reaching the nerve cell and leading to cell death. The destructive pairing of plaques and tangles starts in a region called the hippocampus, which is responsible for forming memories. That's why short-term memory loss is usually the first symptom of Alzheimer's. The proteins then progressively invade other parts of the brain, creating unique changes that signal various stages of the disease. At the front of the brain, the proteins destroy the ability to process logical thoughts. Next, they shift to the region that controls emotions, resulting in erratic mood changes. At the top of the brain, they cause paranoia and hallucinations, and once they reach the brain's rear, the plaques and tangles work together to erase the mind's deepest memories. Eventually the control centers governing heart rate and breathing are overpowered as well resulting in death. The immensely destructive nature of this disease has inspired many researchers to look for a cure but currently they're focused on slowing its progression. One temporary treatment helps reduce the break down of acetylcholine, an important chemical messenger in the brain which is decreased in Alzheimer's patients due to the death of the nerve cells that make it. Another possible solution is a vaccine that trains the body's immune system to attack beta-amyloid plaques before they can form clumps. But we still need to find an actual cure. Alzheimer's disease was discovered more than a century ago, and yet still it is not well understood. Perhaps one day we'll grasp the exact mechanisms at work behind this threat and a solution will be unearthed.

**P64 2014-04-02 What is Alzheimer's disease - Ivan Seah Yu Jun**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=64)

翻译人员: Peipei Xiang 校对人员: Justine Bai平均每4秒就会有一个人被诊断患有阿兹海默症（原称老年痴呆症）这是造成痴呆（dementia）的头号原因影响着全球4千多万人然而研究人员至今也没能找到治愈这种病的方法爱罗斯·阿兹海默博士 一位德国精神病学家于1901年在注意到某一名患者的特有症状之后 首次描述了它这名患者的特有症状包括入睡困难记忆力异常 剧烈的情绪波动以及越发严重的精神混乱当这名病人去世之后阿兹海默得以解剖尸体从而测试他的理论 也就是导致她那些病症的原因是大脑内部的一些不规律的现象在他显微镜下发现的是大脑组织中可见的错误折叠的蛋白质也就是神经斑以及神经元纤维缠结这些神经斑和神经元纤维缠结共同作用毁坏了大脑的结构当神经细胞周围的脂肪膜里面的蛋白质被一种特定的酶切割成一片片并形成有粘性的容易结块的β-淀粉样蛋白时神经斑就形成了结块的时候就产生了我们所知道的“神经斑”这些块状的东西会阻挡信号传递因此阻挡了细胞之间的交流貌似还引发了导致受损的神经细胞毁灭的免疫反应在阿兹海默症中 神经元纤维缠结来源于一种名为“涛”（Tau）的蛋白大脑神经细胞包含了一个由很多管道组成的网络这些管道像是食物分子在其他物质中的高速公路通常 Tau蛋白会确保这些管道的笔直顺畅 好让各种分子自由通过但得了阿兹海默症后这些蛋白扭曲成一束束或缠结在一起造成那些管道的分解使得营养不能到达神经细胞从而导致细胞的死亡神经斑和神经元纤维缠结的共同作恶始于一个叫做海马体的区域这个区域专门负责记忆的形成这就是为什么短期记忆丧失通常是阿兹海默症的第一个症状接着这些蛋白会逐渐侵犯大脑的其他部位阿兹海默症的各个不同阶段的特殊症状逐渐出现在大脑前面的部位这些蛋白会破坏逻辑思考的能力接着 它们转移到大脑控制情感的部位从而导致不稳定的情绪波动在大脑顶部它们会造成妄想症和幻觉而一旦它们到达大脑后部神经斑和神经元纤维缠结会共同作用抹去大脑最深处的记忆最终 掌控心跳和呼吸的控制中心也会受到侵犯并导致死亡阿兹海默症的这种巨大的破坏力激发了很多研究人员去寻找一个治疗方案但是目前他们主要专注于研究如何延缓疾病恶化一个暂时的治疗方案可以减少乙酰胆碱的分解乙酰胆碱是大脑里面的一种重要的化学信使阿兹海默症病人由于制造乙酰胆碱的神经细胞的死亡而缺乏这种化学信使另一个可能的解决方案是一种疫苗这种疫苗可以训练身体免疫系统在β-淀粉样蛋白斑形成结块之前攻击它们不过我们仍然需要找到一种真正的治疗方案阿兹海默症早在一个多世纪以前就已经被发现了而我们至今却还没有完全了解它也许有一天我们会明白这个威胁背后的具体机制并发现一个解决方案

**P65 2014-04-03 History vs. Vladimir Lenin - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=65)

He was one of the most influential figures of the 20th century, forever changing the course of one of the world's largest countries. But was he a hero who toppled an oppressive tyranny or a villain who replaced it with another? It's time to put Lenin on the stand in History vs. Lenin. "Order, order, hmm. Now, wasn't it your fault that the band broke up?" "Your honor, this is Vladimir Ilyich Ulyanov, AKA Lenin, the rabblerouser who helped overthrow the Russian tsar Nicholas II in 1917 and founded the Soviet Union, one of the worst dictatorships of the 20th century." "Ohh." "The tsar was a bloody tyrant under whom the masses toiled in slavery." "This is rubbish. Serfdom had already been abolished in 1861." "And replaced by something worse. The factory bosses treated the people far worse than their former feudal landlords. And unlike the landlords, they were always there. Russian workers toiled for eleven hours a day and were the lowest paid in all of Europe." "But Tsar Nicholas made laws to protect the workers." "He reluctantly did the bare minimum to avert revolution, and even there, he failed. Remember what happened in 1905 after his troops fired on peaceful petitioners?" "Yes, and the tsar ended the rebellion by introducing a constitution and an elected parliament, the Duma." "While retaining absolute power and dissolving them whenever he wanted." "Perhaps there would've been more reforms in due time if radicals, like Lenin, weren't always stirring up trouble." "Your Honor, Lenin had seen his older brother Aleksandr executed by the previous tsar for revolutionary activity, and even after the reforms, Nicholas continued the same mass repression and executions, as well as the unpopular involvement in World War I, that cost Russia so many lives and resources." "Hm, this tsar doesn't sound like such a capital fellow." "Your Honor, maybe Nicholas II did doom himself with bad decisions, but Lenin deserves no credit for this. When the February 1917 uprisings finally forced the tsar to abdicate, Lenin was still exiled in Switzerland." "Hm, so who came to power?" "The Duma formed a provisional government, led by Alexander Kerensky, an incompetent bourgeois failure. He even launched another failed offensive in the war, where Russia had already lost so much, instead of ending it like the people wanted." "It was a constitutional social democratic government, the most progressive of its time. And it could have succeeded eventually if Lenin hadn't returned in April, sent by the Germans to undermine the Russian war effort and instigate riots." "Such slander! The July Days were a spontaneous and justified reaction against the government's failures. And Kerensky showed his true colors when he blamed Lenin and arrested and outlawed his Bolshevik party, forcing him to flee into exile again. Some democracy! It's a good thing the government collapsed under their own incompetence and greed when they tried to stage a military coup then had to ask the Bolsheviks for help when it backfired. After that, all Lenin had to do was return in October and take charge. The government was peacefully overthrown overnight." "But what the Bolsheviks did after gaining power wasn't very peaceful. How many people did they execute without trial? And was it really necessary to murder the tsar's entire family, even the children?" "Russia was being attacked by foreign imperialists, trying to restore the tsar. Any royal heir that was rescued would be recognized as ruler by foreign governments. It would've been the end of everything the people had fought so hard to achieve. Besides, Lenin may not have given the order." "But it was not only imperialists that the Bolsheviks killed. What about the purges and executions of other socialist and anarchist parties, their old allies? What about the Tambov Rebellion, where peasants, resisting grain confiscation, were killed with poison gas? Or sending the army to crush the workers in Kronstadt, who were demanding democratic self-management? Was this still fighting for the people?" "Yes! The measures were difficult, but it was a difficult time. The new government needed to secure itself while being attacked from all sides, so that the socialist order could be established." "And what good came of this socialist order? Even after the civil war was won, there were famines, repression and millions executed or sent to die in camps, while Lenin's successor Stalin established a cult of personality and absolute power." "That wasn't the plan. Lenin never cared for personal gains, even his enemies admitted that he fully believed in his cause, living modestly and working tirelessly from his student days until his too early death. He saw how power-hungry Stalin was and tried to warn the party, but it was too late." "And the decades of totalitarianism that followed after?" "You could call it that, but it was Lenin's efforts that changed Russia in a few decades from a backward and undeveloped monarchy full of illiterate peasants to a modern, industrial superpower, with one of the world's best educated populations, unprecedented opportunities for women, and some of the most important scientific advancements of the century. Life may not have been luxurious, but nearly everyone had a roof over their head and food on their plate, which few countries have achieved." "But these advances could still have happened, even without Lenin and the repressive regime he established." "Yes, and I could've been a famous rock and roll singer. But how would I have sounded?" We can never be sure how things could've unfolded if different people were in power or different decisions were made, but to avoid the mistakes of the past, we must always be willing to put historical figures on trial.

**P65 2014-04-03 History vs. Vladimir Lenin - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=65)

翻译人员: Taiyi Pan 校对人员: Xiaoou Chen他是20世纪最具有影响力的人物之一。他是20世纪最具有影响力的人物之一。永远改变了世界上最大的国家之一的历史进程。永远改变了世界上最大的国家之一的历史进程。但是，他究竟是一个打倒暴政的英雄，但是，他究竟是一个打倒暴政的英雄，还是另一个暴君呢？在“历史和列宁”，让我们把列宁放到审判席上。在“历史和列宁”，让我们把列宁放到审判席上。“肃静，肃静。戏团解散不是你的过错吗？”“审判长，这是弗拉基米尔·伊里奇·乌里扬诺夫，也就是混乱分子列宁。他在1917年推翻了俄沙皇尼古拉斯二世，并建立了20世纪最独裁的政权：苏联。”并建立了20世纪最独裁的政权：苏联。”“哦。”“沙皇是一个残忍的暴君。在他统治下，人民百姓像奴隶一样。”“胡说八道。农奴制在1861年就已经被废除了。”“然后被换成更差的制度。工厂老板对待老百姓比封建时期的地主还要差多了。工厂老板对待老百姓比封建时期的地主还要差多了。不像地主们，工厂老板每时每刻都在。俄罗斯的工人们每天工作11个小时，而工资却是整个欧洲最低的。”“但是，尼古拉斯沙皇颁布了保护工人的法律。”“他只不过是为了防止革命爆发而勉强做的。就在那一点上，他也失败了。记得1905年沙皇的部队对和平请愿者开火以后发生了什么吗？”“当然。在那之后沙皇通过颁布宪法和建立俄议会杜马从而结束了那场叛乱。”“但同时，他依然拥有着绝对权力，并时不时地把杜马解散了。”“但同时，他依然拥有着绝对权力，并时不时地把杜马解散了。”“如果像列宁一样的极端主义者不整天制造混乱，随着时间的推移，俄罗斯或许会有更多的改革。”随着时间的推移，俄罗斯或许会有更多的改革。”“审判长，列宁亲眼目睹了他哥哥亚历山大因为从事革命运动被前一任沙皇处决了。在改革之后，尼古拉斯沙皇照样进行大规模的压迫和处决，并且不顾人民反对继续参与第一次世界大战，并且不顾人民反对继续参与第一次世界大战，虽然一战给俄罗斯造成了巨大的生命和财产损失。”“这沙皇听起来不像是什么好人。”“这沙皇听起来不像是什么好人。”“审判长，也许尼古拉斯二世的确因为错误决定而失去民心，“审判长，也许尼古拉斯二世的确因为错误决定而失去民心，但是列宁和这毫无关系。当1917年二月革命让沙皇被迫退位时，当1917年二月革命让沙皇被迫退位时，列宁还流亡在瑞士。”“那么，谁上台了呢？”“俄杜马建立了由亚历山大·克伦斯基为首的临时政府。“俄杜马建立了由亚历山大·克伦斯基为首的临时政府。他是一个无能的资产阶级败类。虽然俄罗斯在一战中已经付出了巨大的牺牲，他不顾人民期望战争结束的意愿，反而下令军队进攻，导致战败。”“他的政府是一个宪政的社会民主主义政府，是当时最先进的。如果列宁不是因为德国人计谋削弱俄国的战斗力如果列宁不是因为德国人计谋削弱俄国的战斗力并制造内乱而在那年四月被送回国的话，卡伦斯基政府是可以最终成功的。”“太胡说八道了！七月运动是一个针对政府的无能而自然产生并且合情合理的反应。克伦斯基露出了他的真面目，当他加罪于列宁而且宣布列宁的布尔什维克党非法并逮捕其成员，迫使列宁再度流亡于海外。这算什么民主！好在临时政府因为自身的无能和贪婪而崩溃了。好在临时政府因为自身的无能和贪婪而崩溃了。当他们尝试军事政变时，他们不得不需要布尔什维克党的援助，结果落入后者的陷阱。在那之后，列宁在十月份回国并夺取政治权力。政府在一夜之间就被和平地推翻了。”“但是布尔什维克党在夺权之后做的事并不那么和平。“但是布尔什维克党在夺权之后做的事并不那么和平。“但是布尔什维克党在夺权之后做的事并不那么和平。有多少人没有经过审判就被处决了？而且真有必要把沙皇的全家连小孩都杀光吗？”而且真有必要把沙皇的全家连小孩都杀光吗？”“俄罗斯那时正在和想要恢复沙皇统治的外国帝国主义打仗。任何一个被解救的皇族继承人都会被外国政府视为俄国真正的统治者。人民百姓花了艰辛万苦所得来的成果会被付诸一炬。人民百姓花了艰辛万苦所得来的成果会被付诸一炬。况且，列宁可能从没有下那处决令。”“但是布尔什维克党所杀的并不止是帝国主义势力。“但是布尔什维克党所杀的并不止是帝国主义势力。你怎么解释他们处死包括社会主义党 和无政府主义党的前政治盟友呢？你怎么解释他们处死包括社会主义党 和无政府主义党的前政治盟友呢？你怎么解释他们处死包括社会主义党 和无政府主义党的前政治盟友呢？还怎么解释在坦波夫叛乱期间农民们因抵抗政府没收粮食而被毒气毒死？又怎么解释派军队到客琅施塔得岛去镇压渴望民主自治的工人们？这些都算是为了人民的利益吗？”“的确，这些都是极端的手段。但是那是个十分危险的年代。新政府必须要在被十面围攻的情况下保护自己。新政府必须要在被十面围攻的情况下保护自己。只有这样，社会主义制度才能被建立。”“这个社会主义制度到底带来了多少好处呢？内战胜利之后，闹饥荒，搞压迫，上百万人被枪毙或被送去做苦力。同时，列宁的接班人斯大林建立了个人崇拜和极权统治。”同时，列宁的接班人斯大林建立了个人崇拜和极权统治。”“那不是预料当中的事。列宁从不考虑他个人的利益。就连他的敌人都承认列宁百分之百投入到他的革命事业。从他学生年代到他的早年去世，列宁一直朴素地生活着并勤奋地工作着。他认识到斯大林对权力的饥饿，所以他想警告党内人士，但那时已经太晚了。”“那之后的几十年极权统治呢？”“你可以那么讲，但是是列宁的所作所为在几十年之内把俄罗斯从一个都是不识字的农民的极端落后王国转变成了一个现代化工业强国。其中有世界上教育程度最高的人口，有给予女性的新权力和机会，还包括了20世纪最重要的一些科学进展。还包括了20世纪最重要的一些科学进展。人民生活虽然不富裕，但几乎每个人的衣食住行都得到了保障。这在当时是非常了不起的。”“但是社会就算没有列宁和他建立的独裁政权也是会照样前进的。”“是呀，我说不定可以当一个出名的摇滚乐歌星。不过不知道我会唱地怎么样？”我们不可能知道假如不同的人掌权，或那些人做了不同的决定，历史会如何改变。但如果我们不想再犯过去的错误，我们必须愿意审判历史人物的功绩与过错。我们必须愿意审判历史人物的功绩与过错。

**P66 2014-04-03 Why is ketchup so hard to pour - George Zaidan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=66)

French fries are delicious. French fries with ketchup are a little slice of heaven. The problem is it's basically impossible to pour the exactly right amount. We're so used to pouring ketchup that we don't realize how weird its behavior is. Imagine a ketchup bottle filled with a straight up solid like steel. No amount of shaking would ever get the steel out. Now imagine that same bottle full of a liquid like water. That would pour like a dream. Ketchup, though, can't seem to make up its mind. Is it is a solid? Or a liquid? The answer is, it depends. The world's most common fluids like water, oils and alcohols respond to force linearly. If you push on them twice as hard, they move twice as fast. Sir Isaac Newton, of apple fame, first proposed this relationship, and so those fluids are called Newtonian fluids. Ketchup, though, is part of a merry band of linear rule breakers called Non-Newtonian fluids. Mayonnaise, toothpaste, blood, paint, peanut butter and lots of other fluids respond to force non-linearly. That is, their apparent thickness changes depending on how hard you push, or how long, or how fast. And ketchup is actually Non-Newtonian in two different ways. Way number one: the harder you push, the thinner ketchup seems to get. Below a certain pushing force, ketchup basically behaves like a solid. But once you pass that breaking point, it switches gears and becomes a thousand times thinner than it was before. Sound familiar right? Way number two: if you push with a force below the threshold force eventually, the ketchup will start to flow. In this case, time, not force, is the key to releasing ketchup from its glassy prison. Alright, so, why does ketchup act all weird? Well, it's made from tomatoes, pulverized, smashed, thrashed, utterly destroyed tomatoes. See these tiny particles? This is what remains of tomatoes cells after they go through the ketchup treatment. And the liquid around those particles? That's mostly water and some vinegar, sugar, and spices. When ketchup is just sitting around, the tomato particles are evenly and randomly distributed. Now, let's say you apply a weak force very quickly. The particles bump into each other, but can't get out of each other's way, so the ketchup doesn't flow. Now, let's say you apply a strong force very quickly. That extra force is enough to squish the tomato particles, so maybe instead of little spheres, they get smushed into little ellipses, and boom! Now you have enough space for one group of particles to get passed others and the ketchup flows. Now let's say you apply a very weak force but for a very long time. Turns out, we're not exactly sure what happens in this scenario. One possibility is that the tomato particles near the walls of the container slowly get bumped towards the middle, leaving the soup they were dissolved in, which remember is basically water, near the edges. That water serves as a lubricant betwen the glass bottle and the center plug of ketchup, and so the ketchup flows. Another possibility is that the particles slowly rearrange themselves into lots of small groups, which then flow past each other. Scientists who study fluid flows are still actively researching how ketchup and its merry friends work. Ketchup basically gets thinner the harder you push, but other substances, like oobleck or some natural peanut butters, actually get thicker the harder you push. Others can climb up rotating rods, or continue to pour themselves out of a beeker, once you get them started. From a physics perspective, though, ketchup is one of the more complicated mixtures out there. And as if that weren't enough, the balance of ingredients and the presence of natural thickeners like xanthan gum, which is also found in many fruit drinks and milkshakes, can mean that two different ketchups can behave completely differently. But most will show two telltale properties: sudden thinning at a threshold force, and more gradual thinning after a small force is applied for a long time. And that means you could get ketchup out of the bottle in two ways: either give it a series of long, slow languid shakes making sure you don't ever stop applying force, or you could hit the bottle once very, very hard. What the real pros do is keep the lid on, give the bottle a few short, sharp shakes to wake up all those tomato particles, and then take the lid off and do a nice controlled pour onto their heavenly fries.

**P66 2014-04-03 Why is ketchup so hard to pour - George Zaidan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=66)

翻译人员: Carrie Li 校对人员: Jia (Jolie) YU我们都知道炸薯条很好吃再配上番茄酱简直就是人间美味但问题是挤出刚刚好的量的番茄酱实在是太难了我们平时经常挤番茄酱但是从来没注意到过番茄酱有多么的奇怪想像你的番茄酱瓶里装的是固体，比如不锈钢不管你怎么摇晃，不锈钢都不会出来现在再想像一下装了水的番茄酱瓶子把水倒出来简直易如反掌但是番茄酱呢，好像很纠结它到底是固体？还是液体？答案是，看情况。这世界上最常见的液体，比如水，油，还有酒精会对力的作用产生线性反应如果你用两倍的力去挤它们，它们就会以两倍的速度流出来因为苹果而出名的艾萨克·牛顿先生，首次提出了上述现象所以它们被称为牛顿流体番茄酱呢，却是线性规则破坏者小团体中的一员称为非牛顿流体蛋黄酱，牙膏，血液，颜料，花生酱还有其他很多流体，都不会对力的作用产生线性反应也就是说，它们的浓度会根据你的用力大小，时间长度和用力速度改变事实上，番茄酱会表现出两种非牛顿流体现象现象一：你越用力挤，番茄酱越稀但是如果力道小到特定的程度，番茄酱看起来就像固体一样了但是一旦你超过了那个临界点它就摇身一变，变得比刚才稀很多听起来很耳熟吧？现象二：如果你的力道没有达到临界点，番茄酱最后还是会流出来的这种情况下，作用时间长度，而不是力才是挤出番茄酱的关键好吧，那番茄酱到底为什么这么与众不同呢？嗯，首先，它是番茄做的。番茄经过各种切碎，挤压，搅拌之后变得面目全非看到这些小颗粒了吗？它们是在番茄被各种处理后残留下来的番茄细胞那么这些小颗粒周围的液体呢？大部分都是水，还有一些醋，糖，以及香料当番茄酱静止的时候番茄颗粒都很均匀的分布其中现在，假如你突然用很小的力挤番茄酱这些小颗粒就会冲到一起堵在一起，谁都不让谁当然就不会流动啦那如果你突然用很大力去挤番茄酱呢？力度大到可以把颗粒压扁它们不再是球型而是变成了椭圆体，于是乎，现在就有空间让一部分小颗粒穿过去番茄酱就开始流动了再假如你用很小的力挤番茄酱，持续一段时间后但是，嗯，我们也不是很清楚会怎样有一种可能是，靠近瓶壁的番茄颗粒会慢慢的移动到瓶子中间去剩下只有液体基本上就是水留在边缘于是水就会变成瓶壁和番茄酱之间的润滑剂番茄酱就出来了另一种可能就是小颗粒重新组合形成一个个小团儿，然后再慢慢移动研究流体运动的科学家们还在探索到底番茄酱之类的东西是怎么回事番茄酱呢，你越用力，它们就会变得越稀但是其他物体呢，比如欧波力客或者花生酱你越用力它们反倒变得越稠还有一些能顺着转动的棍棒向上流动的还有一些，一旦你开始倾倒，它们就能一直不停的倾泻。从物理学的角度来讲番茄酱是世界上少数几个最复杂的混合物之一如果这还不够的话，平衡的成分，再加上广泛运用于水果饮料和奶昔的天然增稠剂黄原胶的作用下，能够证明两种不同的番茄酱会有截然不同的表现但是一般会出现两种迹象在临界强度压力下突然变稀或者在持续的轻缓挤压下慢慢变得稀薄也就是说你有两种方法可以把番茄酱挤出来要么就是缓缓的慢慢的摇晃注意不要停止用力或者你可以对着瓶底猛地一击一般内行会先不打开瓶盖快速的晃动几下瓶子把里面的小番茄颗粒摇醒然后拧开瓶盖就可以将番茄酱自如的挤到美味的薯条上啦

**P67 2014-04-10 A digital reimagining of Gettysburg - Anne Knowles**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=67)

I'm a geographer at Middlebury College, and I use digital technologies to reimagine the past. I want to take you to Gettysburg, Pennsylvania, July 1, 1863, we're right in the middle of the Civil War. >From the northwest, the Confederate forces under Robert E. Lee, and from the southeast, the Union forces under George Meade, converge at this place more or less by chance. They didn't plan to fight here. But the Battle of Gettysburg turns out to be the turning point of the Civil War. Now, Robert E. Lee is probably the most famous American general, widely respected. But at Gettysburg, he made some crucial mistakes, probably the most important was in ordering Pickett's Charge. I'm going to show you how I took a new look at Pickett's Charge with historical maps and GIS. My key map was this extraordinary thing, 12 feet by 13 feet, in the vault of treasures at the National Archives. Here are some of my students at Middlebury to give you a sense of that scale. It was recompiled into a finished map the size of a large poster. You can see the layout of the town of Gettysburg, you see the undulating shape of the terrain. If you look at other details, you can see forests and orchards and streams and roads. I want you to look at those very fine black lines. Those are called contour lines, and they show the elevation at 4-foot intervals, the most detailed elevation I have ever seen. Now, before I explain this image, I need to tell you a little about GIS. It stands for Geographic Information Systems. It's a kind of software that allows you to map almost anything. You can also use it to do terrain analysis. For example, if you're building a ski resort, and you want people to get off the lift and have the most spectacular view possible, you use viewshed analysis that shows you what you can see from a certain point on the terrain. I used that to place myself digitally in the footsteps of Robert E. Lee, to ask, 'What could he see?' and 'What could he not see?' that might have influenced his command decisions. Now, back to these contour lines. This is the best elevation data that I could find. I traced all of the lines, you see in the black and white drawings, some of those lines, stitched them together, gave them elevation values, and then transformed it, within the GIS program, into a continuous terrain. This is a simulation of the ground of the battlefield. Now, I'm ready to place myself in Lee's boots and ask what he could see. The particular moment I want to look at is that battle I mentioned, Pickett's Charge. Lee makes a crucial decision on the morning of the third day, this is July 3rd, 1863, the fighting on the previous two days has been fierce. It's gone back and forth, neither side has a clear advantage. Lee goes down to the bottom of the field, we know this, here's my gorgeous source map again and watch the red circle appear. He goes to the southern end of the battlefield at about 8:00 in the morning with his binoculars and looks through them to figure out where to attack the Union line, where are they most vulnerable. Now, in this next image, I'm going to show you the GIS process called viewshed analysis, along with Lee's line of sight in that sort of reddish cone is the direction we think he was looking. Viewshed analysis, remember, tells me what I can see and what I can't see from a certain point, so in this map, the grey area is what Lee couldn't see. The clear area, where you see that historic map coming through, is what he could've definitely seen. Notice how much of the right side of the map is in grey. Now, we add another crucial piece of information. Someone named John Bachelder, a landscape painter from New Hampshire, went down to the battlefield as soon as he heard about the fight, in order to document where troops had been and to try to paint the battle. He ended up getting $10,000 from Congress in order to document troop positions down to the half hour. He produced 24 maps that we also digitized and brought into the GIS. And this next map shows that troop position information; it's crucial for understanding what Lee could and what he couldn't see. Now, if you look closely at this map, you might be able to see kind of the middle is a black oval around an area that's relatively clear. The blue markings in that black oval are Union troops that I'm definitely sure that Lee could see. But if you look to the right of that, you'll see an awful lot of blue markings. Those are Union troops in the shadows. Now, we know that on the night before Lee's reconnaissance so, the night of July 2nd, he sent out scouts. Of course, he wanted to know where the federal troops were. But quite astonishingly, we have no explanation for this. The scouts came back saying, 'Don't worry, General Lee. We didn't see any troops to the east,' in your map to the right, 'of the Roundtops, some really big hills.' We don't know if they got drunk or fell asleep, but they didn't see almost a third of the Union army. So Lee is blind from his scouts, and from his viewpoint, he's also blind. He decides to attack what he thinks is the weak middle of the Union line, not knowing about where the rest of the troops are. So if you look in the middle of this image, there's a gap in the Union line from where the blue soldiers are at the north of the battlefield and at the south. So let me now play out, using these troop positions, Pickett's Charge. The Confederate soldiers are lined up on the west side of the battlefield, standing under the trees. 18,000 men who first begin to walk and then trot and then run across open farm fields with their rifles leveled at the federal line. Now, the Union army has about 15-20 minutes to organize itself. They see that the Confederates are converging on the middle of their line, and what do they do? The blue arrow here, representing movement of the Union troops, they pull their troops toward that weak center, and let me show you how they were able to concentrate those men in a remarkably short period of time. Lee didn't know that the Union could've done this. You see now, they're standing like a wall, ready to receive the Confederate assault, which happens between 1:30 and about 2:00, 2:30 in the afternoon. There is tremendously fierce fighting, hand-to-hand combat. Now these blue lines, coming in between 2-2:30 in the afternoon, are pulling more reserves, more reinforcements, to that weak center of the Union line. What happens? The Union soliders drive the Confederates off. Lee rides out, among his men, at 3:00 in the afternoon, saying, 'I'm sorry. It's my fault. It's my fault.' This story of sight has been a missing part of the Battle of Gettysburg. Here's their retreat. Historians have not been previously able to figure out what he could and couldn't see. I think it helps explain his decision. Why? Because from his point of view, the federals were very weak. He was attacking at the logical place, but without full knowledge, he set his men out for a dreadful defeat. Now, there's one more piece to this story. Last summer was the 150th anniversary of the Battle of Gettysburg. And I was able to work with a 3D animator, so we were able to use the GIS information to render the terrain issue as you see it here. And my closing story is about how sight helped the other side. A federal general named GK Warren stood in the spot that this panoramic view is showing you, looking out over the battlefield. And at a key moment on day two, he was able to see on the far horizon Confederate soldiers emerging out of the trees who were about to attack Little Roundtop. He called in reinforcements just in time and saved the day for the Union, setting the stage for the Union almost-victory on day three. So, I hope that all of you who are so gifted with digital technologies will begin to think about how you can use them for history. It can be amazing. Thank you.

**P67 2014-04-10 A digital reimagining of Gettysburg - Anne Knowles**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=67)

翻译人员: Tianshu Wang 校对人员: Jenny Yang我是米德尔伯里学院的地理学家，我用数码技术重现过去。我想带你去1863年7月1日的美国宾夕法尼亚州的葛底斯堡，那正是内战的中期。西北方是罗伯特·李将军的南军而乔治·米德带领下的北军也正好从东南方向过来，在这里相遇，多少是个巧合。他们并没有计划在那里战斗。但葛底斯堡之战却成了内战的转折点。如今，罗伯特·李可能是美国最著名的将军，受到广泛地尊敬。但是在葛底斯堡，他犯了一些严重的错误，其中最严重的错误那个很可能就是发动皮克特冲锋的命令。我将给大家展示我是怎么通过历史地图和GIS重新审视了皮克特冲锋。我的主地图就是这个非同寻常的事物，长13英尺，宽12英尺，收藏在国家档案管的珍宝库。这是我的一些在米德尔伯里的学生，可以让你们直观感受地图的比例尺。它被重新编译成一张完整的地图，有大海报那么大。你能够看到葛底斯堡镇的布局，和波状起伏的地形。如果你留意其他细节，你能看到森林、果园、溪流和公路。我希望你能注意那些相当细小的黑线。它们叫轮廓线，显示了间距4英尺的等高线，这是我见过记录最详细的海拔数据。现在，在我解释这个图像前，我要给你们讲一讲GIS。这是“地理信息系统”的缩写。它是一种软件，几乎能够让你绘制任何地图。你还能用它来做地形分析。举个例子，如果你正在建一个滑雪场，并想让人们在滑下的过程中能尽可能的看到最壮观的景象，你可以通过视域分析显示你在地形中某一点上能看到什么。我用它来模拟罗伯特·李的位置，并问自己： "他可以看到什么？""他不能看到什么？"这些可能影响了他的指挥决策。现在，回到那些等高线。这是我能找到最好的海拔数据。我追踪了所有的线条，你可以看到黑白图示，其中的一些线，相互粘合在了一起，我赋予它们海拔高度值，然后在GIS程序里转换成连绵不断的地形。这是模拟出来的战场地面。现在，我可以将自己放在李所站的地方并且问自己他看到了什么。我想到看到的时刻就是我提到的那战役争，皮克特冲锋。李在第三天早上，也就是1863年7月3日，做了一个重大决定，之前两天的战斗异常激烈。战斗反反复复，双方都没有明显优势。李深入战场，我们都知道这个，再来看我绚丽的源图，注意红色圆圈的出现。他在早晨8点左右去了战场的最南端,带着他的双筒望远镜并通过它寻找袭击北军的位置，就是他们最脆弱的地方。现在来看下一个图像，我将给你展示一个GIS操作也就是视域分析，沿着那个微红的圆锥内李的视线就是我们认为他看的方向。别忘了，视域分析能告诉我，在某个特定的点，哪些是我能看见的，哪些是我看不见的。所以在这张地图里，灰色区域是李看不见的。那张历史地图上，你能够看到的清晰区域，是他肯定不能看到的。请注意地图右边，灰色的区域的大小。现在让我们再加一条重要的信息。一个叫约翰·巴舍尔德的人，他是来自新罕布什尔的风景画家，一听到战讯就去了战场，以便记录军队去过的地方，并描绘战场。最终他从国会拿到了一万美金用于每隔半小时记录一次军队的位置。他一共画了24张地图，我们将这些也数字化并且输入了GIS。下一张地图显示了部队的位置信息要明白李能看到什么，不能看到什么这些信息至关重要。现在，如果你细看这张地图，你也许能看见差不多正中间有一个黑色椭圆，椭圆里的区域比较清晰。黑色椭圆里那些蓝色的标记表示北军，我很肯定李能看到这些军队。但它们的右边，有很多很多蓝色标记。那些是暗处的北军。现在我们知道，在李侦查前的晚上，也就是7月2日的晚上，他派出了侦查员。毫无疑问，他想要知道北军在哪里。但是有一点特别令人惊讶，我们对此也无法解释。侦查员们回来后说“李将军，不用担心，我们没有看到任何东边的军队（也就是你们地图的右边）（那儿）是一些很高的丘陵。”我们不知道他们是否喝醉或睡着了，但他们几乎少看了三分之一的北军。所以李盲从了他的侦探们，而且在他的位置上，也确实看不到什么。他决定进攻他认为薄弱的北军中部，但他并不知道其余的敌军在哪里。所以你看画面的中间，在北军那有一条间隙通过蓝军所在的战场北部和南部。现在我可以说完了，通过皮克特冲锋时这些军队的位置。南军在战场西部布好了阵地，站在树下。首先18000人开始行军，然后小跑跑过开放的农场并用步枪瞄准北军。现在，北军有约15-20分钟时间集合。他们看到南军向他们的防线中部汇聚，他们干什么？这的蓝色剪头代表者南军的行动，他们把军队开到薄弱的中部，让我展示一下他们怎么在如此短的时间内集中这些人。李没料到北军能有这本事。你看，他们站得像一面墙，准备好迎接南军的攻击，这是下午1:30到2:00或2:30左右的事。这场战斗极其惨烈，就是肉搏战。现在这些蓝线，在下午2:00到2:30之间出现，向北军防线薄弱的中部，拉来了更多的后备军，更多的援军.发生什么了？北军击退了南军。下午三点，李在部下的掩护下安全撤离，他说：“对不起。这是我的错，全是我的错。”此景此情一直是盖茨堡之战中缺失的一部分。这里是他们的撤退。历史学家还没能弄清当时他能看到什么，看不到什么。我想这有助于解释他的决定。为何？因为从他的角度来看，北军是非常弱的。他攻击的位置很符合逻辑，但是缺乏全面的了解，他的命令以糟糕的失败告终。现在，这个故事有了一个新片段。去年夏天是盖茨堡之战的150周年纪念日。我能与一个3D动画师合作，所以我们能用GIS信息展示你在这里看到的地形问题。我故事的结尾，是关于视线怎么帮助了对方。北军的一位沃伦将军站在能看到全景的地方观察战场。并且在第二天的一个关键时刻，他看到遥远的地平线上南军正从树林里涌出，准备攻击小圆顶。他刚好及时请来了援军，得以挽救北军，给第三天的险胜铺路。因此，我希望你们中有数码设备的所有人都能开始思考，你能怎么用它们来审视历史。会很有意思的。谢谢。

**P68 2014-04-10 How whales breathe, communicate ... and fart with their faces - Joy R**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=68)

Hi, everybody! I am a comparative anatomist. A comparative anatomist is someone who studies the structure of the body of lots of different animals. And my favorite animals are whales. I like to study whales because they're so interesting. They've adapted to a unique environment of living in the water. And what I'm going to tell you about is how whales make sounds by basically farting with their face. You know that they do this farting thing with their blowhole; they blow out air like that, but they also use air in lots of other ways. They use it for sound production, which is what I'll focus on, but I also study other things they do with air, like keep it out of their bloodstream so they don't get bubbles, which is what happens to human scuba divers when they get decompression sickness. But I'd like to start with the story of how these animals make these farting noises, and that story begins with understanding how hard it is to look at whales, because they live underwater and they're really big, so they're hard animals to study. And in this picture -- you see that animal in the middle? That's a baby whale and it's already the size of a bus! When you look at whales, start with the top of their head because their nose is on the top of their head, kind of like a built-in snorkel. They breathe through that because they're mammals and mammals breathe air. Their nose can be opened and closed, as if you were to pinch it like this. You can see it's open in the bottom frame, where the red arrows are. But not all whales have two nostrils. Whales include the groups of dolphins and porpoises, and dolphins and porpoises, the small whales, have only one nostril on the top of their head, and they open and close that nostril by taking what is essentially an upper lip, like this, and turning it back over their nose, like this. That's how they open and close their nose. So when they make sounds, what they're basically doing is a raspberry, (Makes raspberry sound) which is kind of like a fart, right? Or up in New York, we call it a Bronx cheer. And the way they do that is by taking that big, fatty structure of a big fat lip, which, as you can see here in this picture, which is a cut through the middle of a dolphin's head, that big fat lip is that big yellow portion there, and they roll it back and forth over the top of their nose so that they vibrate it, kind of like when you let the air out of a balloon and it makes that weird vibration sound. So this is what it sounds like when they make their noise: (Vibration noise) Hear it? He'll do it again when he faces the camera. (Vibration noise) Sounds like it's farting underwater. What that dolphin is actually doing, though, is echolocation, which is making these series of pulses, and it uses it like a bat uses sonar. Well, a bat uses radar, but when it's underwater it's sonar, so this animal is using sonar to see its world in sound. Trying to understand how this works, you have to look at it as if you were looking at the amplifier speakers of a sound system. The small-toothed whales are basically the "tweeters," and the sound is coming from that little nose that's moving back and forth and coming out of their forehead. But the big whales are kind of like the "woofers," the big speakers that you have in an amplifier system. And what's happening is their sound is coming out of the throat. So if you tried to make sound like a whale -- make a sound right now, and go, "ahhhhhh." OK, now put your hand on your throat, on your Adam's apple. You feel that vibration right there? That is lost energy for you, because that's not how you communicate to everybody. You do it out of the mouth. But if you open your mouth underwater, no one will hear you. You have to be able to take this energy and amplify it through the water. That's what whales do. And when you hear their sound -- (Squeaking sound) it's kind of like when you squeak the air out of a balloon. So they get a lot of squeaky noises, but they also have this sound: (Vibrating sound) It sounds like it's farting, doesn't it? It's like it's got this giant whoopee cushion in its throat. So, how do you know that's what a whale is doing? Well, we study whales that come to us from strandings. These are animals that die on the beach. Small whales like dolphins and porpoises are easy; we can take them to the lab. But the big whales -- we've got to bring the lab to the whale. And this is what that looks like. I'm the one in the middle with the red hat. I'm not a very tall person, so you can see how big this whale was compared to me. The whale is 65 feet long. And my scalpel is this little tool on the side here. It basically looks like a hockey stick with a blade on the end of it. And doing a dissection of a whale is a very difficult process. You literally have to get into your work. It's kind of like a giant bloody construction zone. You're wearing a hard hat, you're working with heavy machinery. In this case, by the way, that's just the voice box of a blue whale. Just the voice box. I'm only five feet tall -- you can see it's like 12 feet long. How do we know what's going on? Well, we look at the voice box, or larynx, and we see -- this is from a baby whale so it's much smaller. You see this little u-shaped thing I've outlined in blue. That's the part that's vibrating. It's kind of like our vocal folds. When I put my hand in there, where that blue sleeve is, you can see there's a sack underneath it. That's the whoopee cushion. That's the air bubble or the balloon. So what these animals are doing -- and you can see, there's this big black balloon in the throat, where the digestive tract, which is in blue, meets the breathing tract, which is in light blue, and right in the middle is that black sack. These animals are using that sack to make these sounds. And so they vibrate that and send it out. Small-toothed whales also have air sacks; they're all over their heads, so it's like they're airheads. They use this to capture as much air as they can to take down with them when they're diving, because when you dive, pressures increase, and that decreases the volume of air you have available. But more importantly, having that sack allows them to recycle the air that they're using, because air is a precious commodity. You don't want to have to go back up to the surface to get more. So when you make a sound underwater, if you're a whale -- let's hear you start making a sound, go "ahhhh." But whales keep their mouths closed, so go "ahhhmm." (Audience makes noise) You're all humming, right? But whales keep their nose closed and go, "mmmm." (Makes noise) What happened? You can't make the sound anymore once you close your nose because you've pressurized the system. Whales, by having air sacks, keep themselves from pressurizing the system, which means the air continues to flow, and so if you had a bag on the end of your nose, you'd be able to make air continue to flow. So I hope you've enjoyed that. That's what a comparative anatomist does for a living. We study the structure of these animals. We try to mimic it; we apply it back to the human situation, maybe making new technologies for protective devices or maybe even making new treatments for medicines for people's diseases who mimic these weird environments. So I hope you enjoyed that. Thank you. (Applause)

**P68 2014-04-10 How whales breathe, communicate ... and fart with their faces - Joy R**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=68)

翻译人员: JIN锦금 Qian钱전 校对人员: Yolanda Zhang大家好！我是一个比较解剖学家。比较解剖学家的工作是研究 各种不同动物的身体结构。而我最喜欢的动物是鲸鱼。我喜欢研究鲸鱼是因为它们实在太有趣了。它们适应了生活在水中这样独特的环境。今天我要给大家讲的是鲸鱼的发声方式，基本上就是“用它们的脸放屁”。我们知道鲸鱼是通过气孔来排气；像这样喷气，而它们也将空气用于 其他很多不同的用途。它们用气来发声， 也就是后面我将重点谈到的，我同时也研究很多关于 鲸鱼运用空气的其他方面，例如它们如何避免空气 在血流中产生气泡，而免于像人类潜水员潜水时有患上减压病的风险。我想先从关于鲸鱼如何发出这种屁声说起，而首先我们要理解观察鲸鱼 是一件多么困难的事情，因为它们生活在水下，并且如此巨大,所以它们是很难研究的动物。在这幅照片里， 看到中间那个动物了吗？那是一只鲸鱼小宝宝， 但已经有一辆公车那么大个子了。观察鲸鱼要从头顶看起，因为它们的鼻子就在头顶，像一个内置浮潜装备。它们用那个东西呼吸， 因为它们是哺乳动物，哺乳动物需要呼吸空气。它们的鼻子可以打开或关闭，有点儿像这样子捏你的鼻子。你可以看到右下那张图片红箭头处， 指示的是开启状态。但不是所有的鲸鱼都有两个鼻孔。鲸目动物包含海豚科和鼠海豚科，而海豚科和鼠海豚科动物， 这些小个子鲸目动物，只有一个鼻孔，位于头顶，它们开合这个鼻孔的方式是用这个本质上属于上唇的器官， 像这样子，翻到鼻孔上，像这样。它们是这样子开合鼻孔的。所以当它们发声的时候，基本上它们是在“咂舌”，（咂舌声）， 有点儿像是放屁对吧？或者在纽约的话， 我们可以称之为“Bronx cheer”。它们发出这种声音的方法是用那个肥厚的唇状结构，你可以从这张海豚图片纵剖图片看到，那个肥厚的唇状结构，就是这个黄色的部分，在鼻子上方来回翻动，这部分制造了这种震动音，有点像你给气球放气时发出的那种震动音。这就是它们发出的声音 ：（震动音）听到了吗？在它面对镜头的 时候还能再听到一次。（震动音）听起来就像它在水下放屁。而实际上那只海豚是在用这一连串脉冲音进行回声定位，就像蝙蝠用声纳定位一样。不过蝙蝠用的是雷达， 但在水下用的是声纳，所以海豚是在用声纳， 用声音的方式来观察它的世界。想要理解其中的原理，我们需要将它看做 一个音响系统中的功放音箱。小型齿鲸基本上像是“高音喇叭”，它们的声音就发自那个前后移动的小鼻子，从额头发出来。而那些大个子鲸鱼则像是“低音炮”，像是功放系统中的大音箱。它们的声音则是从喉咙中发出来的。所以当你试图模仿鲸鱼的声音时——我们现在来发一下这个声音， “啊————”这样把你的手放在喉咙上， 放在喉结的位置。感觉到震动了吗？你这样做其实是在白白消耗能量，因为这不是交流的正确方式。你通常是从嘴里发出声音。但是如果你在水下张嘴， 没人能听到你的声音。你需要能利用这个能量 并在水中进行放大。这就是鲸鱼的做法。当你听到它们的叫声——（鲸鱼的声音）听到了吗？有点像你把空气从气球里面 挤出来的吱吱声。它们发出很多这种吱吱声：但它们还会发出这种声音：（鲸鱼的声音）听起来像是在放屁，不是么？就好像嗓子里有一个巨大的“whoopee cushion” （恶作剧用的放屁气球）。那么，我们是怎么知道鲸鱼在做什么呢？我们从搁浅的鲸鱼开始研究。这些家伙被困在沙滩上缺水而死。研究那些小型鲸类，比如海豚或鼠海豚 比较容易；我们可以把它们运回实验室。而对于那些死掉的大型鲸鱼， 我们得把实验室运到鲸鱼这边。这就是整个现场。我就是中间那个戴红帽子的人。我个子不是很高，跟我对比一下你们就能看出 这个鲸鱼有多大。这头鲸鱼有差不多20米长。旁边这个小玩意儿就是我的手术刀。它长得像是个头上安了刀片的曲棍球棒。解剖鲸鱼是一个非常困难的过程。你需要整个“进入”到这个工作对象里去。有点儿像个巨大而血腥的建筑工地。你带着安全帽，操纵着重型机械。顺便说一下，在这个照片里图上这个东西仅仅是个蓝鲸的喉部。仅仅是喉部。我身高只有1米5， 这个东西差不多有3.6米长。我们怎么研究的呢？我们会观察喉部结构，或者说声带，这是一个鲸鱼幼崽的喉部，所以小得多。可以看到这个蓝线描出了一个U形部分。这就是振动的部分。有点像我们的声带。当我把手，就是那个蓝色的袖子， 伸进去的时候，可以看到下面有一个袋子。这就是那个“放屁袋”。这就是气泡，或者说气囊。鲸鱼是这么发声的，来看下这张图——它嗓子里有个标为黑色的大气囊，标为蓝色的是消化道，与之衔接的标为浅蓝色的是呼吸道。也就是说消化道和呼吸道 在气囊处交汇。鲸鱼正是用这个气囊 来发出这些声音的。它们通过震动气囊发出声音。小齿鲸鱼也有气囊； 都位于它们的头顶，看起来就像排气孔。它们用这个气囊存储尽可能多的空气，带着这些空气潜入水中，因为在潜水时压力会增大，这样就减小了可用空气的体积。更重要的是，这个气囊还能回收它们所使用的空气，因为空气是非常珍贵的。你不会想总是游回到水面去吸气。所以如果你是鲸鱼，想在水下发声，我们现在来发这个声音“啊————”但是鲸鱼是闭着嘴的， 就变成了”呣————“（观众学着发声）就变成哼哼了对吧？但是鲸鱼同时还闭着鼻子， 就成了"呣……"（观众学发鼻音）现在发生什么了呢？你发不出声音了，因为你堵上了鼻子之后整个系统被加压了。而鲸鱼通过气囊来避免 在呼吸系统中加压，这意味着空气可以继续流动，如果你在鼻子后侧也有个袋子，你也能让空气继续流动。我希望你们喜欢这个演讲。这就是一个比较解剖学家的工作内容。我们研究动物的结构。我们试图模仿这些动物 并（将仿生学技术）应用于人类，也许可以给保护装置开发新技术，或者开发出新的药物治疗方案。应用于有着类似的奇怪状况的人类疾病。我希望你们喜欢这个演讲。谢谢。（掌声）

**P69 2014-04-10 The family structure of elephants - Caitlin O'Connell-Rodwell**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=69)

If I were to distill the 20 years of elephant research that I've done into one sentence, what would it be? What could I tell you? I would say that elephants are just like us! And what do I mean by that? It takes a lot of patience to be out there in the field and trying to figure out patterns of these very slow and intelligent animals. But over time, it is true they are very similar to us. And you think, "Well, how can I say that? Look, they have huge ears, they have really long noses. What do you mean they're like us?" Well, in fact, their families are very similar to ours. And family is extremely important to elephants. They grow up in very tight-knit families and they have extended families. And it's just like our family reunions where you have all the aunts gathering around with all the food they're going to bring and plan, and all the boys are thinking, "Are we going to play our video games together? Are we going to spar?" It's very, very similar, and it's jubilant, and screaming, yelling, it's really amazing to see. But, as soon as you get that family gathering, it's just like a wedding or anything else, all of the sudden the family politics come out, and the lower-ranking individuals in this scene, you see the arrow off to the back, the lower-ranking individuals already know their station, they're going to drink at the muddiest part of the pan because the whole family's here and we can't drink at the best water because that's reserved for the top-ranking family. What's also very similar is that you have elders in the group that everyone reveres. This is the matriarch, and the other female is reaching over and doing what's called a trunk to mouth placing her trunk in the mouth, and it's a sign of respect, it's kind of like a handshake, but it's also like a salute. And this salute is learned at a very young age. Now, ritual and bonding within the family also facilitates coordinated activities. So, here's a young female whose calf has fallen into the trough and she doesn't know what to do and she panics. Well, the older female, that's the matriarch, she says, "No problem here," she just scoops the baby out. Now, that's not true for a lot of different families, they can't coordinate very well, the younger females don't really know what to do, but the older ones will just get down, kneel down together and pick the baby out. Another thing that's very similar is the coming of age of teenage boys. Male elephants at the age of about 12 to 15. The biggest elephant in this photograph here is an elephant who's about the leave the family. He gets too big, he gets a little fresh, the adult females had enough of him, but he also is independent, he wants to go out and play with the guys. So what happens then is that you have this all male society, very ritual male society. Greg is our main dominant bull here, you can see him in the middle. He's got a huge posse, his following reveres him. And it's very interesting how very good leaders, very good dominant individuals know how to titrate the carrot and the stick. This guy's a master at it, and there's other bullies out there that want to kind of want to create their own little following, but they can't do it because they're too agressive. And so when he's not around they try and sweet talk the underlings to come into their fold, and they actually become less agressive. So it's very interesting to see how politics play out in these male and female societies. Now back to the ladies here. In a core family group you'll have a mother, maybe even a grandmother, her daughters and all of their offspring, the male and female calves. And what's very interesting here is that how character makes a difference. So each matriarch has a very different character. These two characters are kind of curious, they're uncertain, whereas these other two characters are really agressive. "We're going to charge first, ask questions later." But then there are also matriarchs that say, "Forget it! I'm going to run first and then figure it out when we're in the bush and it's safe." But the wisest matriarch, the matriarchs that succeed best in all of the studies that have been done, is the one that assesses the danger and decides is this worth running away from or is this not a big deal at all. Now being social is super important for elephants and of course right at the beginning, just like early childhood development, socialization is very important. Bathing together, eating together, playing together, rough housing, this is all very important for social development. And who hasn't tried to beat their sibling to the head of the line coming into the water hole? And these relationships from the beginning is just like best friends forever for real. These females are going to live together for life. Now if it's a male, female they might know each other for life, but it's really important to develop those bonds early on. Those are the relationships that are going to save you later. I'll show you a little schoolyard scenario here. Where, I think if you just focus on what's happening here you can see that we have the bully, he's pulling on the trunk of this baby calf, and then we have the diplomat who's reaching over and saying, "No, don't do that! Stop doing that!" And then, of course, we have the bystander. And how do you get these three different characters within the family? It's kind of fascinating to think that elephants really are just like us. And so I got curious about this and I thought, "Well, what if you measure the difference in character of a dominant female's calf versus a lower-ranking female's calf, and see what happens in their growing up." And so we started doing this. And you can see this little guy with his ears out, really charging at you. The difference between that character and the character who holds back, wants to touch mom, isn't so certain about what's going on here. But the other one's charging ahead all confident. Well, we started measuring how far away a calf will stray from mom, how often do they touch others, how often do they initiate play, and then look at the dominance of the females, of their mothers. And what we found is that socializing with the dominant calves actually socialize more significantly more than the lower-ranking calves. And what it looks like is it's not that the lower-ranking calves don't want to play, they're actually not allowed to interact with the higher-ranking calves. They get swatted away from the dominant females. and so this is kind of the downside of, okay we are very much like elephants, elephants are as much like us, but it's kind of for better or for worse because I can also see this happening in humans and maybe we should take a lesson from that. One last thing that we found is that the males will be the risk-takers, they're more independent and they're more likely to spend more time away from mom. And that's very true in human societies and with other social animals. So I hope I've convinced you that we have very similar lives to elephants and that elephants have very individual, durable characters that we've measured across years. The bully always tends to be the bully unless there's some kind of social upset, and he decides he better be a softy or else he's not going to gain favor at all. And then you have the gentle giants that are always going to be gentle. The young males really need mentoring from the elders, and those gentle giants are very good at doing that, soliciting them. Leaving family is a really hard things for the males, but they survive and they figure out who to hang out with. So, just to end here, I just wanted to say that since they are so similar to us, and have these characters, I hope when you see them on TV or you go out and you're lucky enough to see them in the wild, that maybe you'll think of them as individual characters deserving of our attention, and also deserving of our protection. Thank you.

**P69 2014-04-10 The family structure of elephants - Caitlin O'Connell-Rodwell**

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翻译人员: Binglin Qi 校对人员: kiki zhang如果我要用一句话概括我20年对大象的研究，那会是什么呢？我能告诉你什么？我会说大象真的和我们很像！我这么说是什么意思呢？在野外努力解决这些行动慢、聪明的动物的行为模式是需要很大的耐心的。但随着时间的推移，确实能说他们很像我们你也许会想：“好吧，我怎么能这么说呢？”看，它们有大大的耳朵还有非常长的鼻子你说它们像我们是什么意思？好吧，事实上，是它们的家庭和我们很像而家庭对于大象来说是至关重要的。它们在亲密的家庭关系中长大有着广大的家庭网。这就像我们的家庭重聚一样你能与你的七大姑八大姨凑在一起吃着她们准备或带来的所有食物，所有的男孩都在想“我们会一起玩电子游戏吗？我们会拳击吗？”这真的和我们非常相似你能很惊奇的看到欢愉的气氛，尖叫着大吵着。但是，一旦你们家庭聚在了一起，就像是婚礼或是别的什么，很快家庭政治就会出现，画面中低级的大象们，你们看到它们背后的箭低级的大象已然知道自己的地位，它们会去喝盘里最肮脏的水因为整个家庭都在那里，所以我们不能喝最好的水因为那是为地位高的成员所保存的。另一点也很相似的是在团体里有着每只大象都尊敬的长辈。这是雌族长，其他雌性大象也紧跟上来。并且做一种叫象鼻进嘴巴的动作，把她的象鼻放进嘴巴里。这是表示尊敬的一种动作，有点像我们的握手，但也有点像在行礼。这种行礼在大象很小的时候就学会了。家族内礼制和成员的结合也促进它们进行团队协同活动。比如，有一只年轻小雌象掉进了水槽里，她不知道该怎么办，感到非常恐慌。于是那只年长的雌象，就是雌族长，她会说：”没关系的。“然后把它解救出来。现在，这并不是适用于很多其他不同的家族的。它们不能很好的协同，年轻雌大象真的不知道该怎么做，年长的就会下来一起跪下把小象给捡出来。另一个相似点就是青春期男生的开始年龄。雄性大象青春期开始于12到15岁。这张图片里最大的那只大象就是准备离开家庭的一只大象。他变得太大，而且开始有性冲动，成年雌性受够他了，但是他也相当独立，他想要出去跟其他雄性大象一起玩。所以接下来出现的就是我们有了一个全雄性团体，一个礼节性的雄性团体。Greg是我们这里的主要支配者，他就在这个图片的正中央。他有一大队大象并且他的跟随者非常仰慕他。而且很有趣的是很好的领导者，很好的统治者，是怎样知道如何平衡胡萝卜和棍子。这家伙在这方面是一个大师。其他的强势大象有点想要成立自己的小团队，但是他们做不到因为他们攻击性太强。所以当Greg不在的时候，他们尝试用甜言蜜语劝说Greg的下属进入他们的团队，他们后来变得没那么有攻击性了。所以观察这些政治在雄性和雌性团体中是怎么玩的很有趣。现在让我们回到雌性团体中。在一个核心家庭里你会发现有一位母亲，甚至可能是奶奶，以及她的女儿们和她们的所有的后代，包括小雄象和小雌象。这里接下来很有趣的是性格会对族群行动产生怎样不同的影响。每个雌族长都有不同的性格。这两只有点好奇，不确定，而另外这两只族长性格非常有攻击性。”我们先向前冲，等下再问问题。“但随后有些雌族长大象则会说：”先不管了，我先跑了，等下进了灌木丛在搞明白，那里安全。”但是在我们所有的研究中，最聪明的雌族长，也就是最成功的雌族长，是会衡量风险并且决定是不是值得逃跑还是没什么大不了的。懂得社交对于大象是非常重要的。当然在刚开始的时候，比如小象的早期成长中，社交就非常重要。它们一起洗澡，一起进食，一起玩耍，粗略的打扫，这些对于他们社交的发展都很重要。谁没有尝试过把队伍里前面的兄弟姐妹推进水坑呢？这些关系从一开始就像永远是最好的朋友一样真实。这些雌性大象将会一生住在一起。现在，如果它是雄性的话，雌大象可能会一辈子都记住他。但是早点建立那样的联系是很重要的。这些关系可能在以后会救你一命。在这里我给你展示一个小小的学校场景，在这里，我想让你只关注图片里发生了什么。你可以看到这里出现了欺凌现象，雄性大象正在扯小象的象鼻。然后我们有这个调停人，它正靠过来并说道：”不行！不要那样！快停下来！“然后，当然也有旁观者，你会发现这里怎么有三种不同性格的大象在一个家庭团体中的呢？想到大象跟我们一样真是有点神奇。所以我对这个很感兴趣，然后我就想，”这样啊，那如果我去找雌族长大象后代的和等级地位低的大象后代的性格上的区别，看看它们长大后会怎么样。“所以我们就开始这么做了，你可以看到这只耳朵朝外的小象真的是在向你冲过来。这只小象的性格和那只在后面退缩的想要碰下妈妈的不知道发生了什么的小象是不同的。那一只小象是很自信的向前冲。我们开始测量小象和母亲能相距有多远，小象多久碰一下其他人，还有它们多频繁地玩耍，然后再看看它们的母亲是不是族长，还是排位较低。然后我们发现，族长的孩子其实比低等级地位大象的孩子具有更明显更好的社交能力。并且这看来并不是因为这些低等级小象不想参与，而是它们不被允许和高等级小象之间进行交流。它们会被雌性支配者大象给赶走。所以这算是一个不好的方面。好吧我们很像大象，大象也很像我们，但这不管怎样说都有点...因为我看到我们人也有这样的，也许我们应该吸取这样的教训。最后一点，我们发现雄性是敢于冒险的，他们更加独立，并且他们更有可能花更多时间在远离母亲的生活。这在人类社会中也是一样的，其他社会性动物也是。所以我希望我能说服你我们其实与大象有着相似的生活，大象性格都有着相当独立，持久的性格，这是我们几年研究所发现的。喜欢欺凌其他大象的常常会去欺负其他大象，除非它们遇到了某种社交困难让他们选择最好变得友善一点，否则他是不会得到大家的拥护的。然后，我们发现性格温和的大象，一直都会很温和。那些年轻雄性真的需要长辈们的辅导，那些温和的大象对此也十分在行，以很好态度地跟他们讲。离开家庭对雄性大象来说是一个非常难的事情，但是他们会继续生存下去，并且找到一起玩的其他大象。所以，作为结束，我想说既然他们跟我们相似，也有如此的性格，我希望你们在电视上看到它们时或者幸运的在野外碰到它们时，可能你会想到它们有着值得关注的不同的性格，也值得我们去保护。谢谢。

**P70 2014-04-10 The networked beauty of forests - Suzanne Simard**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=70)

I was walking my mountain the other day, and I was feeling really at home with the forest. And I was so grateful to it for showing me that forests are built on relationships which form networks, like these beautiful river networks. And I thought, "Wow, forests are just like human families." And I was so taken by the beauty of this idea that I fell and I crashed down on the ground, and I hit my head on this new stump. And I was so angry! Then, I was so heartbroken because there was a whole family of trees cut down. Thing is, where I'm from in Western Canada, there's clearcuts like this hidden everywhere, and it wasn't until Google Earth starting sending images, like this, that we realized the whole world was wiping its noses on our old-growth forests. Did you know that deforestation like this around the world causes more greenhouse gas emissions than all the trains, planes and automobiles combined? Yeah, I'm really upset about this, but I'm also really hopeful because I've also discovered in my research that forest networks are organized in the same way as our own neural networks and our social networks. And I believe that if we can learn to integrate these into a whole that we can change this dangerous pathway of global warming because I believe we are wired for healing. So, here's the science: The most ancient of these networks is this below-ground fungal network, or mushroom network. And it evolved over a billion years ago to allow organisms to migrate from the ocean onto the land. And eventually, they got together with plants in this symbiosis. And this allowed plants to photosynthesize, pulling CO2, which is our biggest greenhouse gas, out of the atmosphere and giving off oxygen, which allows us to breathe and actually allowed humans to eventually evolve. Now, we call this symbiosis a mycorrhiza, myco for fungus, rrhiza for root. So, the fungus and root get together, and they trade for mutual benefit. Now, all trees in all forests all over the world depend on these mycorrhizas for their very survival. They can't live without them. And the way it works is that a seed falls on the forest floor, it germinates, it sends a root down into the soil, and it starts sending out chemical signals to the fungi to grow towards the root. And the fungus communicates back with its own signals, and it says to the root, 'You need to grow towards me and branch and soften.' And so by this communication, they grow together into this magical symbiosis. And the way that symbiosis works is the plant takes its hard-earned carbon from photosynthesis and brings it to the fungus because the fungus can't photosynthesize. And the fungus takes nutrients and water it gathers from the soil, where plant roots can't grow, and they give it to the plant. And so they're both benefiting in this cooperation. Now, as the fungus grows through the soil, it starts linking plant and plant and tree and tree together until the whole forest is linked together. Did you know that a single tree can be literally linked up to hundreds of other trees as far as the eye can see? And as you're walking through the forest, what you see, the trees, the roots, the mushrooms, are just the tip of the iceberg. Under a single footstep, there are 300 miles of fungal cells stacked end on end moving stuff around. And if you could look down into the ground, it would be like this super highway with cars going everywhere. Now, all networks are made of nodes and links. In forests, those nodes would be trees and the links fungi. It's kind of like in your Facebook network, where nodes would be friends and links would be your friendships. Now, we all know that some of those nodes, or friends, are busier than others, like that friend who is always sending out group messages. Well, it's the same in forests, and these nodes in forests, we call them hubs, they're the big trees in the forests with roots going everywhere. Now, we also have learned that the systems organized around these hubs, these big old trees, so in forests, that's where the regeneration occurs. In your Facebook network, that might be how parties are organized, around that hub that's always sending out the group messages. We call those hubs in forests mother trees; they're the big old trees in the forest. And they fix the carbon in their leaves, and they send it down through their massive trunks and into the networks all around them that are linked up to all the other trees and seedlings, the young ones, and they start sending that carbon everywhere. The more those seedlings are stressed out, maybe from drought or shade, the more the mother tree sends to them. It's kind of like in your families, where if you're kind of stressed out, mom and dad kick in and help you out a bit more, right? Well, it's the same in forests. The other thing that we've recently discovered is that mother trees will preferentially send more signals to her own kids, her own children. And then, this way she helps them do better, and then they survive more, and then they can pass their genes on to future generations. So, how natural selection works. Now, the way these forests are organized makes them both resilient and vulnerable. They're resilient because there's many mother trees, and there's many fungal species linking them together. And that network is really hard to break. It's pretty darn tough. But of course, we humans have figured out how to do that. And what we do is we take out the mother trees. And maybe taking one out won't make much difference but when you take more and more and more and clearcut and more and more and more that it can cause the system to collapse and fall down, like dominoes. And we can cross tipping points and cause more forest death and more global warming, and we're doing that. So what we do, our choices we make, can lead us towards global heatlh or global sickness. We do have choices. And I'm going to leave you with four ideas that I think are worth spreading. First one: To love the forest you have to go spend time in it. Go be in the forest, connect with it. And then you'll fight hard enough to protect them. Second: Learn how they work. Learn how those networks link things together in organized forests. And to do that, you gotta go out there take risks, make mistakes. Third: Protect forests. They need you to do that because they can't do it themselves. They're stuck in one spot. They can't run away from humans, and they can't run away from global warming. They need you. And finally, and most importantly, use your own very clever, brilliant, neural and social networks to create amazing messages, and spread the word that forests are worth saving because you're worth saving, and I believe that together we're all wired for healing.

**P70 2014-04-10 The networked beauty of forests - Suzanne Simard**

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翻译人员: HONGYU SONG 校对人员: Jenny Yang前些天 我在山林徒步我十分享受置身森林的感觉并且十分欣喜地发现森林本身是相互联系的而这种联系形成了关系网就如同这些壮观的河网一样我不禁感叹哇 森林就像人类的家庭一样我对这个美丽的想法感到十分兴奋以至于跌倒在地我的头撞在一个新的树桩上开始我很生气后来又很伤心因为这些如同家庭一般的树木被无情地砍伐我来自加拿大的西部在那里 到处隐藏着这样的过度砍伐直到谷歌地图开始传送图片像这样的照片我们才意识到整个世界都在糟蹋原始森林你可知道在全球 类似的森林滥伐导致了大量温室气体的释放比所有火车 飞机和汽车排放量的总和还要多我确实对此感到沮丧但内心也充满希望因为我在研究中还发现森林系统的构成与人类的神经系统和社会系统如出一辙我认为如果我们能把这些系统整合起来看待我们就能扭转全球变暖的趋势因为我相信我们都渴望形势好转科学发现表明这些森林系统中最古老的是地下的真菌网络 或者说是蘑菇网并且在超过十亿年前就进化了使得有机体能从海洋迁徙到陆地最后 它们与植物相依达成共生关系这种共生关系帮助植物进行光合作用从大气中吸收最主要的温室气体 二氧化碳并释放出氧气以供我们呼吸实际上 最终使人类得以进化目前 这种共生关系叫做菌根真菌是菌 植物是根因此 真菌和树根聚到一起相互依存 互惠互利全世界所有森林里的所有树木它们的生存都靠这种共生关系没有这种关系就不能生存这种共生的机制就是一颗种子落到森林的地面萌芽向土地里扎根然后开始向真菌释放出化学信号让真菌向其根部生长真菌会以其特有的信号作出反应然后对树根说你要朝我生长 抽枝 变软通过这样的交流它们发展成为这样神奇的共生关系这种共生关系的原理是植物通过光合作用吸收来之不易的二氧化碳并把二氧化碳带给真菌因为真菌自身不能进行光合作用同时真菌从植物的根到不了的土壤中获取营养物质和水并把水和营养提供给植物因此双方都在这场合作中获利随着真菌在土壤中生长它开始把众多的植物和植物连接起来树和树连接起来直到于整个森林都连接起来你可知道 单独一棵树实际上可以和她范围以内的其它几百棵树相连当你行走在森林之中时你所见的树木 根枝 蘑菇只是冰山一角在一步长的地下真菌细胞就有300公里之长首尾相连地移动如果你能透视到地下世界这场景很可能就像我们的高速公路到处汽车飞驰所有的网络都是由点和链接组成在森林中 这些点就是树链接就是真菌这有点像你的Facebook关系网在这里 朋友是点友情是线我们都知道 有一些点或者说 朋友比其他人忙一些比如 一些朋友总是忙着发群消息在森林里也是这样森林中的这些点我们称之为枢纽这些枢纽就是森林中的大树它们的根部四通八达如今 我们还知道复杂的系统就组建在这些枢纽的周围也就是这些大树的周围所以在森林中 再生在这里发生在你的Facebook关系网中一个个聚会往往围绕着枢纽组织起来因为枢纽始终在发出群消息我们称森林中的枢纽为母树母树是森林中的又大又老的树它们用叶子固定二氧化碳并把二氧化碳通过巨大的树干向下输送最终输送到母树周围的关系网中而这些关系网连接着所有其他的树木以及树苗和小树接着这些树开始向四周排出二氧化碳幼苗越是养分不足可能是因为干旱或者光照不足母树就会输送越多的二氧化碳这有点像你的家庭若是你有需要父母就会介入帮助你 对吗森林也一样我们最近的一个发现是母树倾向于发送更多的信号给她自己的孩子这样就会更好的帮助它们成长它们成活的几率也就更大可以把基因传给后代自然选择是多么的神奇啊森林系统构成的方式使得森林本身适应能力很强而又很脆弱适应能力强是因为母树多并且有很多真菌种群连接着它们这种关系网很难被打破十分牢固但是人类却知道如何破坏这个体系我们所做的就是砍掉母树也许砍掉一棵母树不会有太大影响但是当越来越多的母树被砍伐大面积的滥伐越来越多森林系统就会崩塌像多米诺骨牌一样我们的行为会超过临界点越来越多的森林消失 全球变暖加剧而我们正在这么做因此 我们的所作所为我们所做的选择会导致全球生态的健康或者疾病我们是可以选择的我想留给大家四点值得思考的提议第一爱森林你需要花时间去亲近它置身其中 与它产生共鸣那么 你就会努力保护它第二了解森林是如何运作的了解森林网络是怎样将整个森林系统联系在一起的如果你想要了解就得去冒险 去尝试 也可能会犯错误第三保护森林森林需要你的保护因为它们不能自我保护它们无法移动无法逃离人类也无法逃离全球变暖森林需要你最后也是最重要的用你自己的智慧用你的社交网络去创造和发布信息告诉世界 森林值得拯救因为这等于是拯救我们自己我相信 只要我们齐心协力就能够治愈这个美丽的星球

**P71 2014-04-10 The sweaty teacher's lament - Justin Lamb**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=71)

I'd love to be the compassionate teacher; the tough, but fair teacher. But to my brilliant young minds, these scholars for whom I'd stand up at all costs, I'm the sweaty teacher. Not the compassionate teacher who, hey, by the way, happens to sweat, or even the teacher who sweats. No. The sweaty teacher. Adjective, sweaty purposefully coming before noun, teacher, as if to say, "This is Mr. Lamb. Do not define him by the profession he devotes his life to. Define him by the geysers he calls armpits." Every morning, I wake up in a cold... nevermind. The easy-going teacher says, "I shouldn't sweat it." The loud teacher says, "YEAH YOU SHOULDN'T SWEAT IT!" But even the empathetic teacher doesn't understand. I've got funny teacher potential. I used to pretend the notes I confiscated in class were thank you letters. Acknowledgements of my great teaching. "Oh ho ho, you shouldn't have!" Until I intercepted one about a Mr. Stank Pits. No, really. You shouldn't have. Ever since I've started developing quirky habits to deflect attention, to become someone new: the teacher who shrugs his shoulders really aggressively. The teacher who tucks his tie into his pants and pulls the end out his fly because he's so wacky. But it's no use. Because I had the sweaty teacher, too, for geography. And to this day I cannot remember the capital of Bulgaria, and the two bodies of water I know the most about sat below his shoulders. And now, I'm the one looking like I've got the Atlantic and Pacific in headlocks. The one being asked, "How was the dunk tank?" "There was no dunk tank! We live in New Orleans and it is humid!" is how I'd respond if I was the angry teacher. Instead, I look the kid in the eye as the sweat cascades down my nose, and splatters onto his blank paper below, and I say, "I sweat because I am working my tail off and I need you to do the same."

**P71 2014-04-10 The sweaty teacher's lament - Justin Lamb**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=71)

翻译人员: William Pang 校对人员: Jenny Yang我很想成为一个有爱心的老师，一个严格既公平的老师，但据我年轻灵光的头脑看来，还有对这些我极仰慕的学者来说，我是个「汗淋淋老师」。并非一个有爱心的老师，嘿！他偶尔也会流汗哦。甚至也不是「那个流汗的老师」。都不是，就是叫「汗淋淋老师」。形容词，「汗淋淋」专门放在名词「老师」前面，好像在说：「这位是兰姆先生。」「但不要以他全心献身于的职业来定义他。」「要以他腋窝下那两股间歇泉来定义他。」每天早上，我在一个冷冷的...醒过来...算了吧。随和的老师会叫我不用「太紧张」(sweat it: 是俚语，有忧虑紧张之意）大声的老师会说：「是啊！你紧张什么吗！？」甚至连有同情心的老师也不明白。其实我有潜质成为一个搞笑的老师，我以前会把课堂上没收的小纸条装作感谢信来读，把它们当作对我精彩教学的感言。「哦，呵呵 ，你太客气了！」直到一次我没收了一张关于「臭水坑先生」的纸条不！你真是不应该！从那时候开始，我开始养成一些奇怪的习惯为了引开人对我的注意,让自己成为一个全新的人：一个经常充满劲头地...耸肩的老师。一个爱把领带塞进裤腰里，然后把领带末端从裤子前面抽出来的老师，因为他太雷人了。但这些都不管用。因为我以前也有一个汗淋淋的地理老师，到今天我都记不起保加利亚的首都是哪儿，而我记忆最深刻的两片水域，就坐落于他双肩以下。现在轮到我了，我就如摔跤手般把大西洋和太平洋同时夹在我双腋下。有人问：「『水桶鬼门关(dunk tank)』好玩吗？」「根本就没有水桶鬼门关！」「我们住在新奥尔良，太潮湿啦！」如果我是恼火的老师，我就会这样回答。我却不是，我盯着那学生的双眼，汗水瀑布似的流到我鼻子上，然后飞溅在他桌上的那张白纸。我说：「我流汗是因为我辛劳到喘口气的机会都没有」「你，也需要同样地勤奋学习。」

**P72 2014-04-17 Cell vs. virus - A battle for health - Shannon Stiles**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=72)

You're in line at the grocery store when, uh oh, someone sneezes on you. The cold virus is sucked inside your lungs and lands on a cell on your airway lining. Every living thing on Earth is made of cells, from the smallest one-celled bacteria to the giant blue whale to you. Each cell in your body is surrounded by a cell membrane, a thick flexible layer made of fats and proteins, that surrounds and protects the inner components. It's semipermeable, meaning that it lets some thing pass in and out but blocks others. The cell membrane is covered with tiny projections. They all have functions, like helping cells adhere to their neighbors or binding to nutrients the cell will need. Animal and plant cells have cell membranes. Only plant cells have a cell wall, which is made of rigid cellulose that gives the plant structure. The virus cell that was sneezed into your lungs is sneaky. Pretending to be a friend, it attaches to a projection on the cell membrane, and the cell brings it through the cell membrane and inside. When the virus gets through, the cell recognizes its mistake. An enemy is inside! Special enzymes arrive at the scene and chop the virus to pieces. They then send one of the pieces back through the cell membrane, where the cell displays it to warn neighboring cells about the invader. A nearby cell sees the warning and immediately goes into action. It needs to make antibodies, proteins that will attack and kill the invading virus. This process starts in the nucleus. The nucleus contains our DNA, the blueprint that tells our cells how to make everything our bodies need to function. A certain section of our DNA contains instructions that tell our cells how to make antibodies. Enzymes in the nucleus find the right section of DNA, then create a copy of these instructions, called messenger RNA. The messenger RNA leaves the nucleus to carry out its orders. The messenger RNA travels to a ribosome. There can be as many as 10 million ribosomes in a human cell, all studded along a ribbon-like structure called the endoplasmic reticulum. This ribosome reads the instructions from the nucleus. It takes amino acids and links them together one by one creating an antibody protein that will go fight the virus. But before it can do that, the antibody needs to leave the cell. The antibody heads to the golgi apparatus. Here, it's packed up for delivery outside the cell. Enclosed in a bubble made of the same material as the cell membrane, the golgi apparatus also gives the antibody directions, telling it how to get to the edge of the cell. When it gets there, the bubble surrounding the antibody fuses to the cell membrane. The cell ejects the antibody, and it heads out to track down the virus. The leftover bubble will be broken down by the cell's lysosomes and its pieces recycled over and over again. Where did the cell get the energy to do all this? That's the roll of the mitochondria. To make energy, the mitochondria takes oxygen, this is the only reason we breathe it, and adds electrons from the food we eat to make water molecules. That process also creates a high energy molecule, called ATP which the cell uses to power all of its parts. Plant cells make energy a different way. They have chloroplasts that combine carbon dioxide and water with light energy from the sun to create oxygen and sugar, a form of chemical energy. All the parts of a cell have to work together to keep things running smoothly, and all the cells of your body have to work together to keep you running smoothly. That's a whole lot of cells. Scientists think there are about 37 trillion of them.

**P72 2014-04-17 Cell vs. virus - A battle for health - Shannon Stiles**

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翻译人员: Taiyi Pan 校对人员: Cora Liu你在超市里排队，哦，不妙，有个人朝你打了个喷嚏。感冒病毒被吸到了你的肺里，然后降落在你气管壁上的一个细胞。地球上所有的生命都是由细胞组成的，从最小的单细胞细菌，到巨大的蓝鲸，到你。你身体里的每一个细胞都是被细胞膜所包起来。那是由脂肪和蛋白质组成的一层即厚又软的物质，包围着并保护着细胞内部。细胞具有半渗透性，意味着它让有些东西自由进出，但阻挡其它的东西。细胞膜上有很多突出的部分。它们都有用处的，比如帮助细胞吸附住临近的细胞，或帮细胞链接上营养物质。动物细胞和植物细胞都有细胞膜。但是只有植物细胞有细胞壁，当中坚硬的纤维素给植物制造了他的结构。被打喷嚏进你肺里的病毒体是很狡猾的。它假装是一个朋友，连到细胞膜上的一个突出部分，然后细胞让它穿过细胞膜进来。当病毒在里面了以后，细胞认识到它犯的错误。敌人到里面来了！特殊的酶赶到现场，把病毒切成数块。之后它们把其中的一块放到细胞膜外面，这样细胞就可以警示它旁边的细胞：有入侵者。旁边一个细胞看到了这个警示，立刻开始行动。它需要制造叫做抗体的会攻击并杀掉入侵病毒的一种蛋白质。整个制造流程从细胞核内开始。细胞核装有我们的DNA。那是一幅告诉我们细胞怎么制造我们身体所需的一切东西的蓝图。我们DNA的一部分有指示来告诉我们的细胞怎么制造抗体。细胞核中的酶找到正确的DNA部分，再制造这些指令的备份，叫做信使RNA。信使RNA离开细胞核去执行它的命令。信使RNA到了一个核糖体。在一个人体细胞里有一千万个核糖体，都集中在一个叫做内质网的结构上。这个核糖体解读来自细胞核的指示。它把氨基酸一个接一个串起来，制造成一个会攻击病毒的抗体蛋白质。但在那之前，抗体必须得离开细胞。抗体去往高基式体。在这里，它会被包装起来向细胞外运输。包在一个由细胞膜物质组成的泡泡里，高基式体也会给抗体指示，告诉它怎么去细胞的边缘。当它到了那里，包着抗体的泡泡融入细胞膜。细胞射出抗体，然后抗体去找那病毒。剩下的泡泡会被细胞的溶体而分解。它的碎片被重复地回收利用。细胞在哪里找来能量去做这些事情？那是线粒体的功能。为了制造能量，线粒体吸进氧气。这是我们需要氧气的唯一原因。然后它加入从我们吃的食物中来的电子去制造水分子。这个过程同时制造出一个高能量分子，叫做三磷酸腺苷，为细胞供给能量所用。植物细胞通过不同的形式制造能量。它们有叶绿体。叶绿体把二氧化碳和水份与太阳光能量合成氧气与糖份，一种化学能量。细胞所有部分必须得一起工作，才能使一切步骤到位。你体内所有的细胞也必须一起工作使你一切正常。人体内有很多细胞。科学家们认为人体内有37万亿个细胞。

**P73 2014-04-18 Climate change - Earth's giant game of Tetris - Joss Fong**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=73)

To understand climate change, think of the game "Tetris." For eons, Earth has played a version of this game with blocks of carbon. They enter the atmosphere as carbon dioxide gas from volcanoes, decaying plant matter, breathing creatures and the surface of the sea. And they leave the atmosphere when they're used by plants during photosynthesis, absorbed back into the ocean, or stored in soil and sediment. This game of Tetris is called the carbon cycle, and it's the engine of life on Earth. What's the connection to climate? Well, when that carbon dioxide is in the air, waiting to be reabsorbed, it traps a portion of the sun's heat, which would otherwise escape to space. That's why carbon dioxide is called a greenhouse gas. It creates a blanket of warmth, known as the greenhouse effect, that keeps our Earth from freezing like Mars. The more carbon dioxide blocks hang out in the atmosphere waiting to be cleared, the warmer Earth becomes. Though the amount of carbon in the atmosphere has varied through ice ages and astroid impacts, over the past 8,000 years the stable climate we know took shape, allowing human civilization to thrive. But about 200 years ago, we began digging up that old carbon that had been stored in the soil. These fossil fuels, coal, oil and natural gas are made from the buried remains of plants and animals that died long before humans evolved. The energy stored inside them was able to power our factories, cars and power plants. But burning these fuels also injected new carbon blocks into Earth's Tetris game. At the same time, we cleared forests for agriculture, reducing the Earth's ability to remove the blocks. And since 1750, the amount of carbon in the atmosophere has increased by 40%, and shows no sign of slowing. Just like in Tetris, the more blocks pile up, the harder it becomes to restore stability. The extra carbon dioxide in the atmosphere accelerates the greenhouse effect by trapping more heat near the surface and causing polar ice caps to melt. And the more they melt, the less sunlight they're able to reflect, making the oceans warm even faster. Sea levels rise, coastal populations are threatened with flooding, natural ecosystems are disrupted, and the weather becomes more extreme over time. Climate change may effect different people and places in different ways. But, ultimately, it's a game that we're all stuck playing. And unlike in Tetris, we won't get a chance to start over and try again.

**P73 2014-04-18 Climate change - Earth's giant game of Tetris - Joss Fong**

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翻译人员: Peipei Xiang 校对人员: Qingqing Mao要了解气候变化，可以想一下“俄罗斯方块”游戏。长期以来，地球一直在玩类似的一个“碳方块”的游戏。这些方块以二氧化碳的形式进入到大气层，通过火山喷发、腐烂的植物、会呼吸的生物，以及海洋的表面。当它们被植物的光合作用吸收，被海洋吸收，或储藏在土壤和沉积物里时，则离开了大气层。这个俄罗斯方块的游戏被称之为碳循环，而它是地球上生命的动力来源。这跟气候有什么关系呢？是这样的，当这些二氧化碳在空中等待被重新吸收的时候，它会将一部分太阳的热能锁住，否则这些热能就会逃逸到太空。这就是为什么二氧化碳被称之为“温室气体”。它形成了一个温暖的表层，也就是我们熟知的“温室效应”，才使得我们的地球不至于像火星一样冰冷。停留在大气层等待被重新吸收的二氧化碳越多，地球就越温暖。虽然大气中的碳含量在冰河世纪和小行星撞击的影响下有过很多变化，在过去的8000年里，我们熟悉的稳定的气候开始成形，也使得人类文明得以繁荣。但是在大约200年以前，我们开始挖掘那些埋藏在地下的古老的碳。那些化石燃料、煤、石油和天然气是由那些早在人类进化以前就消亡了的埋藏在地下的动植物的遗体组成的。储存在它们内部的能量能够给工厂、汽车和发电厂提供能源。然而，燃烧这些燃料也给地球的俄罗斯方块游戏释放了新的碳方块。与此同时，我们为农业砍伐森林，降低了地球了消除那些碳方块的能力。自1750年以来，大气中的碳含量已经增加了40%，并没有任何减缓的迹象。就跟俄罗斯方块游戏一样，随着方块的增加，恢复平衡也变得越来越难。大气层中额外的二氧化碳给地球表面锁住了更多的热能，加速了温室效应，并导致极地冰帽融化。它们融化得越多，能反射的太阳光就越少，于是导致海洋升温的速度更快。海平面上升，沿海人口受到洪水的威胁，大自然的生态系统遭到破坏，极端天气越发频繁。气候变化会以不同的方式影响不同的地方、不同的人。但最终，这是一个我们每个人都参与其中的游戏。与俄罗斯方块游戏不同的是，我们不会有重来的机会。

**P74 2014-04-18 Not all scientific studies are created equal - David H. Schwartz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=74)

Studies have shown that taking vitamins is good for your health and bad for your health. That newly discovered herb can improve your memory or destroy your liver. Headlines proclaim a promising new cancer treatment and never mention it again. On a daily basis, we are bombarded with attention-grabbing news, backed up by scientific studies, but what are these studies? How are they performed? And how do we know whether they're reliable? When it comes to dietary or medical information, the first thing to remember is that while studies on animals or individual cells can point the way towards further research, the only way to know how something will affect humans is through a study involving human subjects. And when it comes to human studies, the scientific gold standard is the randomized clinical trial, or RCT. The key to RCTs is that the subjects are randomly assigned to their study groups. They are often blinded to make them more rigorous. This process attempts to ensure that the only difference between the groups is the one the researchers are attempting to study. For example, when testing a new headache medication, a large pool of people with headaches would be randomly divided into two groups, one receiving the medication and another receiving a placebo. With proper randomization, the only significant overall difference between the two groups will be whether or not they received the medication, rather than other differences that could affect results. Randomized clinical trials are incredible tools, and, in fact, the US Food and Drug Administration often requires at least two to be conducted before a new drug can be marketed. But the problem is that an RCT is not possible in many cases, either because it's not practical or would require too many volunteers. In such cases, scientists use an epidemiological study, which simply observes people going about their usual behavior, rather than randomly assigning active participants to control invariable groups. Let's say we wanted to study whether an herbal ingredient on the market causes nausea. Rather than deliberately giving people something that might make them nauseated, we would find those who already take the ingredient in their everyday lives. This group is called the cohort. We would also need a comparison group of people who do not have exposure to the ingredient. And we would then compare statistics. If the rate of nausea is higher in the herbal cohort, it suggests an association between the herbal supplement and nausea. Epidemiological studies are great tools to study the health effects of almost anything, without directly interfering in people's lives or assigning them to potentially dangerous exposures. So, why can't we rely on these studies to establish causal relationships between substances and their effects on health? The problem is that even the best conducted epidemiological studies have inherent flaws. Precisely because the test subjects are not randomly assigned to their groups. For example, if the cohort in our herbal study consisted of people who took the supplement for health reasons, they may have already had higher rates of nausea than the other people in the sample. Or the cohort group could've been composed of people who shop at health food stores and have different diets or better access to healthcare. These factors that can affect results, in addition to the factor being studied, are known as confounding variables. These two major pitfalls, combined with more general dangers, such as conflicts of interest or selective use of data, can make the findings of any particular epidemiological study suspect, and a good study must go out of its way to prove that its authors have taken steps to eliminate these types of errors. But even when this has been done, the very nature of epidemiological studies, which examine differences between preexisting groups, rather than deliberately inducing changes within the same individuals, means that a single study can only demonstrate a correlation between a substance and a health outcome, rather than a true cause and effect relationship. At the end of the day, epidemiological studies have served as excellent guides to public health, alerting us to critical health hazards, such as smoking, asbestos, lead, and many more. But these were demonstrated through multiple, well-conducted epidemiological studies, all pointing in the same direction. So, the next time you see a headline about a new miracle cure or the terrible danger posed by an everyday substance, try to learn more about the original study and the limitations inherent in any epidemiological study or clinical trial before jumping to conclusions.

**P74 2014-04-18 Not all scientific studies are created equal - David H. Schwartz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=74)

翻译人员: Cora Liu 校对人员: Qingqing Mao研究表明，吃维生素有利于健康，也有害于健康。最新发现的一种药草可以增强记忆力，或者损害你的肝脏。头条新闻报道了一种前景光明的癌症治疗方法，接着却再也没有提及。每天我们被吸睛的新闻所轰炸，它们都有科学研究的支持，但这些研究到底是什么？它们是如何进行的？我们怎么知道它们是否可靠？当涉及饮食和医疗信息时，首先需要记住的是，虽然实施在动物或单个细胞上的研究可以引导未来的研究，但想知道它们如何影响人类的唯一方法是通过一个有人体参与的研究。当涉及人体研究的时候，科学的黄金标准就是随机临床试验，或者叫RCT。RCT的关键是被试者被随机分配到各个研究组。他们通常是不知情的，这样可以使研究更加严谨。这个过程是为了保证不同组之间的唯一区别是研究者想要研究的东西。举个例子，当测试一种全新的治疗头痛的药物时，一大群有头痛问题的人会被随机分配到两组，一组得到治疗的药物，另一组得到安慰剂。在正确的随机分配下，两组间唯一显著的区别就是他们有没有得到药物，而不是其他会影响结果的因素。随机临床试验是非常有用的工具。事实上，美国食品及药物管理局（FDA）通常要求在新药上市前要进行至少两次随机临床试验。但是问题是在很多案例里随机临床试验是不可能的。这可能是因为它不切实际，或者是因为需要过多的志愿者。在这类情况下科学家们使用一种流行病学研究，它简单地观察人们的日常行为，而不是通过随机分配主动参与者来控制不变量。假设我们想研究一种市场上的草药成分是否会引起恶心。我们不会故意给人们一些可能造成他们恶心的东西，而是找到那些在日常生活中已经服用了这种成分的人。这个组叫做队列。我们还需要一个比较组，他们并没有接触过这种成分。接着我们就要比较数据。如果恶心程度在草药队列里面偏高，它就表明了在草药成分和恶心之间有一种联系。流行病学研究非常有用，可用于研究几乎任何东西对健康的影响，而不需要直接干扰人们的生活，也不会让人们接触到有潜在危险的东西。那么，我们为什么不依赖这些研究来研究物质和它们对健康的影响之间的因果关系？问题是即使是实施得最好的流行病学研究也存在内在的缺陷。准确的说是因为被试者不是被随机分配到他们的组别的。比如在我们的草药研究中，如果队列是由那些因为健康原因而服用草药成分的人所组成的，他们可能本身就比在另一个组里的人更有可能感到恶心。或者说队列组有可能由那些在健康食品商店购物的人组成，或者由不同饮食习惯的人组成，或者由那些享有更好的医疗保健的人组成。这些在被研究因素之外也可能影响到结果的因素，被称为混肴变量。这两个主要的缺陷加上更多的常规性问题——比如利益冲突或是选择性地使用数据，能让任何流行病学的发现变得可疑。而一个好的研究必须不厌其烦地来证明它的研究者采取了必要的步骤来消除各种类型的错误。但是，即使这些都做到了，流行病学研究的本质是研究已经存在的不同组别的差异，而不是在相同群体内特意加入差别。这意味着一个单独的研究只能证明一种物质和一个健康结果之间的一种关联，而不是一个真的因果联系。最后我想说，流行病学研究在公共健康中起到了非常大的指导作用，警告我们某些严重的健康威胁，比如吸烟、石棉、铅，还有更多。但是这些都是通过多个实施良好的流行病学研究来证明的，而所有这些研究都指向同一结果。所以，下次你看到一个头条新闻关于某种全新神奇的治疗，或是关于某种日常用品产生的可怕威胁，试着去看一下原始的研究，去了解流行病学研究和临床试验中内在的局限性，而不是直接跳过去读结论。

**P75 2014-04-21 The case of the missing fractals - Alex Rosenthal and George Zaidan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=75)

It was a night like any other night, except here I was climbing the platonic peaks like Romeo on a second date. (ugh) I was there for the dame. She had eyes like imaginary numbers and curves that went on forever. Said she wanted to go home. Said I could help. Said the pay was good. Didn't say anything about climbing a... Voice: "Who's there?" Manny Brot: "Manny Brot, private eye." Voice: "What are you doing here?" "A pretty number sent me to find a stolen dingus." Voice: "Well, to enter the cave, you must answer my riddles three." What was it with riddles, and why do they always come in threes? "Is it an egg?" "No. Why would it be an egg?" "It's usually an egg." "What can I hold in my hand, but has zero area?" "Is it a dodo egg?" "It's not an egg!" I took out the rock that had nearly brained me before and gave it a hard ponder. The size of the rising bump on my conk said to me that this thing had area, and a lot of it. But what if I carved out a triangle from this side here? As any mook could see, this triangle had a quarter of the area of the full triangle. I did the same thing again with each of the smaller triangles. Again, a quarter of the remaining area -- gone. And I just kept going. After an infinite number of cuts, I was satisfied that my triangle had zero area. A bounded shape with zero area. Now, it's not often that I surprise myself, but my own two mitts had created something crazy, and new. "Very good. (ahem) Now, show me a shape with finite area, but an infinitely long perimeter." "Let me get this straight. If I want to make a snip in the border of this shape, smooth it out, and lay it on the ground ... " "It would go on for ... " "Wait 'til I'm through, and then you can talk. It would go on forever." "Are you through?" "Yeah." "So show me that shape then." Mmm ... I hadn't been this stuck since the Rubik's Cube fiasco of '58. All the shapes I knew had perimeters. Circles: 2πr. Triangles: sum of their sides. What's this? An angle. An angle from heaven. What if I were to pinch each side, like so. A third of the way through, just so. And do it again, and again, and again. After each pinch, the perimeter got a third longer because where there had been three line segments, now there were four. As for the area, every pinch made more triangles, that's true. But those triangles were getting smaller and smaller. You could say that the area was converging, approaching a fixed number, while the perimeter was just getting bigger and bigger, uncontrollably ballooning like an overindulgent birthday clown. After infinity pinches, flimflam, there it was: Finite area, but infinite perimeter. Now that is a piece of work. "Oh, you're good. (ahem) Riddle three: Show me a picture that if I magnify it under my microscope, I'll keep seeing the original picture, no matter how much I zoom in." "You're a strange little man." "Thank you." I was out of ideas, so I looked at my muse, my complex Dora. Voice: "Who's the dame?" And then it hit me. "She's a heart breaker, my fractal femme fatale. Will she do?" "Yes, she'll do just fine." (lightning) It was dark, and at first I thought the cave was empty, but then I noticed: the box. The dame had played me like a triangle. She had told me she wanted to go home. (Lightning) What she really wanted was to bring her home here. The fractals spread everywhere. Most of them the same no matter how deep you looked at them, like Dora's mugshot. Some had infinitely long perimeters, others were objects with no area or volume, all of them created through infinite repetition. So, you wanted to know what fractals are? Well, kid, they're the stuff that dreams are made of. (Music)

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翻译人员: Mingyu Cui 校对人员: Shengwei Cai这是一个再寻常不过的夜晚，只不过，我在攀登一座想像中的高峰，如同罗密欧的第二次赴约。（啊）我去那是为了那位夫人。她有着虚数般难以刻画的眼睛和一头长长的卷发。她说她要回家，而我可以帮忙，她说会给我很好的报酬，并没有提到爬上……声音：“谁？”侦探：“曼尼·勃罗特，私家侦探。”声音：“你来干什么？”侦探：“一个漂亮的数字 差我来找一个失窃的东西。”声音：“想要进入这个洞穴，你必须解出我的三则谜语。”谜语是什么，为什么总是三则？我在心里嘀咕。“是一只蛋吗？”“不！怎么会是蛋？”“答案通常是蛋。”“什么东西没有面积，但我能握在手里？”“是渡渡鸟蛋吗？”（渡渡鸟：一种已灭绝不会飞的鸟）“不是蛋！”我拿出了那块差点把我开瓢的石头，开始仔细思考。石头突起的部分有大小。这告诉我这个东西有面积，还不小。但如果我从这条边上把三角形裁开呢？谁都能看出，这个小三角形的面积是大三角形的四分之一。我再对每个小三角形做同样的操作。又一次，剩下面积的四分之一被拿走了。我就这样一直操作。在无穷次操作之后，我很满意，我的三角形没有面积了。一个被包围的图形，却没有面积。确实，我不经常惊到我自己，但我自己创造了神奇的、新颖的东西。“很好。（咳）现在，给我一个面积有限的图形，但是周长是无限的。”“让我说清楚吧。如果我在这个图形的边界上去掉一点，抹平它，把他拍在地面上...”“它就会一直...”“等我说完，你才能说话。它就会一直延伸下去。”“你说完了？”“说完了。”“那就给我看看这个图形。”嗯...我在1958年的魔方难题之后就从来没遇到过这样的困难。我知道的所有图形都有周长。圆的周长是2π乘上半径。三角形的周长是三边的和。这是什么？一个角。天使般的一个角。我如果把每条边向外拉，像这样。把边的三分之一拉起来，就像这样。再做一次，再做一次，第三次。每次拉，周长都增长三分之一。因为原来有三个线段，现在变成了四个。对于面积，的确每拉一次都产生了更多的三角形，可是这些三角形却越来越小。可以说面积是收敛的。面积会接近一个固定值。可是周长的确在变得越来越大，无法控制，就像小丑一样向外膨胀。在无限次向外拉以后，看：有限的面积，无限的周长。这就是成果。“哦，你很强。（咳）第三条谜语：给我一张图片，如果我用望远镜观察它，我仍然能看到原始的图像，不论我把它放大多少倍。”“你真是个怪人。”“谢谢。”我没主意了，所以我看向我的小本，那位朵拉女士。声音：“这位女士是谁？”我突然有了主意。“她能让你心碎，我的分形的致命小姐。她符合吗？”“没错，她正好。”（闪电）天很暗，刚开始我以为山洞是空的，但我马上注意到了那个盒子。女士像玩弄三角形一样玩了我。她告诉过我她想回家。（闪电）她想的其实是把她家带来这里。分形散到了各处。他们大多长得一样，无论你多么细看它们，就像朵拉女士的照片。有的图形有无限长的周长，其他的没有面积或者体积，所有图形都是通过无限的重复动作创造的。所以你想要知道分形是什么吗？孩子，他们是组成梦的东西。（音乐）

**P76 2014-04-22 How tsunamis work - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=76)

In 479 BC, when Persian soldiers besieged the Greek city of Potidaea, the tide retreated much farther than usual, leaving a convenient invasion route. But this wasn't a stroke of luck. Before they had crossed halfway, the water returned in a wave higher than anyone had ever seen, drowning the attackers. The Potiidaeans believed they had been saved by the wrath of Poseidon. But what really saved them was likely the same phenomenon that has destroyed countless others: a tsunami. Although tsunamis are commonly known as tidal waves, they're actually unrelated to the tidal activity caused by the gravitational forces of the Sun and Moon. In many ways, tsunamis are just larger versions of regular waves. They have a trough and a crest, and consist not of moving water, but the movement of energy through water. The difference is in where this energy comes from. For normal ocean waves, it comes from wind. Because this only affects the surface, the waves are limited in size and speed. But tsunamis are caused by energy originating underwater, from a volcanic eruption, a submarine landslide, or most commonly, an earthquake on the ocean floor caused when the tectonic plates of the Earth's surface slip, releasing a massive amount of energy into the water. This energy travels up to the surface, displacing water and raising it above the normal sea level, but gravity pulls it back down, which makes the energy ripple outwards horizontally. Thus, the tsunami is born, moving at over 500 miles per hour. When it's far from shore, a tsunami can be barely detectable since it moves through the entire depth of the water. But when it reaches shallow water, something called wave shoaling occurs. Because there is less water to move through, this still massive amount of energy is compressed. The wave's speed slows down, while its height rises to as much as 100 feet. The word tsunami, Japanese for "harbor wave," comes from the fact that it only seems to appear near the coast. If the trough of a tsunami reaches shore first, the water will withdraw farther than normal before the wave hits, which can be misleadingly dangerous. A tsunami will not only drown people near the coast, but level buildings and trees for a mile inland or more, especially in low-lying areas. As if that weren't enough, the water then retreats, dragging with it the newly created debris, and anything, or anyone, unfortunate enough to be caught in its path. The 2004 Indian Ocean tsunami was one of the deadliest natural disasters in history, killing over 200,000 people throughout South Asia. So how can we protect ourselves against this destructive force of nature? People in some areas have attempted to stop tsunamis with sea walls, flood gates, and channels to divert the water. But these are not always effective. In 2011, a tsunami surpassed the flood wall protecting Japan's Fukushima Power Plant, causing a nuclear disaster in addition to claiming over 18,000 lives. Many scientists and policy makers are instead focusing on early detection, monitoring underwater pressure and seismic activity, and establishing global communication networks for quickly distributing alerts. When nature is too powerful to stop, the safest course is to get out of its way.

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翻译人员: Catherine Gu 校对人员: Jia (Jolie) YU公元前479年波斯士兵围攻希腊城市波提狄亚时，潮水比平时退得更远，留下了一条便捷的入侵路线。但这不是意外的好运。士兵们还没走到一半，高过以往见过的回流的水波就淹死了这些进攻者。波提狄亚人认为他们得救于波塞冬的愤怒。但真正救了他们的可能是已摧毁过无数他人的同样的现象：海啸。虽然海啸通常被称为潮汐波，它们实际与太阳和月亮引起的潮汐活动无关。在许多方面，海啸只是比正常波浪还大的波浪。它们有波谷和波峰，并不是流动的水，而是水的能量运动。区别在于这种能量是从哪里来的。正常的海波来自风。由于风只影响表面，波浪的大小和速度是有限的。但海啸是由水下的能量引起的，（比如）火山爆发ˎ海底滑坡ˎ或最常见的，地球表面的板块滑动引起的海底地震向水里释放出大量的能量。这能量向上行进到表面，排开水且使水面高于正常的海平面，但重力把它拉下来，使得能量向外横向传播。因此，海啸就出现了，以每小时500英里以上的速度行进当海啸远离海岸时，海啸几乎不能被探测到，因为海啸通过整个水深移动。但当海啸到达浅水地带，波变浅的情况就发生了。因有较少的水移动，这巨大的能量被压缩。水波的速度慢了，但水波的高度升起高达100英尺。海啸这个词，日语叫“港波，来源于它似乎只出现在海岸附近这一事实。如果海啸的低谷先到达海岸，在波浪撞击之前，水会比正常情况下退出的距离更远，这种情况既危险又有误导性。海啸不仅会淹死靠近海岸的人，还会把内陆一英里或更远距离的建筑物和树木冲平，特别是在低洼的地方。好像这还不够，水然后再退下来，随之脱下来的还有新产生的碎片，以及路途中极不幸被冲走的任何东西或人。2004年印度洋发生的海啸是历史上一次最致命的自然灾害之一，在整个南亚地区死了超过200,000人。因此怎样才能保护我们抵抗这种大自然的破坏力呢？某些地区的人们试图用海堤、防洪门和渠道疏导水来阻止海啸。但这些并不总起作用。2011年的海啸超越了保护日本福岛电厂的防洪墙，引起核灾难，造成超过18,000人丧生。许多科学家和政策制定者却集中在早期发现，监测水下压力和地震活动，并建立全球通信网络以快速发送警报。当自然太强大而无法阻止它时，最安全的做法是为其让道。

**P77 2014-04-22 The fundamentals of space-time - Part 2 - Andrew Pontzen and Tom Whyn**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=77)

Light: it's the fastest thing in the universe, but we can still measure its speed if we slow down the animation, we can analyze light's motion using a space-time diagram, which takes a flipbook of animation panels, and turns them on their side. In this lesson, we'll add the single experimental fact that whenever anyone measures just how fast light moves, they get the same answer: 299,792,458 meters every second, which means that when we draw light on our space-time diagram, it's world line always has to appear at the same angle. But we saw previously that speed, or equivalently world line angles, change when we look at things from other people's perspective. To explore this contradiction, let's see what happens if I start moving while I stand still and shine the laser at Tom. First, we'll need to construct the space-time diagram. Yes, that means taking all of the different panels showing the different moments in time and stacking them up. From the side, we see the world line of the laser light at its correct fixed angle, just as before. So far, so good. But that space-time diagram represents Andrew's perspective. What does it look like to me? In the last lesson, we showed how to get Tom's perspective moving all the panels along a bit until his world line is completely vertical. But look carefully at the light world line. The rearrangement of the panels means it's now tilted over too far. I'd measure light traveling faster than Andrew would. But every experiment we've ever done, and we've tried very hard, says that everyone measures light to have a fixed speed. So let's start again. In the 1900s, a clever chap named Albert Einstein worked out how to see things properly, from Tom's point of view, while still getting the speed of light right. First, we need to glue together the separate panels into one solid block. This gives us our space-time, turning space and time into one smooth, continuous material. And now, here is the trick. What you do is stretch your block of space-time along the light world line, then squash it by the same amount, but at right angles to the light world line, and abracadabra! Tom's world line has gone vertical, so this does represent the world from his point of view, but most importantly, the light world line has never changed its angle, and so light will be measured by Tom going at the correct speed. This superb trick is known as a Lorentz transformation. Yeah, more than a trick. Slice up the space-time into new panels and you have the physically correct animation. I'm stationary in the car, everything else is coming past me and the speed of light works out to be that same fixed value that we know everyone measures. On the other hand, something strange has happened. The fence posts aren't spaced a meter apart anymore, and my mom will be worried that I look a bit thin. But that's not fair. Why don't I get to look thin? I thought physics was supposed to be the same for everyone. Yes, no, it is, and you do. All that stretching and squashing of space-time has just muddled together what we used to think of separately as space and time. This particular squashing effect is known as Lorentz contraction. Okay, but I still don't look thin. No, yes, you do. Now that we know better about space-time, we should redraw what the scene looked like to me. To you, I appear Lorentz contracted. Oh but to you, I appear Lorentz contracted. Yes. Uh, well, at least it's fair. And speaking of fairness, just as space gets muddled with time, time also gets muddled with space, in an effect known as time dilation. No, at everyday speeds, such as Tom's car reaches, actually all the effects are much, much smaller than we've illustrated them. Oh, yet, careful experiments, for instance watching the behavior of tiny particles whizzing around the Large Hadron Collider confirmed that the effects are real. And now that space-time is an experimentally confirmed part of reality, we can get a bit more ambitious. What if we were to start playing with the material of space-time itself? We'll find out all about that in the next animation.

**P77 2014-04-22 The fundamentals of space-time - Part 2 - Andrew Pontzen and Tom Whyn**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=77)

翻译人员: Qingqing Mao 校对人员: Xiaoou Chen光：宇宙中最快的东西但我们依然有办法测量它的速度如果我们把画面放慢，我们可以使用时空图来分析光的运动就像从侧面来看一页页的手翻书在这堂课里，我们将补充一个实验事实当任何人测量光的速度的时候都会得到相同的结果每秒299 792 458米这意味着当我们把光画在时空图上时光的世界线必须总是呈现相同的角度但是，我们之前看到速度，即世界线的角度会随着不同观察者的视角而改变为了弄清这个矛盾让我们来看看如下情况如果我开始移动而我站在这里朝着汤姆发射激光首先，我们需要构造时空图这意味着取出对应每一个时刻的每一帧图片然后把它们叠在一起从侧面我们看到激光的世界线有着固定的、正确的角度就和早先的一样目前为止一切顺利但是这个时空图展示的是安德鲁的视角从我的视角来看是什么样的呢？在上一课里我们展示了如何得到汤姆的视角只需把所有的图片平移一点直到汤姆的世界线完全垂直但是仔细看看光的世界线平移所有图片的话会使得光的世界线倾斜过度我所测得的光速将会快于安德鲁所测得的但是我们所做过的所有实验我们所有的努力都表明光速是恒定的让我们重新开始在19世纪00年代，有个聪明的家伙叫爱因斯坦他想出了如何从汤姆的视角来正确地看待问题而同时依然能得到正确的光速首先我们需要把分离的画面都粘合起来粘成完整的一块于是我们有了时空将时间和空间变成一整块平顺连续的材料现在，变戏法的时候到了你要做的是沿着世界线拉伸你的整块时空然后在垂直于世界线的方向上同等数量地压缩时空唵嘛呢叭咪吽！汤姆的世界线变得垂直了所以这代表了他眼中的世界但是最重要的是光的世界线从未改变角度所以汤姆所测量的光速也是正确的光速这个杰出的戏法叫做洛伦兹变换这可不是骗人的把戏重新将时空分割为一幅幅画面你将得到物理上正确的动画我静止坐在车里所有东西都朝我移来并经过我身边而光速依然是那个恒定的速度和所有人测量的光速一样而另一方面有些奇怪的事情发生了围栏柱子的间隔不再是一米了而我妈妈会担心我看起来瘦了这不公平！为什么我看起来没瘦？我以为物理学对每个人都是一样的的确是一样的，你也看起来瘦了所有这些，时空的拉伸和压缩把我们之前认为的独立的时间和空间都混合到了一起这个特别的压缩效应被称为洛伦兹收缩好吧，可是我依然看起来不瘦不，你的确看起来瘦了现在我们对时空有了更多的了解我们应该重新画出我眼中的情形是怎么样的对你来说，我表现出洛伦兹收缩而对你来说，我表现出了洛伦兹收缩对好吧，至少这是公平的说到公平不仅空间被时间搅浑时间也被空间搅浑有个效应叫做时间膨胀虽然在日常的速度下比如汤姆的车速实际的效应非常非常地小比我们刚才展示的要小得多然而精密的实验比如观察微小的粒子在大型强子对撞机里的运动确认了这些效应是真实存在的既然现在时空已是被实验验证的事实我们的野心可以更大一些我们是否可以开始考虑时空本身的性质？我们会在下一个动画里找到答案

**P78 2014-04-24 Lessons from Auschwitz - The power of our words - Benjamin Zander**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=78)

It really makes a difference what we say. I learned this from a woman who survived Auschwitz. She went to Auschwitz when she was fifteen years old, and her brother was eight, and the parents were lost. And she told me this, "We were in the train going to Auschwitz, and I looked down, and I saw my brother's shoes were missing. And I said, 'Why are you so stupid? Can't you keep your things together? For goodness sake!' The way an elder sister might speak to a younger brother." Unfortunately, it was the last thing she ever said to him because she never saw him again. He did not survive. And so when she came out of Auschwitz, she made a vow. She said, "I walked out of Auschwitz into life. And the vow was, "I will never say anything that couldn't stand as the last thing I ever say." Now, can we do that? No. But it is a possibility to live in to. Thank you.

**P78 2014-04-24 Lessons from Auschwitz - The power of our words - Benjamin Zander**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=78)

翻译人员: xin li 校对人员: Yiqun Liu我们说出去的话能产生不小影响我是从一位奥斯维辛集中营幸存的女士那儿学到的她去奥斯维辛时只有十五岁弟弟八岁 与父母走散了这是她告诉我的我们在去往奥斯维辛的火车上我低头看了眼 发现我弟弟的鞋子不见了然后我说道 ”你为什么那么笨““就不能管好自己的东西吗？”“天哪！”不过就是姐姐教训弟弟那样遗憾的是 这竟是她对他说的最后一些话因为她再也没见过他他没能活下来当她走出奥斯维辛的时候 她发了一个誓她说 “我离开奥斯维辛后重获新生”誓言中这样说道“我再也不会说些伤人的话”“因为那也许会是我所说的最后一句话”现在，我们能做到吗？不能但不妨把它作为毕生的一个追求谢谢

**P79 2014-04-30 The science of symmetry - Colm Kelleher**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=79)

When you hear the word symmetry, maybe you picture a simple geometric shape like a square or a triangle, or the complex pattern on a butterfly's wings. If you are artistically inclined, you might think of the subtle modulations of a Mozart concerto, or the effortless poise of a prima ballerina. When used in every day life, the word symmetry represents vague notions of beauty, harmony and balance. In math and science, symmetry has a different, and very specific, meaning. In this technical sense, a symmetry is the property of an object. Pretty much any type of object can have symmetry, from tangible things like butterflies, to abstract entities like geometric shapes. So, what does it mean for an object to be symmetric? Here's the definition: a symmetry is a transformation that leaves that object unchanged. Okay, that sounds a bit abstract, so let's unpack it. It will help to look at a particular example, like this equilateral triangle. If we rotate our triangle through 120 degrees, around an access through its center, we end up with a triangle that's identical to the original. In this case, the object is the triangle, and the transformation that leaves the object unchanged is rotation through 120 degrees. So we can say an equilateral triangle is symmetric with respect to rotations of 120 degrees around its center. If we rotated the triangle by, say, 90 degrees instead, the rotated triangle would look different to the original. In other words, an equilateral triangle is not symmetric with respect to rotations of 90 degrees around its center. But why do mathematicians and scientists care about symmetries? Turns out, they're essential in many fields of math and science. Let's take a close look at one example: symmetry in biology. You might have noticed that there's a very familiar kind of symmetry we haven't mentioned yet: the symmetry of the right and left sides of the human body. The transformation that gives this symmetry is reflection by an imaginary mirror that slices vertically through the body. Biologists call this bilateral symmetry. As with all symmetries found in living things, it's only approximate, but still a striking feature of the human body. We humans aren't the only bilaterally symmetric organisms. Many other animals, foxes, sharks, beetles, that butterfly we mentioned earlier, have this kind of symmetry, as do some plants like orchid flowers. Other organisms have different symmetries, ones that only become apparent when you rotate the organism around its center point. It's a lot like the rotational symmetry of the triangle we watched earlier. But when it occurs in animals, this kind of symmetry is known as radial symmetry. For instance, some sea urchins and starfish have pentaradial or five-fold symmetry, that is, symmetry with respect to rotations of 72 degrees around their center. This symmetry also appears in plants, as you can see for yourself by slicing through an apple horizontally. Some jellyfish are symmetric with respect to rotations of 90 degrees, while sea anemones are symmetric when you rotate them at any angle. Some corals, on the other hand, have no symmetry at all. They are completely asymmetric. But why do organisms exhibit these different symmetries? Does body symmetry tell us anything about an animal's lifestyle? Let's look at one particular group: bilaterally symmetric animals. In this camp, we have foxes, beetles, sharks, butterflies, and, of course, humans. The thing that unites bilaterally symmetric animals is that their bodies are designed around movement. If you want to pick one direction and move that way, it helps to have a front end where you can group your sensory organs-- your eyes, ears and nose. It helps to have your mouth there too since you're more likely to run into food or enemies from this end. You're probably familiar with a name for a group of organs, plus a mouth, mounted on the front of an animal's body. It's called a head. Having a head leads naturally to the development of bilateral symmetry. And it also helps you build streamlined fins if you're a fish, aerodynamic wings if you're a bird, or well coordinated legs for running if you're a fox. But, what does this all have to do with evolution? Turns out, biologists can use these various body symmetries to figure out which animals are related to which. For instance, we saw that starfish and sea urchins have five-fold symmetry. But really what we should have said was adult starfish and sea urchins. In their larval stage, they're bilateral, just like us humans. For biologists, this is strong evidence that we're more closely related to starfish than we are, to say, corals, or other animals that don't exhibit bilateral symmetry at any stage in their development. One of the most fascinating and important problems in biology is reconstructing the tree of life, discovering when and how the different branches diverged. Thinking about something as simple as body symmetry can help us dig far into our evolutionary past and understand where we, as a species, have come from.

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翻译人员: Alex Wang 校对人员: Qingqing Mao当你听到“对称”这个词时，你的脑海里大概会出现一个简单的几何图形，比如一个正方形或三角形，或者是更复杂一点的图案，诸如蝴蝶翅膀。如果你是一个富有艺术感的人，你可能会想到莫扎特协奏曲中微小的转调，或者芭蕾舞首席女演员毫不费力的舞姿。在日常生活中，对称这个词含糊地代表了唯美，和谐以及平衡的观念。在数学和科学中，对称有着不同，而且非常特殊的定义。从技术角度而言，对称是物体的一种特性。基本上所有物体都有对称性，从有形的物体比如蝴蝶，到抽象物体如几何图形。那么，一个物体有“对称性”是什么意思呢？定义如下：对称是使物体维持原样的一种变换。嗯，听起来有点抽象，让我们来具体解释一下。举个等边三角形的例子会有助于我们理解。如果我们把这个三角形以中心为轴旋转120度，我们会得到一个完全一样的三角形。在本例中，物体是三角形，而使物体维持原样的变换是旋转120度。所以我们可以说，等边三角形以中心为轴的120度旋转是有对称性的。如果我们把这个三角形旋转90度，这个三角形和原来那个就不同了。换句话来说，等边三角形以中心为轴的90度旋转是没有对称性的。但是数学家和科学家们为什么要在意对称呢？答案是，对称在数学及科学的很多领域中至关重要。让我们举一个例子来说明：生物学中的对称。你可能会注意到，我们还没有提及一类很常见的对称：人体左右两侧的对称。这个对称所对应的变换是反射，我们可以想象一面镜子把人体从中间竖直分开。生物学家们把这叫做“两侧对称”。如同所有可以在生物体上找到的对称，这只是一种近似的对称，但这依旧是人体的一个显著特征。我们人类并不是唯一一种两侧对称的生物。还有很多动物也是，比如狐狸，鲨鱼，甲壳虫，还有我们之前提到的蝴蝶等，都有这种对称性，一些植物比如兰花，也是如此。其他生物体有不同的对称性，有一些对称只有你在把它绕中心点旋转时才看得出来。这和我们之前看到的三角形的旋转对称非常相似。不过当这种对称出现在动物身上时，我们称它为“辐射对称”。例如，某些海胆还有海星呈五辐射对称，或五次对称。意思是，这些生物以中心为轴进行72度旋转是有对称性的。植物中也会出现这种对称，你去把一个苹果从水平方向切开就会发现了。有些水母是关于90度旋转对称的，而海葵则是对于任意角度都是旋转对称的。另一方面，某些珊瑚不具有任何对称性。它们完全不对称。但是为什么生物体会呈现这些不同的对称呢？物种身体的对称性是否向我们揭示了动物的生活习性？让我们来重点观察一个群体：两侧对称的动物。在这个分组里，我们有狐狸，甲壳虫，鲨鱼，蝴蝶，当然，还有人类。这类两侧对称的生物的特点是它们的身体构造是建立在运动的基础上的。如果你想朝某个方向移动，有一个集中了各种感官的前端是很有帮助的——包括了你的眼睛，耳朵和鼻子。把嘴放在前端也很有用，因为这个前端既会的得到食物，也有可能遭遇敌人。你应该对一个带有包括嘴在内的一堆器官，伫立在动物身体最前端的东西很熟悉。这个东西叫做——头。有一个头的生物会很自然地进化成两侧对称体。如果你是一条鱼，这也会帮助你长出流线型的鳍，如果你是一只鸟，那就会长出符合空气动力学的翅膀，或者如果你是狐狸，那你就会有非常协调的腿。但是这些和物种进化又有什么关系呢？答案是，生物学家们可以用这些身体对称性来判断物种间的联系。比如，我们知道海胆和海星都具有五次对称。但我们要注意的是只有成年海星和海胆才这样。在它们幼年时期，它们就像我们人类一样是两侧对称的。对于生物学家来说，这是一个有力的证据，这表明，相比于珊瑚或者其他在任何生长阶段都不具备两侧对称的生物而言，我们人类与海星的关系要近得多。生物学中有一个迷人且又重要的任务就是重建“生命之树”，找出物种进化中各分支形成的时间与方式。研究身体对称性这种简单的东西可以帮助我们深入发掘我们的进化历程，从而了解我们，作为一个物种，是从何而来的。

**P80 2014-05-05 The science of attraction - Dawn Maslar**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=80)

We like to think of romantic feelings as spontaneous and indescribable things that come from the heart. But it's actually your brain running a complex series of calculations within a matter of seconds that's responsible for determining attraction. Doesn't sound quite as poetic, does it? But just because the calculations are happening in your brain doesn't mean those warm, fuzzy feelings are all in your head. In fact, all five of your senses play a role, each able to vote for, or veto, a budding attraction. The eyes are the first components in attraction. Many visual beauty standards vary between cultures and eras, and signs of youth, fertility and good health, such as long lustrous hair, or smooth, scar-free skin, are almost always in demand because they're associated with reproductive fitness. And when the eyes spot something they like, our instinct is to move closer so the other senses can investigate. The nose's contribution to romance is more than noticing perfume or cologne. It's able to pick up on natural chemical signals known as pheromones. These not only convey important physical or genetic information about their source but are able to activate a physiological or behavioral response in the recipient. In one study, a group of women at different points in their ovulation cycles wore the same T-shirts for three nights. After male volunteers were randomly assigned to smell either one of the worn shirts, or a new unworn one, saliva samples showed an increase in testosterone in those who had smelled a shirt worn by an ovulating woman. Such a testosterone boost may give a man the nudge to pursue a woman he might not have otherwise noticed. A woman's nose is particularly attuned to MHC molecules, which are used to fight disease. In this case, opposites attract. When a study asked women to smell T-shirts that had been worn by different men, they preferred the odors of those whose MHC molecules differed from theirs. This makes sense. Genes that result in a greater variety of immunities may give offspring a major survival advantage. Our ears also determine attraction. Men prefer females with high-pitched, breathy voices, and wide formant spacing, correlated with smaller body size. While women prefer low-pitched voices with a narrow formant spacing that suggest a larger body size. And not surprisingly, touch turns out to be crucial for romance. In this experiment, not realizing the study had begun, participants were asked to briefly hold the coffee, either hot or iced. Later, the participants read a story about a hypothetical person, and were asked to rate their personality. Those who had held the hot cup of coffee perceived the person in the story as happier, more social, more generous and better-natured than those who had held the cup of iced coffee, who rated the person as cold, stoic, and unaffectionate. If a potential mate has managed to pass all these tests, there's still one more: the infamous first kiss, a rich and complex exchange of tactile and chemical cues, such as the smell of one's breath, and the taste of their mouth. This magical moment is so critical that a majority of men and women have reported losing their attraction to someone after a bad first kiss. Once attraction is confirmed, your bloodstream is flooded with norepinephrine, activating your fight or flight system. Your heart beats faster, your pupils dilate, and your body releases glucose for additional energy, not because you're in danger but because your body is telling you that something important is happening. To help you focus, norepinephrine creates a sort of tunnel vision, blocking out surrounding distractions, possibly even warping your sense of time, and enhancing your memory. This might explain why people never forget their first kiss. The idea of so much of our attraction being influenced by chemicals and evolutionary biology may seem cold and scientific rather than romantic, but the next time you see someone you like, try to appreciate how your entire body is playing matchmaker to decide if that beautiful stranger is right for you.

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翻译人员: Huiling Jiang 校对人员: Sherry Chen我们倾向于将浪漫当成是一种来自于内心内心，自发而又而难以言述的行为但是实际上是你的大脑，在瞬间做出的一系列复杂运算决定了一个人对你的吸引力听起来一点也没有诗意对吧？然而，虽然所有的运算都是由大脑完成的那些温暖而朦胧的感觉并不仅仅存在于脑海中实际上，你的五种感觉都参与其中各自趋同或者否决了正在萌芽中的吸引力眼睛是吸引力的第一个裁判不同的文化和时代，对视觉美的标准都有所不同而作为年轻、活力、健康的标志，比如富有光泽的长发或者光滑无疤的皮肤永远很受欢迎因为它们也代表着良好的繁殖能力当眼睛注意到他们喜爱的事物，我们的本能让我们越靠越近这时其他的感觉也参与其中鼻子对于浪漫的贡献绝不仅仅是分辨香水或古龙水它能够辨别一种被称作“费洛蒙“的天然的化学信号它们不仅传递着气味发出者重要的生理或基因信息而且能够激发接收者的心理或行为上的反应在一个研究中，一组处于不同月经周期的女性连续三个晚上穿着同样的T恤之后，男性志愿者被随机抽取去闻一件穿过的T恤，或者一件新的没穿过的唾液样本显示那些闻过排卵期女性穿过的T恤的男性睾丸素分泌有明显的增加睾丸素分泌的增加可能会促使这个男人去追求这个平时他可能就会忽略的女性女性的鼻子对一种名为MHC分子的化学物质尤为敏感这种物质是用来对抗疾病的因此，异性相吸另一个研究要求女性来闻不同男性穿过的T恤她们更倾向于和她们自己的MHC分子不同的气味这是说得通的基因造成的免疫力的巨大差异可能会给后代以重要的生存优势我们的耳朵同样决定着吸引力男人更喜欢女性拥有音调较高、带有呼吸声、共振间隔较长的声音因为它让人联想到小巧玲珑而女性则更喜欢音调低沉、共振间隔较短的男性声音因为它让人联想到高大威猛意料之中触觉对浪漫有着决定性的作用在一个实验中被告知实验开始前参与者被要求短暂地拿着一杯咖啡或者是热的，或者是冷的然后，参与者被要求阅读一个假想的人的故事并且评价他的个性拿着热咖啡的人认为故事里的人快乐、具有社会性、慷慨、天性善良而拿了冷咖啡的人则认为这个人冷酷、恬淡无欲、没有感情即便一个潜在的伴侣已经成功通过以上所有的测试这里还有最后一关初吻初吻是一次内涵丰富而寓意复杂的触觉和化学信息的交换比如口气和嘴唇的触感这个神奇的时刻如此关键以至于大部分的男性和女性均表示曾因为一个糟糕的初吻而丧失了对对方的吸引力一旦吸引力被确认你的血液和肾上腺素一起沸腾激发你的“战斗或逃跑”系统你的心跳加速你的瞳孔扩大你的身体也释放出葡萄糖来提供更多的能量这不是因为你面临着危险而是你的身体在告诉你这件事十分重要为了帮助你专心肾上腺素创造出一种管状视力防止注意力涣散甚至有可能弯曲你的时间观念并提升记忆力这也许能够解释为什么人们对初吻念念不忘我们的大部分吸引力被化学和进化生物学深深影响这个观点也许看上去冷酷又理性，一点也不浪漫但是下次你见到一个喜欢的人的时候试试让你的整个身体都参与配对过程来决定这个美丽的陌生人是否是那个对的人

**P81 2014-05-06 What is the world wide web - Twila Camp**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=81)

The World Wide Web, where you're likely watching this video, is used by millions of people every day for everything from checking the weather, ordering food, and chatting with friends to raising funds, sharing news, or starting revolutions. We use it from our computers, our phones, even our cars. It's just there, all around us, all the time. But what is it exactly? Well first of all, the World Wide Web is not the Internet, even though the terms are often used interchangeably. The Internet is simply the way computers connect to each other in order to share information. When the Internet first emerged, computers actually made direct calls to each other. Today, networks are all around us, so computers can communicate seamlessly. The communication enabled through the Internet has many uses, such as email, file transfer, and conferencing. But the most common use is accessing the World Wide Web. Think of the Web as a bunch of skyscrapers, each representing a web server, a computer always connected to the Internet, specifically designed to store information and share it. When someone starts a website, they are renting a room in this skyscraper, filling it with information and linking that information together in an organized way for others to access. The people who own these skyscrapers and rent space in them are called web hosts, but anyone can set up a web server with the right equipment a bit of know-how. There's another part to having a website, without which we would be lost in the city with no way of finding what we need. This is the website address, which consists of domain names. Just like with a real life address, a website address lets you get where you want to go. The information stored in the websites is in web languages, such as HTML and JavaScript. When we find the website we're looking for, our web browser is able to take all the code on the site and turn it into words, graphics, and videos. We don't need to know any special computer languages because the web browser creates a graphic interface for us. So, in a lot of ways, the World Wide Web is a big virtual city where we communicate with each other in web languages, with browsers acting as our translators. And just like no one owns a city, no one owns the Web; it belongs to all of us. Anyone can move in and set up shop. We might have to pay an Internet service provider to gain access, a hosting company to rent web space, or a registrar to reserve our web address. Like utility companies in a city, these companies provide crucial services, but in the end, not even they own the Web. But what really makes the Web so special lies in its very name. Prior to the Web, we used to consume most information in a linear fashion. In a book or newspaper article, each sentence was read from beginning to end, page by page, in a straight line until you reached the end. But that isn't how our brains actually work. Each of our thoughts is linked to other thoughts, memories, and emotions in a loose interconnected network, like a web. Tim Berners-Lee, the father of the World Wide Web, understood that we needed a way to organize information that mirrored this natural arrangement. And the Web accomplishes this through hyperlinks. By linking several pages within a website or even redirecting you to other websites to expand on information or ideas immediately as you encounter them, hyperlinks allow the Web to operate along the same lines as our thought patterns. The Web is so much a part of our lives because in content and structure, it reflects both the wider society and our individual minds. And it connects those minds across all boundaries, not only enthnicity, gender, and age but even time and space.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=81)

翻译人员: Keke Gu 校对人员: Xiaoou Chen万维网，你可能正用它来观看此视频，每天有数百万的人们使用它来做任何事。从查看天气，订购食品，和朋友聊天，到筹集基金，分享信息，或者开始革命。我们通过我们的电脑，手机，甚至汽车来使用它。它就这么简单的存在着，时刻围绕我们。可它究竟是什么呢？首先，万维网不是互联网，尽管这两个名称时常被互换使用。互联网就由多个计算机网络相互连接而成一个大型网络，用来分享信息。在互联网诞生初期，计算机实际上是直接互相通话的。而如今，网络无所不在，所以计算机也可以沟通无碍了。由互联网支撑的这个沟通有很多的用处，比如发邮件，传文件和开展会议。但最常见的用途就是来访问万维网。请把网络想象成一堆的高楼大厦，每一个大厦代表一个网络服务器，一部计算机总是连接到互联网上，专门设计用来存储和分享信息。当某人建造一个网站时，他们就相当于在这个大厦里租了个房间，来储存信息并井然有序地链接信息来方便他人的访问。那些拥有高楼大厦和出租其空间的人，被称为虚拟主机，但人人都可以创建网络服务器只要有适当的设备和一点窍门。拥有一个网站还需要另一部分，没有它，我们就会在城市中迷路而无法找到我们需要的东西。那就是网址，它由域名组成。就好像一个真实的地址，一个网址可以带你去想去的地方。在网站上的信息是用网络语言来储存的。比如HTML（注：超文本标记语言）和JavaScript。当我们找到目标网站时，我们的网络浏览器能够收集网站上的所有代码将它们译成文字，图像和视频。我们不需要知道任何特别的计算机语言因为网络浏览器能为我们建立一个图形界面。所以说，从很多方面来说，万维网就是一个虚拟大城市，我们可以在其中，用网络语言互相交流，借助浏览器来做我们的翻译。就像没人拥有一个城市一样，也没人拥有网络它属于我们大家。任何人都可以搬进来和开商店。我们可能需要支付一个网络服务供应商来获取通路，通过网页寄存公司来租用网络空间，或者让域名注册商来保留我们的网址。像在城市里的能源公司，这些公司提供关键服务，但最终，他们也并不拥有网络。真正让网络如此特别的就在于它的名字。在网络出现之前，我们获取信息的方式是线型的。在书本或者报纸文章上，从头到尾读遍每一句话，一页又一页，直线进行直到读完。但我们的大脑其实不是这样运行的。我们的每一个想法都与其他想法，记忆，和情绪连接在一起构成一个疏松的互联的网状物，就像网络一样。蒂姆·伯纳斯-李，万维网的发明者，明白我们需要一种方式来组织信息这个方式要对应这个自然的布局。而网络就是运用超链接来实现这个的。通过链接网站上的一些页面或者甚至将你重定位到其它网站来迅速扩展信息和想法当你和它们相遇的时候，超链接使网络能够像我们的思维模式一样运作。网络在我们的生命中是多么重要的一部分因为它的内容和结构同时反映了更广泛的社会和我们个人的头脑。将这些头脑联络起来，穿越所有边界，不仅是种族，性别，年龄甚至是时间和空间。

**P82 2014-05-12 The cancer gene we all have - Michael Windelspecht**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=82)

Cancer is like a car crash. Your body typically regulates the speed at which your cells divide, but sometimes, cancer cuts the brake lines, and your cells divide too quickly, accumulating mutations that cause them to veer away from their original function, form dangerous tumors, and land you in the hospital. Cancer is basically an inability of the body to control the speed at which cells divide. When cells divide too quickly, they can often accumulate mutations that cause them to ignore their original function in the body, forming tumors. In turn, these tumors may interfere with the natural processes of the body, such as digestion and respiration, potentially leading to death. Typically, your body has a number of genetic mechanisms to control how fast your cells divide. One of these genes is BRCA1, which stands for breast cancer susceptibility gene 1. BRCA1 belongs to a class of genes called tumor suppressor genes. Tumor suppressor genes are involved in regulating how fast a cell divides. Normally, cell division follows an orderly process called the cell cycle, which is basically the life cycle of a cell. Within the cell cycle is a series of checkpoints, where proteins, such as the one produced by BRCA1, regulate how fast the cell may proceed. How does it do this? BRCA1 helps repair some forms of mutation in your DNA. If your DNA is damaged, BRCA1 keeps the cell from dividing until the mutation is repaired. You have two copies of the BRCA1 gene in every cell of your body. One copy you inherited from Mom, the other from Dad. This redundancy is a good a thing because you only need one functioning BRCA1 gene in a cell to regulate the cell cycle. But it's important to note that while these copies have a similar function they're not necessarily the same. In fact, there are hundreds of variations, or alleles, of BRCA1. Some regulate the cell cycle more effectively than others. In other words, some people are born with better regulating and repair mechanisms than others. And in some cases, mutations may render BRCA1 ineffective. When this happens, cells with damaged DNA are allowed to divide. As they divide, these cells may accumulate additional mutations. These mutations may cause the cell to become less specialized and stop performing its original function in the tissue. If this occurs, then there's a greater chance they'll develop into cancer cells. While we all have the gene, such as BRCA1, that can cause cancer, it's only when these genes fail at their function that problems develop. Having an ineffective or mutated version of BRCA1 can increase your susceptibility to cancer, much like driving with bad brakes increases the risk of an accident.

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翻译人员: Alex Wang 校对人员: Peipei Xiang癌症就像一场车祸。通常，你的身体调节着细胞分裂的速度，但有时，癌症切断了刹车油管，使你的细胞分裂速度过快，积累的变异使细胞偏离了它们原本的功能，而形成危险的肿瘤，并把你送进了医院。从根本上来说，癌症是身体缺乏调节细胞分裂速度能力的体现。细胞分裂过快就会积累变异，从而导致细胞忽视它们在体内原本的功能，形成肿瘤。接下来，这些肿瘤可能会干扰身体的自然活动，比如消化和呼吸，并可能导致死亡。通常来说，你的身体有一些控制细胞分裂速度的遗传机制。其中一个叫做BRCA1，就是”乳腺癌1号基因”。乳腺癌1号基因是属于肿瘤抑制基因的一种。肿瘤抑制基因参与控制细胞分裂速度。一般来说，细胞分裂遵循一个叫做“细胞周期”的有序的进程，也就是一个细胞的生命周期。在细胞周期内有一系列的检验点，是诸如由乳腺癌1号基因制造的蛋白质调节细胞分裂速度的地方。它是如何做到这些的呢？乳腺癌1号基因可以修复你的遗传物质中的某些变异。如果你的遗传物质遭到损坏，乳腺癌1号基因可以使细胞停止分裂直到变异被修复。在你身体的每个细胞内，乳腺癌1号基因有两个副本。一个从妈妈那里遗传得来，另一个从爸爸那里得来。这种“多余”其实是件好事，因为你虽然只需要一个乳腺癌1号基因工作就能控制细胞周期，但有一点很重要：尽管这两个副本有着类似的功能，但它们并不是完全一模一样。事实上，它们之间有成百种差异，或者说，有成百种乳腺癌1号基因的等位基因。它们中的某些在调节细胞周期上比其他要更高效。换句话来说，一些人生来就有比别人更好的调节与修复机制。在某些情况下，变异可能导致乳腺癌1号基因失效。当这种情况发生，带有被损坏遗传物质的细胞会不受控制，继续分裂。随着它们的分裂，这些细胞可能积累诱发更多变异。这些变异可能导致细胞失去功能，停止它们在人体组织内的正常工作。如果这种情况发生，它们就会有很大的几率演变成癌症细胞。我们每个人身体里都有诸如乳腺癌1号基因 这类可能导致癌症的基因存在，但癌症只会发生在这些基因失效时。带有失效或是变异的乳腺癌1号基因会增加你患癌症的风险，就像开一辆刹车坏掉的车子更容易发生事故一样。

**P83 2014-05-13 From Aaliyah to Jay-Z - Captured moments in hip-hop history - Jonatha**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=83)

This is The Notorious B.I.G., 1995, the Palladium nightclub, New York City. What really I want to talk about is my dedication, my 100% focus, and finding something that I love, my passion point. I fought to be on this stage, to be able to stand next to Lil' Kim and take all these pictures to create one definitive photo. A photo that was the most important of anything that I took. And I really wanted it for future generations to be able to feel the energy that was in that room, and certaintly you can feel that right there. I'm a photographer, this is what I do for a living. I chase these moments, these fractions of seconds, that will never be the same again. You can't take this picture again because I took it, and he's no longer with us, sadly, rest in peace. The definitive portrait of that person, in that moment, is what I strive for every single time out, like when you close your eyes and think of a picture of Jay-Z, I want it to be my picture. So far, so good. Eight album covers for Jay-Z later, I'm not doing too bad. Aaliyah. Gorgeous and amazing, and I really spent proper time with her, conversing, having a conversation, connecting to her, which I find is a big part of my work. That connection, to be able to have a conversation, to say you're doing great, to say why I want a certain picture and a certain attitude. In this moment, we talked about shooting in the Caribbean, and it's sort of a passion point for me, Caribbean culture, Trinidad, Barbados, Jamaica, and I said, "We should do a photo shoot there because I think it would be incredible." And she said, "Yeah, you know, let's do it." You know, as we're taking these beautiful pictures, all this is happening, I'm continuing to converse with her and really connect. So, she believed in my vision at that moment, you know, even while all the work was happening there was a human connection that happened. At the end of the day, I have people sign Polaroids just as kind of a diary for myself. And she wrote, "I can't wait for the Caribbean. I'll see you then." (Exhales) You've got to take a breath. You've got to take a breath. She's missed incredibly. And I think what the reminder is that these moments are really precious, and you really have to take the time to connect to them, to be part of that process, to make a difference in people's lives in that moment. You never know how you're affected by somebody, clearly I am, you can see it, but you never know how you affect that person, how you make that moment a little more important for them. This is my good friend Drake. I had the opportunity to work with him for the FADER magazine. He is a beast and one of my favorites. He's my friend. I shot him for three different days, two in New York, and he had just signed his record deal. He said, "What's most important to me is going home to Toronto to celebrate with my family." So, we went home. We flew home. And he said, "I've got to do a pit stop. I've got to go see my grandmother in the afternoon, and so you probably don't want to bother with that." I said, "It would be an honor to meet your grandmother." I asked for what I wanted. I asked for access that nobody else had because this is what makes a photographer sort of greater, to have a picture that somebody else doesn't have. We want these unique moments. I asked for these moments, right? And I'm reminded of a story. He said, "Grandma, I just got millions of dollars. I just signed a record deal. I've got millions of dollars from Cash Money Universal and Young Money." And she said, "A million dollars?" He said, "No Grandma, millions of dollars. What do you want?" And she said, "I want a kiss, and I want a hug." Again, the reminder of, like, why we do this. It also revealed for me another layer of Drake as a character, and how important this guy is, you know, his message. He's not just about the limelight and self-serving. He's connected to these moments as much as I was connected to this moment as a photographer. I know everybody does this everyday, they ask DMX to get in a pool of blood. This was my challenge this day. I needed to get him to see my vision. I was very clear in what I wanted for "Flesh of My Flesh, Blood of My Blood," which was his album cover. You know, I envisioned photographs of him in this pool of blood, just making these things happen, you know? And what was difficult was he didn't see it the same way I saw it, right? He walked in, and he had these pants on. Brand new pants. Everybody feels fresh when they have brand new pants on, right? He said, "I'm not getting in that pool of blood." I said, "Oh yes, you're going to get in that pool of blood." You know? And he said, "No, my dogs, I'm not getting in that pool of blood." And I said, "My dude, you're going to get in that pool of blood." And in a bold statement, using all the psychology knowledge that I had from my schooling at Kenyon College, I dropped my pants in front of 40 people on a set that all were, like, stunned. DMX laughed. He said, "Alright, my dude, put your pants back on, and I'll get in the blood." One of the most epic photos that we've ever created in this hip-hop movement. I'm on home soil. I'm in New Orleans. We've got to give love to Lil Wayne. Lil Wayne is an incredible MC, and the biggest point that I want to drive home here is about the opportunity to create somebody's legacy with them, to take pictures, to see them grow. It was about trust in the moment and understanding that you could make a difference, have a communication, see somebody elevate and move forward, to take a variety of different pictures, you know? Him in a spacesuit. He's a Martian, you know, what can I say, you know? But it was about seeing his growth, and having an important role and communication with this guy in the moment. DJ Quick once said, "Isn't it incredible how you make people see your vision in hip-hop? The way that people look at hip-hop is through your eyes." I'm really, really proud of what I've created, what I've done, and passionately working to make quality work constantly. It's not about taking a photo. For me, it's about giving a photo to people that believe in it so much. Thank you.

**P83 2014-05-13 From Aaliyah to Jay-Z - Captured moments in hip-hop history - Jonatha**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=83)

翻译人员: Jingfan Zhang 校对人员: Jenny Yang这是饶舌歌手克里斯托弗·华莱士1995年在纽约的一家夜店的场景。我真正想探讨的是我的专注奉献，我百分百的精力，以及找到我热爱的事业我的激情．我竭尽全力争取登上舞台，从而能够站到莉儿金身边，拍摄了所有这些照片并捕捉到了最关键的一刻这是一张珍贵的照片，比任何我照的照片都要重要．我真正想给未来的一代人们留下的是能够感受到现场的那种能量，当然要在此时此地感受到．我是一个摄影师，这是我的职业．我抓拍镜时刻，这些时间时刻是不会再变得与原来一样了你不能再拍这张照片了因为我拍下了它，而他也已经去世了，愿他安息．该人物的在那个瞬间的明确写照是我努力追求的每一个定格像是你每次闭上你的眼睛想象一张杰斯的照片．我想让那张照片是我拍下的．到目前为止一直还不错．八张杰斯的专辑封面，我做的都不错．美丽迷人的阿利亚和我共度了一段时光我们交谈，交流心中的想法，这都是我工作的很大一部分。那种联系，交谈感受，告诉她你很棒，告诉她为什么我想要一组特别的照片和特别的态度在其中。当时我们谈及了加勒比海的枪击案，而这件事激起了我的热情。加勒比海文化，特立尼达，巴巴多斯，牙买加等等。然后我说：“我们应该在那拍一组照片，一定会很棒的！”“好，就这么做！”她说。在我们拍这些照片的同时，拍摄的过程中，我还和她一直在交流。所以说那一刻她相信我的眼光。就算是在拍摄的时候，我们之间的联系交流都不曾中断。当天结束的时候，我让大家在胶片上签名，像是我自己的一个日记。而阿利亚写道“我都等不及一起到加勒比海了，到时候见！”（喘气）大家都要喘口气。她深深地被怀念。而我觉得这提醒了大家这些时刻的珍贵，而我们也需要去和她们交流，成为这个过程的一部分在那一刻对他人的生活做出改变。你永远不会知道你会如何被他人影响，我很明显被他人影响了，你能看出来，但是你不知道你会怎样影响那个人怎样让那一时刻对他们更加重要。这是我的好朋友德雷克，我有过和他合作的机会，是给FADER杂志的拍摄。他是一头野兽，也是我最喜欢的之一。他是我的朋友。我给他拍了三次照片，两次是在纽约，他刚刚签下了他的唱片合同，他说：“对我来说最重要的是回到多伦多和我家人一起庆祝。”所以说我们回到了他家，然后他说：“我中途需要停一下，下午我要去看我的奶奶，所以你大概不想被这种事打扰。”我说：“见你的奶奶是我的荣幸。“我要求了我想要的。我要到了这种接近程度任何人没有过的，因为这让一个摄影师更加出色去拍到其他人没有的照片。我们想要这些独一无二的时刻，我请求了这种时刻，对吧？我想到了这个故事他说：”奶奶，我刚刚赚了上百万的钱，我刚刚签下了一份唱片合同，我赚了上百万，从Young Money唱片公司。“她说：”一百万美元么？“他回答：”不，是上百万！你想要什么吗？“然后她说：”我想要一个吻，和一个拥抱。“这再一次的提醒我们为什么这么做。这也为我揭示了德雷克的另一面，告诉我他的重要性，他传达的信息，告诉我们他不只是他人关注的焦点和自私自利的人。他与这些时刻的联系和我作为摄影师与这些时刻的联系时一样的。我知道现在所有人都做这件事，他们都让DMX走进一游泳池的血里。这可是我的挑战。我需要让他看到我的远见。我当时特别明确我想要什么。”我的肉体，我的鲜血“这是他的专辑封面。我预想了他在这一池子血中的照片，就是想让这件事发生，懂么？但是他不能看到我的远见，不是么？他走进来的时候穿着全新的裤子，因为所有人都感觉到鲜活当穿上新裤子的时候，对吧？DMX说：”我不会进那一池子血里的。“我说：“哦，你要进去。”但他说“不可能，我不会进去的。”然后我坚持：“兄弟，你要进那一池子血里。”为了坚持的声明我的观点，利用我在肯尼恩学院学到的所有心理学知识，我在片场40人面前脱下了我的裤子，所有人都震惊了。DMX笑了，说：“好吧兄弟，把你裤子穿上，我会进那堆血里面。”这是在嘻哈运动里我们创造的最传奇性的照片之一。我在故乡，新奥尔良的时候，我们要向李尔·韦恩传递爱。李尔·韦恩是一位伟大的MC，也是我最想回家的原因，找到这些机会，去创造这些人的传奇为他们拍照，看他们成长，在那一刻是关于信任的，还有了解你可以创造出不同，和他们交流，看他们提升，前进，都是通过拍这些不同的照片。这是他在宇航服里面。他是火星人，你懂么，我能说什么呢？但是这实际是在说他的成长，在这一刻成为关键的角色，以及和他的沟通。DJ Quick 曾经说过：“这难道不是很棒么，让他人在嘻哈音乐中看到你的远见，视野？人们通过你的眼睛观察嘻哈音乐？“我真的特别骄傲，对我的作品，热情的工作，经常创作出高质量的作品。这不仅是拍摄了，对我来说，这是将照片传递给相信它的人。谢谢。

**P84 2014-05-15 How the heart actually pumps blood - Edmond Hui**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=84)

For most of history, humans had no idea what purpose the heart served. In fact, the organ so confused Leonardo da Vinci, that he gave up studying it. Although everyone could feel their own heart beating, it wasn't always clear what each thump was achieving. Now we know that the heart pumps blood. But that fact wasn't always obvious, because if a heart was exposed or taken out, the body would perish quickly. It's also impossible to see through the blood vessels, and even if that were possible, the blood itself is opaque, making it difficult to see the heart valves working. Even in the 21st century, only a few people in surgery teams have actually seen a working heart. Internet searches for heart function, point to crude models, diagrams or animations that don't really show how it works. It's as if there has been a centuries old conspiracy amongst teachers and students to accept that heart function cannot be demonstrated. Meaning that the next best thing is simply to cut it open and label the parts. That way students might not fully grasp the way it works, but can superficially understand it, learning such concepts as the heart is a four-chambered organ, or potentially misleading statements like, mammals have a dual-circulation: one with blood going to the lungs and back, and another to the body and back. In reality, mammals have a figure-eight circulation. Blood goes from one heart pump to the lungs, back to the second heart pump, which sends it to the body, and then back to the first pump. That's an important difference because it marks two completely different morphologies. This confusion makes many students wary of the heart in biology lessons, thinking it signals an intimidating subject full of complicated names and diagrams. Only those who end up studying medicine compeltely understand how it all actually works. That's when its functions become apparent as medics get to observe the motion of the heart's valves. So, let's imagine you're a medic for a day. What you'll need to get started is a whole fresh heart, like one from a sheep or pig. Immerse this heart in water and you'll see that it doesn't pump when squeezed by hand. That's because water doesn't enter the heart cleanly enough for the pumping mechanism to work. We can solve this problem in an extraordinarly simple way. Simply identify the two atria and cut them off, trimming them down to the tops of the ventricles. This makes the heart look less complicated because the atria have several incoming veins attached. So without them there, the only vessels remaining are the two major heart arteries: the aorta and pulmonary artery, which rise like white columns from between the ventricles. It looks -- and really is -- very simple. If you run water into the right ventricle from a tap (the left also works, but less spectacularly), you'll see that the ventricular valve tries to close against the incoming stream. And then ventricle inflates with water. Squeeze the ventricle and a stream of water squirts out of the pulmonary artery. The ventricular valves, called the tricuspid in the right ventricle and the mitral in the left, can be seen through the clear water opening and closing like parachutes as the ventricle is rhythmically squeezed. This flow of water mimics the flow of blood in life. The valves are completely efficient. You'll notice they don't leak at all when the ventricles are squeezed. Over time, they also close against each other with very little wear and tear, which explains how this mechanism continues to work seamlessly for more than 2 billion beats a heart gives in its lifetime. Now, anyone studying the heart can hold one in their hands, make it pump for real and watch the action unfold. So place your hand above your own and feel its rhymic beat. Understanding how this dependable inner pump works gives new resonance to the feeling you get when you run a race, drink too much caffeine or catch the eye of the one you love.

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翻译人员: Sunny Wang 校对人员: Jessica Chen长期以来心脏的功能一直不为人所知实际上，这个器官也让达·芬奇十分困惑让他不得不放弃对它的研究尽管每个人都能感觉到自己心脏的跳动但对每次跳动起到的作用却并不清楚现在，我们已经知道了心脏的功能是泵血但这在以前却不那么显而易见因为如果把心脏从体内取出来身体也很快会死去而且想看清血管里面的情况也不现实即使看到了血液本身不透明很难观察心脏瓣膜的运作即使在21世纪只有手术人员才能看到工作中的心脏如果上网搜一下心脏如何工作搜到的是粗略模型、图解即使是动画，都不能准确地描述心脏工作的过程似乎长久以来学生和老师们都默认了心脏的工作过程是无法模拟的这意味着只能退而求其次把心脏切开，注明各部分名称这种方法虽然不能帮助学生完全明白心脏的工作过程但起码表面上能理解而且学到一些知识，比如：心脏有四个腔以及一些本身就错误的论断，如：哺乳动物有双循环一个负责把血液输送到肺然后再流回心脏；另外一个把血液输送到全身然后再流回心脏。但实际上，哺乳动物的血液循环呈“8”字形血液先通过心脏中的第一个泵挤压被输送到肺部回到第二个泵再次挤压被输送到身体各部然后再回到第一个泵上述两次血液被挤压的循环方式有很大差别因为这代表着两种不同的生理结构许多学生对此感到困惑在生物课上学习心脏方面的知识也感到很吃力认为这个是个高深的领域名词难记，图解复杂只有那些最终学习了医学的学生才完全弄懂了心脏是如何工作的为了弄清心脏的功能医学学生观察了心脏瓣膜的运动现在，设想一下你是一名医学学生首先，拿一个新鲜完整的心脏可以是羊的心脏，也可以是猪的心脏把心脏完全浸入水中你会发现即使用手捏它也不会泵水那是因为进入心脏的水还不够导致心脏无法泵水我们可以用一个很简单的办法来解决这个问题那就是找到两个心房并整个切除一直切到心室上部这样，心脏看起来就不完整了因为心房上连接着数条静脉所以没了心房，剩下的就只有两个主要的心脏动脉了：主动脉和肺动脉像两个心室间一根上升的圆锥这样看起来的确简单多了如果用水管给右心室注水（用左心室也可以，只是不那么直观）你会看到心室瓣膜在水注进来时会闭合之后整个心室都灌满了水捏右心室，就会看到一股水流从肺动脉涌出心室瓣膜有左右之分，右心室的称为三尖瓣左心室的称为两尖瓣在注水时可以看到它们像降落伞一样打开、闭合但要同时有节奏地捏心室这种水流的循环模拟了生命体中的血液循环心脏瓣膜起到了至关重要的作用你会发现当捏心室时，并不会有水漏出来慢慢，它们会自己闭合这过程几乎不会受损这就解释了为什么心脏能夜以继日地高效工作在人的一生中，能跳动达20亿次之多现在，可以的话找一个心脏让它跳动观察整个过程然后把手放在你自己的心脏上感受一下这种有韵律的跳动弄懂了这个牢靠的内在的泵的工作原理之后你就能明白当你跑步时摄入了太多咖啡因时或者看见你爱的人是怎样的感觉

**P85 2014-05-21 The fundamentals of space-time - Part 3 - Andrew Pontzen and Tom Whyn**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=85)

Gravity. It controls the universe. Everything attracts everything else. Ouch! Including you. Ow! In this final lesson, we'll explore what gravity means for space-time, or rather what space-time means for gravity. Until now, we've been dealing with things moving at constant speeds, with straight world lines in space-time. But once you add gravity, if you measure a speed at one moment, then again a bit later, the speed may have changed. In other words, as I discovered, gravity causes acceleration, so we need the world line to look different from one moment to the next. As we saw in the last lesson, the correct way to tilt an object's world line is using a Lorentz transformation: Einstein's stretch and squash trick. So, to map out what gravity is doing to Tom's motion, we need to create a whole load of little patches of space-time, each transformed by different amounts. So that my world line is at a different angle in each one. And then, we're ready to stitch everything together. We assemble a cozy quilt of space-time where world lines look curved. Where the world lines join, the objects collide. By making these connections between the patches, a curvature gets built into space-time itself. But Einstein's true genius was to describe precisely how each patch is stretched and squashed according to nearby mass and energy. The mere presence of stuff curves the space-time, and curving space-time moves the stuff around. This is gravity, according to Einstein. Previously, Isaac Newton had explained gravity using the ideas of force and acceleration, without any wibbily wobbly space-time, and that did pretty well. But Einstein's theory does just slightly better at predicting, for example, the orbit of Mercury around the Sun, or the way that light rays are deflected by massive objects. More importantly, Einstein's theory predicts things that simply don't exist in older theories where space, time and gravity were separate. The stitching can leave wrinkles in the space-time material. These are called gravitational waves, which should be detectable as tiny, repetitive, subtle squashes and stretches in space. So we're building experiments to check if they are there. In the meantime, indirect evidence, most recently in the polarization patterns of light left over from the Big Bang, strongly suggest that they are. But despite Einstein's successes, when too much stuff gets concentrated in too small a space, like in a black hole, the curvature of space-time becomes so large, that his equations collapse. We need a new picture of space-time that incorporates quantum mechanics to unlock the secret at the heart of black holes. Which means there's plenty more to be discovered about space, time, and space-time in the future.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=85)

翻译人员: Qingqing Mao 校对人员: Xiaoou Chen引力，它控制着宇宙万物互相吸引。哎哟！包括你哎哟！在这最后一课里我们将探寻引力对于时空意味着什么更准确地说，是时空对于引力意味着什么目前为止，我们已经处理过了匀速运动的物体它们的世界线是直线然而一旦你加入引力如果你在某一刻测量某物体的速度稍后再次测量速度可能会有所变化换句话说，我发现引力造成加速因此从某一刻至下一刻世界线需要看起来有所变化如我们上一节课所见倾斜一个物体的世界线的正确方法是使用洛伦兹变换：爱因斯坦的拉伸和压缩戏法。为了弄清引力如何影响汤姆的运动我们需要制造一大堆小片的时空补丁对每一小片补丁做不同程度的变换使得我的世界线在每一小片里都有不同的角度随后，我们就可以把所有的小片补丁缝到一起我们组成了一条舒适的时空被子其中的世界线看起来是弯曲的当世界线相交时，物体发生了碰撞随着我们将这些补丁连接起来时空本身产生了弯曲但是爱因斯坦真正天才的地方在于他精确描述了每块补丁是如何根据其附近的质量和能量而拉伸和压缩的物体的存在就能弯曲时空而弯曲的时空又会移动物体爱因斯坦认为，这就是引力早先，艾萨克·牛顿使用力和加速度的概念来解释引力并不需要扭曲的时空解释的效果也不错但是爱因斯坦的理论在预测物理现象时更好一点点比如在预测水星绕太阳的轨道时或者光如何被大质量物体偏折更重要的是，爱因斯坦的理论预测出了在时间，空间，引力分离的旧理论中不存在的现象缝制的过程可以造成时空的褶皱这些褶皱被称为引力波这应该是可以探测到的它体现为空间里极小的、重复的、微妙的伸缩我们正在建造实验来验证其的存在与此同时，有间接证据强烈地暗示了它们的存在最近的一个间接证据是大爆炸余晖中的偏振模式虽然爱因斯坦的理论很成功然而当很多东西被集中到一个很小的空间里比如一个黑洞此时时空的曲率是如此之大以至于爱因斯坦的公式垮了我们需要一个加入了量子力学的新的时空理论这样才能解开黑洞中心的秘密这意味着在将来还有很多关于空间，时间，和时空的东西有待发现

**P86 2014-05-23 How languages evolve - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=86)

In the biblical story of the Tower of Babel, all of humanity once spoke a single language until they suddenly split into many groups unable to understand each other. We don't really know if such an original language ever existed, but we do know that the thousands of languages existing today can be traced back to a much smaller number. So how did we end up with so many? In the early days of human migration, the world was much less populated. Groups of people that shared a single language and culture often split into smaller tribes, going separate ways in search of fresh game and fertile land. As they migrated and settled in new places, they became isolated from one another and developed in different ways. Centuries of living in different conditions, eating different food and encountering different neighbors turned similar dialects with varied pronunciation and vocabulary into radically different languages, continuing to divide as populations grew and spread out further. Like genealogists, modern linguists try to map this process by tracing multiple languages back as far as they can to their common ancestor, or protolanguage. A group of all languages related in this way is called a language family, which can contain many branches and sub-families. So how do we determine whether languages are related in the first place? Similar sounding words don't tell us much. They could be false cognates or just directly borrowed terms rather than derived from a common root. Grammar and syntax are a more reliable guide, as well as basic vocabulary, such as pronouns, numbers or kinship terms, that's less likely to be borrowed. By systematically comparing these features and looking for regular patterns of sound changes and correspondences between languages, linguists can determine relationships, trace specific steps in their evolution and even reconstruct earlier languages with no written records. Linguistics can even reveal other important historical clues, such as determining the geographic origins and lifestyles of ancient peoples based on which of their words were native, and which were borrowed. There are two main problems linguists face when constructing these language family trees. One is that there is no clear way of deciding where the branches at the bottom should end, that is, which dialects should be considered separate languages or vice versa. Chinese is classified as a single language, but its dialects vary to the point of being mutually unintelligible, while speakers of Spanish and Portuguese can often understand each other. Languages actually spoken by living people do not exist in neatly divided categories, but tend to transition gradually, crossing borders and classifications. Often the difference between languages and dialects is a matter of changing political and national considerations, rather than any linguistic features. This is why the answer to, "How many languages are there?" can be anywhere between 3,000 and 8,000, depending on who's counting. The other problem is that the farther we move back in time towards the top of the tree, the less evidence we have about the languages there. The current division of major language families represents the limit at which relationships can be established with reasonable certainty, meaning that languages of different families are presumed not to be related on any level. But this may change. While many proposals for higher level relationships -- or super families -- are speculative, some have been widely accepted and others are being considered, especially for native languages with small speaker populations that have not been extensively studied. We may never be able to determine how language came about, or whether all human languages did in fact have a common ancestor scattered through the babel of migration. But the next time you hear a foreign language, pay attention. It may not be as foreign as you think.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=86)

翻译人员: Xinrong Li 校对人员: Peipei Xiang在圣经故事巴别塔中，所有人类都讲同一种语言，直到他们突然分裂成多个相互之间都听不懂的族群。我们不知道是否曾经存在过 这么一种初始语言，但我们知道如今的成千上万种语言可以追溯到有限的几种。那么我们是如何最终形成这么多语言的呢？在早期人类迁徙的时候，地球上人烟稀少。拥有同一种语言文化的族群通常分裂为更小的部落，分头各自寻找野味和肥沃的土地。当他们迁移定居在新的地方后，相互之间变得疏远并以各自不同的方式发展。几个世纪的不同生活条件，不同食物，不同邻居，使原本相似而只是发音和词汇有所不同的方言变成了完全不同的语言，并随着人口的增长和迁移不断分化。系谱学家、现代语言学家等 试图重现这个过程，他们尽力追溯不同语言的共同的起源，也称为原始母语。以同一原始母语演化而来的 不同语言称为一个语系，它可能包括很多分支和子系。那么我们如何确定不同语言 在开始的时候是有关联的呢？相似的发音并不能说明什么。它们可能是被误解的同源词 或者只是外来语而不是源于同根。语法和句法有更可靠的指导意义，基本词汇也是，像代词、数字或亲属称谓，这些都不太可能是外来语。通过系统地比较这些特征，查找读音变化的常见形式和不同语言的对应关系，语言学家能们够确定它们之间的关系，追溯它们发展演变的详细过程，甚至重建 没有文字记录的早期语言。语言学家们甚至可以 发现其他重要的历史线索，比如确定地理起源 和古代人的生活方式，这是基于他们的语言 哪些是母语，哪些是外来语。语言学家们在重建这些语言系谱时主要面临两大问题。一个是没有清晰定义系谱树的枝干末端在哪里，也就是说，哪种方言应该被认为是 不同语言或只是方言。汉语被归类为一门语言，但它的不同方言之间 差别大到完全听不懂，然而讲西班牙语和葡萄牙语的人们通常可以听懂对方。正在被人类使用的语言不存在严格的种类划分，而是逐渐过渡，跨越界限和分类。通常语言和方言的不同之处在于多变的政治和国家格局，而不是语言学特征。这就是为什么“这个世界上究竟有多少种语言”的答案可能是3000-8000之间某个数，它取决于谁来数。另一个问题是我们沿着系谱树回溯越接近树的顶端，关于语言的证据就越少。现在对主要语系的划分，在合理的可能性内， 不同语言之间的关系仅限于这几种，就意味着不同语系的语言在任一层面上都没有交集。但这种情况可能会变。很多人推测存在更高层面的关系也就是超级语系，一些说法已经被广泛认同另一些还有争议，特别是对只有较少人使用的语言还没有全面研究。我们也许永远不会知道语言从何而来，也不知道人类语言是否真有共同的 原始母语并通过移民们散落于各处。不过当你下一次听到一门外语的时候， 留意一下。它也许并没有你想象的那么不同。

**P87 2014-05-30 How does your brain respond to pain - Karen D. Davis**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=87)

Translator: Jessica Ruby Reviewer: Caroline Cristal Let's say that it would take you ten minutes to solve this puzzle. How long would it take if you received constant electric shocks to your hands? Longer, right? Because the pain would distract you from the task. Well, maybe not; it depends on how you handle pain. Some people are distracted by pain. It takes them longer to complete a task, and they do it less well. Other people use tasks to distract themselves from pain, and those people actually do the task faster and better when they're in pain than when they're not. Some people can just send their mind wandering to distract themselves from pain. How can different people be subjected to the exact same painful stimulus and yet experience the pain so differently? And why does this matter? First of all, what is pain? Pain is an unpleasant sensory and emotional experience, associated with actual or potential tissue damage. Pain is something we experience, so it's best measured by what you say it is. Pain has an intensity; you can describe it on a scale from zero, no pain, to ten, the most pain imaginable. But pain also has a character, like sharp, dull, burning, or aching. What exactly creates these perceptions of pain? Well, when you get hurt, special tissue damage-sensing nerve cells, called nociceptors, fire and send signals to the spinal cord and then up to the brain. Processing work gets done by cells called neurons and glia. This is your Grey matter. And brain superhighways carry information as electrical impulses from one area to another. This is your white matter. The superhighway that carries pain information from the spinal cord to the brain is our sensing pathway that ends in the cortex, a part of the brain that decides what to do with the pain signal. Another system of interconnected brain cells called the salience network decides what to pay attention to. Since pain can have serious consequences, the pain signal immediately activates the salience network. Now, you're paying attention. The brain also responds to the pain and has to cope with these pain signals. So, motor pathways are activated to take your hand off a hot stove, for example. But modulation networks are also activated that deliver endorphins and enkephalins, chemicals released when you're in pain or during extreme exercise, creating the runner's high. These chemical systems help regulate and reduce pain. All these networks and pathways work together to create your pain experience, to prevent further tissue damage, and help you to cope with pain. This system is similar for everyone, but the sensitivity and efficacy of these brain circuits determines how much you feel and cope with pain. This is why some people have greater pain than others and why some develop chronic pain that does not respond to treatment, while others respond well. Variability in pain sensitivities is not so different than all kinds of variability in responses to other stimuli. Like how some people love roller coasters, but other people suffer from terrible motion sickness. Why does it matter that there is variability in our pain brain circuits? Well, there are many treatments for pain, targeting different systems. For mild pain, non-prescription medications can act on cells where the pain signals start. Other stronger pain medicines and anesthetics work by reducing the activity in pain-sensing circuits or boosting our coping system, or endorphins. Some people can cope with pain using methods that involve distraction, relaxation, meditation, yoga, or strategies that can be taught, like cognitive behavioral therapy. For some people who suffer from severe chronic pain, that is pain that doesn't go away months after their injury should have healed, none of the regular treatments work. Traditionally, medical science has been about testing treatments on large groups to determine what would help a majority of patients. But this has usually left out some who didn't benefit from the treatment or experienced side effects. Now, new treatments that directly stimulate or block certain pain-sensing attention or modulation networks are being developed, along with ways to tailor them to individual patients, using tools like magnetic resonance imaging to map brain pathways. Figuring out how your brain responds to pain is the key to finding the best treatment for you. That's true personalized medicine.

**P87 2014-05-30 How does your brain respond to pain - Karen D. Davis**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=87)

翻译人员: Becky Zhao 校对人员: Yiqun Liu假如你要用十分钟完成这个拼图。你会用多久完成它？如果你的手被电击了呢？会用更长的时间是不是？因为痛苦让你从工作中分神。其实，也许不是；这取决于你如何控制疼痛。疼痛使有些人分心，让他们花更长的时间去完成工作，并让他们做的没有那么好。另外有一些人通过工作忘记疼痛，并且他们在疼痛的时候，比没有疼痛的时候，工作得更快更好。一些人可以转换思维去转移疼痛。为什么不同的人在受到相同的疼痛刺激时却感受的疼痛程度不同？并且为什么这是有意义的呢？首先，什么是疼痛？疼痛是一个不愉悦的感知和情感经历，联系到实际的或潜在的肌肉损伤。疼痛是我们经历的东西，所以它最接近于你所感受到的。疼痛有强度；你可以把它用程度表示出来从零级没有疼痛，到十级最疼，不过疼痛是有特点的，比如尖锐的，缓慢的，灼烧的或心痛的。到底是什么产生了疼痛的感觉呢？其实，当你受伤时，特定的肌肉疼痛感知神经细胞，也叫伤害感受器，触动并发送信号到脊髓再传送到大脑。这个过程是由神经元与神经胶质完成的。这就是你的灰质。并且脑路携带信息就像电子脉冲一样从一个区域到另一个，这就是白质。这个携带疼痛信息从神经元到大脑的脑路是我们的感觉通道到皮质层结束，脑部的一部分决定如何处理疼痛信号。另外一个相互关联的脑细胞系统叫做巡航网络它决定了需要注意什么。因为疼痛可能会有严重的后果，疼痛信号立刻激发巡航网络。现在，你就会注意疼痛了。大脑也会回应疼痛并处理这些疼痛信号。因此，运动元神经被激发比如说，让你把手从火炉上移开。不过调整网络也被唤醒去传递安多芬和脑啡肽，在你疼痛的时候释放化学物质或在剧烈运动时，使运动员保持高水平。这些化学系统帮助调节并减轻疼痛。所有这些网络和通路互相作用使你产生疼痛的体验，减轻肌肉的伤害，并帮助你处理疼痛。每个人的系统都类似，不过大脑循环的敏感度和效率决定了你对疼痛的感受和如何处理疼痛。这就是为什么有些人觉得比别人疼为什么一些人有长期病痛却并没有因治疗好转，然而其他人却好了。疼痛感受的差异性没有比各种对刺激的不同反应更多。就像一些人酷爱过山车，其他人就觉得那种剧烈移动很难受。为什么我们疼痛的脑路差异那么重要呢？首先，对于不同的系统，有许多对疼痛的治疗手段。对于轻微的痛苦，非处方药可以作用于导致疼痛的细胞。其他强烈的疼痛药和麻醉剂可作用于减轻疼痛感知回路活动或者增强处理系统，或脑内啡。一些人可以用一些方法对付疼痛比如转移注意力，休息，冥想，瑜伽，或一些可以学到的策略，如认知行为治疗。对于一些遭受严重慢性疼痛的人，那种疼痛在痊愈几个月后都不会减轻，常规的治疗也都不起作用。一般来说，药物研究是测试大量人群的结果来判断它是否帮助了大部分的患者。不过确实有些人并没有从治疗中受益或有副作用。现在，新的治疗手段直接刺激或阻断特定的疼痛意识或调整网络已经被研究出来，它针对于特定的病人，使用像磁共振成像的工具来绘制脑路。研究大脑如何处理疼痛是找到最好治疗办法的关键。这才是真的私人治疗。

**P88 2014-06-02 The Silk Road - Connecting the ancient world through trade - Shannon**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=88)

A banker in London sends the latest stock info to his colleagues in Hong Kong in less than a second. With a single click, a customer in New York orders electronics made in Beijing, transported across the ocean within days by cargo plane or container ship. The speed and volume at which goods and information move across the world today is unprecedented in history. But global exchange itself is older than we think, reaching back over 2,000 years along a 5,000 mile stretch known as the Silk Road. The Silk Road wasn't actually a single road, but a network of multiple routes that gradually emerged over centuries, connecting to various settlements and to each other thread by thread. The first agricultural civilizations were isolated places in fertile river valleys, their travel impeded by surrounding geography and fear of the unknown. But as they grew, they found that the arid deserts and steps on their borders were inhabited, not by the demons of folklore, but nomadic tribes on horseback. The Scythians, who ranged from Hungary to Mongolia, had come in contact with the civilizations of Greece, Egypt, India and China. These encounters were often less than peaceful. But even through raids and warfare, as well as trade and protection of traveling merchants in exchange for tariffs, the nomads began to spread goods, ideas and technologies between cultures with no direct contact. One of the most important strands of this growing web was the Persian Royal Road, completed by Darius the First in the 5th century BCE. Stretching nearly 2,000 miles from the Tigris River to the Aegean Sea, its regular relay points allowed goods and messages to travel at nearly 1/10 the time it would take a single traveler. With Alexander the Great's conquest of Persia, and expansion into Central Asia through capturing cities like Samarkand, and establishing new ones like Alexandria Eschate, the network of Greek, Egyptian, Persian and Indian culture and trade extended farther east than ever before, laying the foundations for a bridge between China and the West. This was realized in the 2nd century BCE, when an ambassador named Zhang Qian, sent to negotiate with nomads in the West, returned to the Han Emperor with tales of sophisticated civilizations, prosperous trade and exotic goods beyond the western borders. Ambassadors and merchants were sent towards Persia and India to trade silk and jade for horses and cotton, along with armies to secure their passage. Eastern and western routes gradually linked together into an integrated system spanning Eurasia, enabling cultural and commercial exhange farther than ever before. Chinese goods made their way to Rome, causing an outflow of gold that led to a ban on silk, while Roman glassware was highly prized in China. Military expeditions in Central Asia also saw encounters between Chinese and Roman soldiers. Possibly even transmitting crossbow technology to the Western world. Demand for exotic and foreign goods and the profits they brought, kept the strands of the Silk Road in tact, even as the Roman Empire disintegrated and Chinese dynasties rose and fell. Even Mongolian hoards, known for pillage and plunder, actively protected the trade routes, rather than disrupting them. But along with commodities, these routes also enabled the movement of traditions, innovations, ideologies and languages. Originating in India, Buddhism migrated to China and Japan to become the dominant religion there. Islam spread from the Arabian Penninsula into South Asia, blending with native beliefs and leading to new faiths, like Sikhism. And gunpowder made its way from China to the Middle East forging the futures of the Ottoman, Safavid and Mughul Empires. In a way, the Silk Road's success led to its own demise as new maritime technologies, like the magnetic compass, found their way to Europe, making long land routes obsolete. Meanwhile, the collapse of Mongol rule was followed by China's withdrawal from international trade. But even though the old routes and networks did not last, they had changed the world forever and there was no going back. Europeans seeking new maritime routes to the riches they knew awaited in East Asia led to the Age of Exploration and expansion into Africa and the Americas. Today, global interconnectedness shapes our lives like never before. Canadian shoppers buy t-shirts made in Bangladesh, Japanese audiences watch British television shows, and Tunisians use American software to launch a revolution. The impact of globalization on culture and economy is indisputable. But whatever its benefits and drawbacks, it is far from a new phenomenon. And though the mountains, deserts and oceans that once separated us are now circumvented through super sonic vehicles, cross-continental communication cables, and signals beamed through space rather than caravans traveling for months, none of it would have been possible without the pioneering cultures whose efforts created the Silk Road: history's first world wide web.

**P88 2014-06-02 The Silk Road - Connecting the ancient world through trade - Shannon**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=88)

翻译人员: Zhiting Chen 校对人员: Geoff Chen一位伦敦商人把他最新的股票信息在不到一秒的时间内发送到了 他在香港的同事。美国纽约的客户点下鼠标，就下了订单购买 北京制造的电子产品，几天内就通过货运飞机 或是海运集装箱把货物从大洋的一端运到了另一端。当今全球的货物和 信息流动的速度和总量，都是史无前例的。但是全球商品交流的历史 要比我们想象的古老的多，2000年前， 沿着一条5000英里长的道路，即著名的丝绸之路， 这一活动就已经开始。丝绸之路并不只是一条道路，而是许多交错纵横的路线。这些路线是在几个世纪中 逐渐出现的，一条条的路线通向不同的栖居地，也将它们相互连接在一起。最原始的农业文明发源于偏远的，肥沃的河谷之中，周围地势的不便以及对未知的恐惧阻碍了当地人的交往。当地人在这里居住过一段时间后，他们发现他们在干旱的沙漠 和边界周围所住着的，不是民间传说里的魔鬼，而是马背上的游牧部落。从蒙古到匈牙利遍布的西塞亚人早就跟希腊，埃及，印度以及中国有所接触。这些接触通常都不是和平的，但即便是通过突袭，战争，贸易，以及以保护往来商人为条件增收税务，游牧民族将货物，思想和技术扩散到了那些 没有直接接触的文明之间。在这个不断扩大的网络当中，最重要的一条就要数波斯御道了。这条御道是在公元前五世纪， 由大流士一世完成的。它从底格里斯河一直延绵至爱琴海， 全长约2000英里。货物和信息在其中继点 通行所需的时间仅是单个旅客所需时间的十分之一。随后亚历山大大帝征服了波斯，通过占领例如撒马尔罕这种城市， 其疆域一直扩展到了中亚，此外他还建立了 例如苦盏城这样新的城池，希腊，埃及，波斯以及印度 这些国家的文明和贸易网络向东延伸的程度达到了历史之最，这为中国和西方之间的 沟通桥梁打下了基础。直到公元前二世纪，一位名叫张謇的大使，被派往前去跟西方的游牧部落谈判，这位大使回到中国之后， 向当时的汉朝皇帝讲述了许多有关 其边界西部地区古老的文明，蓬勃的贸易，以及奇异的货物的故事。接着许多大使、商人 相继被派往波斯和印度，用丝绸和玉交换他们的马和棉花。当时随从的还有军队， 以保证他们旅途的安全。东方和西方之间的道路逐渐形成了一个跨欧亚的网络，这一网络使得欧亚之间的 文化和商业交往程度达到了当时的历史之最。中国的货物来到了罗马，造成大量的黄金外流， 因此罗马禁止了丝绸交易。罗马的玻璃器具 在中国也十分受欢迎，中亚的远征军看到了中国和罗马军队的相遇。石弓技术传到西方。对于异国货物的需求，贸易带来的利益，使得这条丝绸之路一直保存完好，尽管罗马帝国分崩离析，中国的朝代盛衰兴废。即使是那些以抢劫和掠夺 臭名昭著的蒙古囤积商人，也积极地保护这些贸易通道， 而不是破坏它们。随着商品经济的发达，这条道路同时也使得文化，创新技术， 思想和语言得以流通。发源于印度，佛教传播到了中国和日本成为亚洲地区最盛行的宗教。伊斯兰教从阿拉伯半岛传到南亚，和当地的信仰融合形成新的宗教，比如锡克教。火药从中国传到中东形塑了土耳其帝国，萨法维帝国， 与马拉塔帝国的未来。某种程度上说， 丝绸之路成功地终结了自己。新的航海技术，像是磁罗盘，传往欧洲，使得陆地上的长程公路被淘汰了。与此同时，元朝瓦解后，中国从国际贸易版图消失。即便旧的道路和贸易网络没能长久，它们也永久改变了世界，没有倒退的可能了。欧洲人寻找新的海上航道想要寻找东亚的财富导致了其在非洲和美洲的探索和扩张。今天，全球各国相互联络 无时无刻不在影响着我们的生活。加拿大消费者购买 在孟加拉制作的 T 恤，日本观众观看英国电视节目，突尼斯人使用美国的软件来组织革命。全球化对文化和经济的影响 是无可争议的。但随之而来的好处与缺点，也不是新鲜事了。尽管山川，沙漠，海洋那些曾经隔断我们被超音速机械，海底电缆和穿越空间的信号传输包围，不再是商队跋涉数月了，上述一切都不会发生如果没有先进的文化这样的先进文化创造了丝绸之路：世界上第一个连接世界的互联网。

**P89 2014-06-03 How to choose your news - Damon Brown**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=89)

How do you know what's happening in your world? The amount of information just a click away may be limitless, but the time and energy we have to absorb and evaluate it is not. All the information in the world won't be very useful unless you know how to read the news. To your grandparents, parents, or even older siblings, this idea would have sounded strange. Only a few decades ago, news was broad-based. Your choices were limited to a couple of general interest magazines and newspaper of record, and three or four TV networks where trusted newscasters delivered the day's news at the same reliable time every evening. But the problems with this system soon became apparent as mass media spread. While it was known that authoritarian countries controlled and censored information, a series of scandals showed that democratic governments were also misleading the public, often with media cooperation. Revelations of covert wars, secret assassinations, and political corruption undermined public faith in official narratives presented by mainstream sources. This breakdown of trust in media gatekeepers lead to alternative newspapers, radio shows, and cable news competing with the major outlets and covering events from various perspectives. More recently, the Internet has multiplied the amount of information and viewpoints, with social media, blogs, and online video turning every citizen into a potential reporter. But if everyone is a reporter, nobody is, and different sources may disagree, not only opinions, but on the facts themselves. So how do you get the truth, or something close? One of the best ways is to get the original news unfiltered by middlemen. Instead of articles interpreting a scientific study or a politician's speech, you can often find the actual material and judge for yourself. For current events, follow reporters on social media. During major events, such as the Arab Spring or the Ukrainian protests, newscasters and bloggers have posted updates and recordings from the midst of the chaos. Though many of these later appear in articles or broadcasts, keep in mind that these polished versions often combine the voice of the person who was there with the input of editors who weren't. At the same time, the more chaotic the story, the less you should try to follow it in real time. In events like terrorist attacks and natural disasters, today's media attempts continuous coverage even when no reliable new information is available, sometimes leading to incorrect information or false accusations of innocent people. It's easy to be anxious in such events, but try checking for the latest information at several points in the day, rather than every few minutes, allowing time for complete details to emerge and false reports to be refuted. While good journalism aims for objectivity, media bias is often unavoidable. When you can't get the direct story, read coverage in multiple outlets which employ different reporters and interview different experts. Tuning in to various sources and noting the differences lets you put the pieces together for a more complete picture. It's also crucial to separate fact from opinion. Words like think, likely, or probably mean that the outlet is being careful or, worse, taking a guess. And watch out for reports that rely on anonymous sources. These could be people who have little connection to the story, or have an interest in influencing coverage, their anonymity making them unaccountable for the information they provide. Finally, and most importantly, try to verify news before spreading it. While social media has enabled the truth to reach us faster, it's also allowed rumors to spread before they can be verified and falsehoods to survive long after they've been refuted. So, before you share that unbelievable or outrageous news item, do a web search to find any additional information or context you might have missed and what others are saying about it. Today, we are more free than ever from the old media gatekeepers who used to control the flow of information. But with freedom comes responsibility: the responsibility to curate our own experience and ensure that this flow does not become a flood, leaving us less informed than before we took the plunge.

**P89 2014-06-03 How to choose your news - Damon Brown**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=89)

翻译人员: Zhiting Chen 校对人员: Chenlu Wang你会通过什么方式 去了解这个世界正在发生什么？动动鼠标，你就可以知道大把消息多到数不过来的消息，但是我们用来 吸收和判断这些消息的时间和精力却是有限的。对你来说， 并不是每一条消息都有用除非你知道如何去选择新闻。对你的父辈，祖父辈，甚至是年长一点的哥哥姐姐来说，这个话题听来略显怪异。也就十几年前，新闻是包罗万象的而你的选择也是很有限的局限于那些普通的杂志，报纸，还有3到4个电视频道权威的播音员每天准时准点播出的每日新闻中。随着大众传媒的普及这些老旧的收取新闻渠道的缺点 变得越来越明显。专制的国家对于新闻的控制和审查这一点大家心知肚明，一连串的丑闻被曝光显示出民主政府也同样会通过传媒，去误导大众。隐蔽的战争，秘密暗杀，政治腐败无一不在摧毁大众对于 由主流媒体报道并粉饰的政府丑陋行为的信心。对主流媒体的信任瓦解导致了报纸，电台，有线新闻与另一些持不同观点的传播渠道竞争。近年来，互联网上各类的信息咨询和评论观点多不胜数，因为大众传媒，博客，在线视频网正不知不觉将每一个人 打造成有潜力的记者。但若每个人都是记者， 则每个人也都不是记者了，同一事件不同渠道的报道各有不同，不仅评论有异议， 真实性也众说纷纭。此前提下，试问你如何了解真相？其中一个最好的方法 就是去找到未经中间人过滤的新闻原始版本。那些所谓经科学研究的， 或是出去政客之口的文章多半有水分，所以，你完全可以找到原始信息， 然后自己做判断。对于那些时事新闻， 你可以听听电视上那些记者是怎么说的。对于那些热门大事件， 比如阿拉伯之春或是乌克兰的抗议新闻工作者和博客主们已经提供了最新的情况和记录。要注意，我们从电视和报纸上看到的，很多信息都是在场的当事人以及不在场的编辑制造出的混合体同时，事件越混乱，你就越不该实时跟踪此事件。比如恐怖袭击和自然灾害，即使没有可信的信息支持， 当天的媒体也想对事件进行持续报道，有时候会提供错误信息或造成对无辜群众的错误指控。面对这样的事件， 我们会变得焦虑，但是要尝试从不同的渠道接受有关同一事件的信息，大概每隔几分钟电视上就出来一个新的细节消息推翻错误的报道。好的记者看中事件的客观性媒体的偏颇却也是无可避免。当你无法直接知道事件的真相，多看看不同媒体的报道看看不同的记者是如何报道， 同时听听不同专家的评论多渠道多分析和比较你将这些消息片段拼接在一起便能看到更完整的画面。学会将事件从评论分离，也很重要。那些不确定多字眼像是， 认为， 有可能，也许代表着媒体的谨慎或许，这只是在媒体的猜测。对于那些匿名的信息来源 就要格外当心了，那也许是内部人士提供的，或是在事件中能够获利的人提供的，他们的匿名使得所提供的消息并不可信。最后，也是最重要的一，点在传播消息之前要确定它的真实性。当大众传媒令真相那么唾手可得的时候，也令流言能在未被证实前传播开来假象在被证实前也已经流传很久了。所以，在你传播那些不可思议或是劲爆的新闻消息前，上网查阅，看看这个消息被遗漏的要点或是别人对此事件的评价。现如今，我们比起以前生活在官媒控制下的人们有着更大的自由。但是自由带来责任：我们有责任去保证这条新闻不会造成无谓的新闻泛滥让我们变得更加一无所知。

**P90 2014-06-06 The colossal consequences of supervolcanoes - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=90)

The year was 1816. Europe and North America had just been through a devastating series of wars, and a slow recovery seemed to be underway, but nature had other plans. After two years of poor harvests, the spring brought heavy rains and cold, flooding the rivers and causing crop failures from the British Isles to Switzerland. While odd-colored snow fell in Italy and Hungary, famine, food riots and disease epidemics ensued. Meanwhile, New England was blanketed by a strange fog that would not disperse as the ground remained frozen well into June. In what came to be known as "the Year Without a Summer," some thought the apocalypse had begun. A mood captured in Lord Byron's poem "Darkness": "I had a dream which was not all a dream. The bright sun was extinguish'd, and the stars did wander darkling in the eternal space, rayless, and pathless, and the icy Earth swung blind and blackening in the moonless air; morn came and went -- and came, and brought no day." They had no way of knowing that the real source of their misfortunes had occurred a year ago thousands of miles away. The 1815 eruption of Mount Tambora on the Indonesian island of Sumbawa was what is known as a supervolcano, characterized by a volume of erupted material, many times greater than that of ordinary volcanoes. And while the popular image of volcanic destruction is molten rock engulfing the surrounding land, far greater devastation is caused by what remains in the air. Volcanic ash, dispersed by wind, can blanket the sky for days, while toxic gases, such as sulfur dioxide, react in the stratosphere, blocking out solar radiation and drastically cooling the atmosphere below. The resulting volcanic winter, along with other effects such as acid rain, can effect multiple continents, disrupting natural cycles and annihilating the plant life on which other organisms, including humans, depend. Releasing nearly 160 cubic kilometers of rock, ash and gas, the Mount Tambora eruption was the largest in recorded history, causing as many as 90,000 deaths. But previous eruptions have been even more deadly. The 1600 eruption of Peru's Huaynaputina is likely to have triggered the Russian famine, that killed nearly two million, while more ancient eruptions have been blamed for major world events, such as the fall of the Chinese Xia Dynasty, the disappearance of the Minoan civilization, and even a genetic bottleneck in human evolution that may have resulted from all but a few thousand human beings being wiped out 70,000 years ago. One of the most dangerous types of supervolcano is an explosive caldera, formed when a volcanic mountain collapses after an eruption so large that the now-empty magma chamber can no longer support its weight. But though the above-ground volcano is gone, the underground volcanic activity continues. With no method of release, magma and volcanic gases continue to accumulate and expand underground, building up pressure until a massive and violent explosion becomes inevitable. And one of the largest active volcanic calderas lies right under Yellowstone National Park. The last time it erupted, 650,000 years ago, it covered much of North America in nearly two meters of ash and rock. Scientists are currently monitoring the world's active volcanoes, and procedures for predicting eruptions, conducting evacuations and diverting lava flows have improved over the years. But the massive scale and global reach of a supervolcano means that for many people there would be nowhere to run. Fortunately, the current data shows no evidence of such an eruption occurring in the next few thousand years. But the idea of a sudden and unavoidable civilization-destroying apocalypse caused by events half a globe away will remain a powerful and terrifying vision. Less fictional than we would like to believe. "The winds were withered in the stagnant air, and the clouds perish'd; darkness had no need of aid from them -- she was the universe." - Lord Byron

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翻译人员: nancy liu 校对人员: Qiwen Lu那是1816年欧洲和北美洲刚刚经历过一场毁灭性的战争一场复苏仿佛在慢慢进行但是自然另有安排在两年的歉收之后来年的春天带来了大雨和寒冷河面上涨引发洪水导致颗粒无收从大不列颠到瑞士都发生了这样的灾难然而，意大利和匈牙利降下了颜色古怪的雪饥荒，食品暴乱，瘟疫接连爆发与此同时新英格兰被奇怪的雾笼罩久久不得消散因此大地保持被冻住的状态直到六月在这被称为“无夏之年”中人们认为大灾难要开始了这种心情被拜伦写进了他的诗“黑暗”中“我曾有个似梦非梦的梦境明亮的太阳熄灭而星星在暗淡的永恒虚空中失所流离无光，无路那冰封的地球球体盲目转动在无月的天空下笼罩幽冥早晨来而复去——白昼却不曾降临“他们无法了解这不幸的根源在一年前的千里之外已被埋下1815年在印尼的松巴哇岛上一座名为坦博拉的火山爆发了坦博拉火山是一座超级火山它喷出喷出物的速度比普通火山快上好多倍然而，提及火山爆发，我们最先想到的画面是岩浆环绕并吞没了小岛但是，更加深远的影响是空气中残留下来的物质火山灰，被风带到了世界各地可以空气中弥留数日然而有毒气体，例如二氧化硫在平流层中发生化学反应阻挡了太阳的辐射导致大气层之下的温度骤降他带来了火山冬天还有其他的后果比如酸雨这些后果可以影响多个大陆扰乱了自然界的循环杀死了植物和其他生物也伤害了人类喷出了将近160立方千米的熔岩，灰烬和气体坦博拉火山的爆发据记载是规模最大的一次导致了约90，000人的死亡但是之前一次的火山爆发更加有毁灭性1600年秘鲁火山Huaynaputina的爆发很大程度上导致了俄国的饥荒使将近两百万人失去生命然而，再古老的火山爆发则被人们认为是世界上的大事件导致的比如中国夏朝代的覆灭弥诺斯文明的消失这些70，000年前消失的人类甚至导致了人类进化的基因瓶颈人类进化的基因瓶颈超级火山中最危险的一种是爆发性的巨火山口一场规模巨大的火山爆发导致岩浆房变空因此岩浆房无法再支撑自身的重量火山坍塌，便形成了巨火山口虽然地上的火山已经消失地下的火山活动却在依然继续没有办法进行释放岩浆和火山气体不断的在地下积累、膨胀压力不断上升，最终导致了火山突然剧烈的喷发成为不可避免的情况世界上最大的巨火山口之一坐落于美国黄石公园之中它上一次的喷发，是在650,000年前喷出物例如岩浆和火山灰覆盖了大部分的北美洲使大陆的地面上升了大约两米科学家们如今在监测世界上的活火山也在进行火山喷发的预测人员疏散和改变岩浆流向的计算在过去这些年中这些都有了很大的提升然而，一次规模巨大并且可以触及全球的超级火山喷发意味着许多人将无处可逃幸运的是，目前的数据表明在接下来的几千年中不会有这样的爆发发生一次剧烈而不可避免的火山爆发会导致世界上的文明被摧毁而这座火山，可能与你相隔半球之遥每当想起这件事人们会感觉到无力与恐惧比我们想象的还要真实“凝滞的气流里风也断绝烟消云逸他们留存无益因为黑暗——便是宇宙自己“

**P91 2014-06-10 Tycho Brahe, the scandalous astronomer - Dan Wenkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=91)

How do you imagine the life of a scientist? Boring and monotonous, spending endless hours in the lab with no social interaction? Maybe for some but not Tycho Brahe. The 16th century scholar who accurately predicted planetary motion and cataloged hundreds of stars before the telescope had been invented also had a cosmic-sized personal life. Tycho Brahe was born in 1546 to Danish nobles, but at age two was kidnapped to be raised by his uncle instead. His parents didn't seem to mind. Tycho was supposed to have a career in law, but after witnessing a solar eclipse at thirteen, he began spending more time with mathematics and science professors, who taught him the art of celestial observation. By the time Tycho's uncle sent him off to Germany a few years later, he had lost interest in his law studies, instead reading astronomy books, improving his instruments, and taking careful notes of the night skies. It wasn't long before his own measurements were more accurate than those in his books. While in Germany, Tycho got into a bit of an argument with another student at a party over a mathematical formula, resulting in a sword duel and Tycho losing a good-sized chunk of his nose. After that, he was said to have worn a realistic prosthetic of gold and silver that he would glue onto his face. Fortunately, Tycho didn't need his nose to continue his astronomical work. He kept studying the night sky and creating all sorts of instruments, including a building-sized quadrant for measuring the angles of stars. After months of careful observation, Tycho discovered a new star in the constellation Cassiopeia. The publication of this discovery granted him rock star status and offers of scientific positions all over Europe. Wanting to keep him at home, the King of Denmark offered to give Tycho his own personal island with a state of the art observatory. Called Uraniborg and costing about 1% of Denmark's entire budget, this observatory was more of a castle, containing formal gardens, rooms for family, staff and visiting royalty, and an underground section just for all the giant instruments. Tycho also built a papermill and printing press for publishing his papers, and a lab for studying alchemy. And since no castle would be complete without entertainment, Tycho employed a clairvoyant dwarf named Jep as court jester. Tycho lived on his island, studying and partying for about 20 years. But after falling out with the new Danish King, he took up an invitation from the Holy Roman Emperor to become the official imperial astronomer in Prague. There, he met another famous astronomer Johannes Kepler, who became his assistant. While Kepler's work interested him, Tycho was protective of his data, and the two often got into heated arguments. In 1601, Tycho attended a formal banquet where he drank quite a lot but was too polite to leave the table to relieve himself, deciding to tough it out instead. This proved to be a bad idea, as he quickly developed a bladder infection and died a few days later. But over 400 years after his death, Tycho still had a few surprises up his sleeve. When his body was exhumed and studied in 2010, the legendary gold and silver nose was nowhere to be found, with chemical traces suggesting that he wore a more casual brass nose instead. Tycho's mustache hair was also found to contain unusually high levels of toxic mercury. Was it from a medicine used to treat his bladder infection? A residue from his alchemy experiments? Or did his quarrelsome coworker Johannes Kepler poison him to acquire his data? We may never know, but the next time you think scientists lead boring lives, dig a little deeper. A fascinating story may be just beyond the tip of your nose.

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翻译人员: Qingqing Mao 校对人员: Jenny Yang你是如何想象科学家的生活的？枯燥和单调？在实验室里度过无尽的时间？没有任何社交？也许有些科学家是这样的，但第谷·布拉赫不是。这位16世纪的学者，在望远镜发明之前就精确预测了行星运动并编目了数百颗星星，他同时也有着宇宙般广阔的个人生活。第谷·布拉赫于1546年出生于丹麦的贵族之家，但在两岁时，他被其伯父擅自带走并抚养长大。他的父母对此似乎并不在意。第谷原本应该去从事法律工作，但是在他13岁时目睹了一次日全食之后，他开始把更多的时间花在与数学和科学教授待在一起，他们教给他天体观测的技巧。几年后第谷的伯父将他送去德国，此时他对法律学习已经完全失去了兴趣，转而阅读天文学书籍，改进他的仪器设备，并仔细地记录夜空。没过多久，他自己所做的测量就已经比书中的更为精确了。在德国期间，第谷和另一个学生在一个舞会上因为一个数学公式而发生争吵。最后这演变为一场长剑决斗，而第谷在决斗中失去了相当大的一部分鼻子。此后，据说他戴着一个金银制做的逼真的假鼻子，他将其粘贴在自己的脸上。幸运的是，第谷不需要用鼻子来继续他的天文学工作。他继续研究着夜空，并制造了各种类型的仪器，包括一台房子大小的象限仪，用于测量星星的角度。经过数月的仔细观测，第谷发现了一颗新的恒星，位于仙后座。这一发现的公布给于了他摇滚巨星般的地位，以及欧洲各地的科学职位任职邀请。为了把他留在祖国，丹麦国王承诺给于第谷他的私人小岛和当时最先进的天文台。这个叫做Uraniborg的天文台花费了丹麦全国预算的1%，这个天文台更像一个城堡，包含了正规的花园，给家人、员工以及来访皇室成员的房间，和一个放置所有巨大仪器的地窖。第谷还建造了造纸厂和印刷机用于发表他的论文，还有一个研究炼金术的实验室。城堡怎么可以没有娱乐节目，于是第谷还雇佣了一个宫廷弄臣，一个名为杰普的未卜先知的侏儒。第谷生活在他的岛上，进行研究和派对狂欢了约20年。但是，在和丹麦的新国王闹翻以后，他接受了神圣罗马帝国的一个邀请，在布拉格担任官方的皇家天文学家。在那里他遇到了另一位著名的天文学家约翰内斯·开普勒，他成为了第谷的助手。第谷对开普勒的研究很有兴趣，但同时第谷严密保护自己的数据，双方时常陷入激烈的争吵。1601年，第谷出席了一个正式晚宴，席间他喝了很多，但他太过礼貌以至不愿离席去上厕所，于是决定就这么憋着。后来证明这是一个坏主意，他很快就患了膀胱感染，数天后就去世了。但是他逝世400年后，第谷仍能给我们带来些意想不到的东西。2010年，当他的遗体被发掘出来进行研究时，传说中的金银鼻无处可寻，化学痕迹显示他其实带着一个更随便的铜质鼻子。第谷的胡须里发现了异常高含量的有毒物质水银。这是否来源于治疗膀胱感染的药物？或是他做炼金术实验的残留物？还是他那个好争论的同事约翰内斯·开普勒为了得到他的数据而下了毒？我们可能永远也不会知道，但下回你再认为科学家们的生活无聊，更深入地探究一下。一个迷人的故事可能就近在咫尺

**P92 2014-06-10 Why do honeybees love hexagons - Zack Patterson and Andy Peterson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=92)

Honeybees are fascinating creatures for a number of reasons: their incredible work ethic, the sugary sweet syrup they produce and their intricate social structure. But another reason is that honeybees are, in fact, excellent mathematicians. Scientists claim the tiny insects can calculate angles, and can even comprehend the roundness of the Earth. But there's particular mathematical bee genius behind the most important aspect of honeybee life: the hive. Just like humans, bees need food and shelter to stay alive. The hive is not only the bees' home, but doubles as a place to store their honey. Since it's so central to survival, honeybees have to perfect the hive's architectural design. If you examine any piece of honeycomb, you'll see that it's constructed from tightly packed hexagonal, or six-sided, cells. Of all the possible designs, why do honeybees choose this one? To understand, you need to think like a bee. Bees need a secure place for their entire colony to live. Similarly, there needs to be a place where their nectar can be stored and ripened suitably until it turns into honey. That means there's a need for some serious space efficiency. A good solution is to build little storage units, or cells, just big enough for a bee to fit into, which can also double as the containers in which nectar is stored: The bees' very own honey jars. The next thing, is to decide what the little cells should be made out of. Bees don't have beaks or arms to pick up things, but they are capable of producing wax. The thing is, producing it is a lot of hard work. Bees have to consume 8 ounces of honey to produce just 1 ounce of wax. So they don't want to waste it. So, they need a design that allows them to store the largest possible amount of honey using the least amount of wax. What shape does that? Imagining for a minute that all bees had to attend architecture academy and go to math class. Let's say they asked their geometry teacher, "What shape would give us the most space to store our honey, but require the least amount of wax?" And then geometry teacher replied, "The shape that you're seeking is the circle." Leaving the bees to return to their trial construction site and begin building their honeycomb using circular cells. After a while, some of them might have noticed a problem with their design: small gaps between the cells. "We can't even fit in there! That's wasted space!" they might have thought. So, ignoring the geometry lesson, and taking matters into their own hands, the bees went back to the drawing board to rethink their beehive design. One suggested triangles, "We can use triangles. Look! They fit together perfectly." Another bee suggested squares. Finally, a third bee piped up and said, "Pentagons don't seem to work, but hexagons do! We want the one that will use the least amount of wax and be able to store the most amount of honey. Yes, I think that's the hexagon." "Why?" "It looks more like the circle than the others." "But how do we know for sure?" To find out, the industrious insect architects calculated the areas of the triangle, the square and the hexagon and found that the hexagon was, in fact, the shape that gave them the most storage space. They agreed on an ideal size and returned to work. The space efficient comb that is a bee's trademark today, is probably the result of this trial and error, but over long periods of evolutionary history. However, it paid off. Peek into any hive -- with your protective goggles and netting on, of course -- and you'll see the end result: a beautiful compact honeycomb that any architect would have be proud to design.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=92)

翻译人员: Jieyao Yuan 校对人员: Yuanqing Edberg蜜蜂是一种非常迷人的生物，原因有如下几个：它们有难以置信的工作准则，它们能酿造含糖的甜浆，以及它们错综复杂的社会结构。然而事实上，还有另外一个原因是蜜蜂是出色的数学家。科学家们声称这些小虫子们能计算角度，甚至意识到地球是圆的。不过蜜蜂还有一个特殊的数学天赋这也是蜜蜂一生中最重要的一方面：蜂巢。就像人类一样，蜜蜂也需要食物和居所来维持生存。蜂巢不仅仅是蜜蜂们的家，还是它们贮藏蜂蜜的地方。因为这是生存的核心部分，蜜蜂们不得不让他们蜂巢的建筑设计完美无瑕。如果你考量蜂房的任何一处，你会发现它是由紧凑的六角或六边小巢室构成的。在所有可能的设计里，为什么蜜蜂们要选择这个呢？为了找到答案，你必须要像一只蜜蜂一样去思考。蜜蜂们需要一个安全的地方来支撑整个群体的生活。同样，它们需要一个地方使它们的花蜜可以适宜地贮藏起来并且适当成熟直到变成蜂蜜。那意味着有效利用空间的重要性。一个好的解决办法是建造小的贮藏单元或者小巢室，仅仅能让一只蜜蜂进出就足够了，它同时还可以充当贮藏花蜜的容器：蜜蜂们自己的蜂蜜罐子。接下来的事情是决定这些小巢室应该用什么来建造。蜜蜂们没有喙或者手臂来拿起物品，但是他们有能力生产蜂蜡。问题是，生产蜂蜡是一项繁重的工作。蜜蜂们不得不消耗8盎司的蜂蜜来生产仅仅1盎司的蜂蜡。所以他们不想浪费。因此他们需要一个允许他们贮藏最大量蜂蜜的设计同时只用最少的蜂蜡。那是个什么形状呢？想象一下所有的蜜蜂不得不去建筑学院上数学课。让我们假设，它们问它们的几何老师，“哪种形状可以给我们最大的空间来贮藏我们的蜂蜜，但是只需要最少量的蜂蜡呢？“然后几何老师回答到，”你们寻找的形状是圆形。“离开的蜜蜂们回到它们自己的试验建造基地开始用一个个的圆形小巢室来建造它们的蜂房。不一会儿，一些蜜蜂可能发现了它们设计上的一个问题：小巢室之间的小缝隙。”我们甚至不能进出那了！那样是浪费空间！“它们可能会这样想。所以，忽略几何课，它们决定自己处理这个问题，这些蜜蜂们回到画板上重新思考它们蜂巢的设计。有一只蜜蜂建议用三角形，”我们可以用三角形。看！三角形之间匹配得很完美。“另一只蜜蜂建议用正方形。最后，第三只蜜蜂高声说到，”五边形好像不行，但是六边形可以！“我们需要一个形状使用最少量的蜂蜡并且可以贮藏最大量的蜂蜜。是的，我认为那是六边形。“”为什么？“”它比其他形状看起来更像圆形。”“但是我们怎么能确定呢？”为了找到答案，勤劳的昆虫建筑师们计算了三角形、正方形和六边形的面积它们发现事实上六边形可以提供最多的贮藏空间。它们同意这个完美的形状并且重新回到工作中。如今，这个有效利用空间的蜂房是蜜蜂的标志，它可能是不断尝试和更正的结果，而在长期的进化过程中，蜜蜂取得了成功。观察一下任何一个蜂巢，当然要带上你的护目镜和网状面罩你会看到最终的结果：一个美丽且紧实的蜂房任何一个建筑师都将引以为傲的设计。

**P93 2014-06-16 A brief history of religion in art - TED-Ed**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=93)

It's only been the last few hundreds years or so that Western civilization has been putting art in museums, at least museums resembling the public institutions we know today. Before this, for most, art served other purposes. What we call fine art today was, in fact, primarily how people experienced an aesthetic dimension of religion. Paintings, sculpture, textiles and illuminations were the media of their time, supplying vivid imagery to accompany the stories of the day. In this sense, Western art shared a utilitarian purpose with other cultures around the world, some of whose languages incidentally have no word for art. So how do we define what we call art? Generally speaking, what we're talking about here is work that visually communicates meaning beyond language, either through representation or the arrangement of visual elements in space. Evidence of this power of iconography, or ability of images to convey meaning, can be found in abundance if we look at art from the histories of our major world religions. Almost all have, at one time or another in their history, gone through some sort of aniconic phase. Aniconism prohibits any visual depiction of the divine. This is done in order to avoid idolatry, or confusion between the representation of divinity and divinity itself. Keeping it real, so to speak, in the relationship between the individual and the divine. However, this can be a challenge to maintain, given that the urge to visually represent and interpret the world around us is a compulsion difficult to suppress. For example, even today, where the depiction of Allah or the Prophet Muhammad is prohibited, an abstract celebration of the divine can still be found in arabesque patterns of Islamic textile design, with masterful flourishes of brushwork and Arabic calligraphy, where the words of the prophet assume a dual role as both literature and visual art. Likewise, in art from the early periods of Christianity and Buddhism, the divine presence of the Christ and the Buddha do not appear in human form but are represented by symbols. In each case, iconographic reference is employed as a form of reverence. Anthropomorphic representation, or depiction in human form, eventually became widespread in these religions only centuries later, under the influence of the cultural traditions surrounding them. Historically speaking, the public appreciation of visual art in terms other than traditional, religious or social function is a relatively new concept. Today, we fetishize the fetish, so to speak. We go to museums to see art from the ages, but our experience of it there is drastically removed from the context in which it was originally intended to be seen. It might be said that the modern viewer lacks the richness of engagement that she has with contemporary art, which has been created relevant to her time and speaks her cultural language. It might also be said that the history of what we call art is a conversation that continues on, as our contemporary present passes into what will be some future generation's classical past. It's a conversation that reflects the ideologies, mythologies, belief systems and taboos and so much more of the world in which it was made. But this is not to say that work from another age made to serve a particular function in that time is dead or has nothing to offer the modern viewer. Even though in a museum setting works of art from different places and times are presented alongside each other, isolated from their original settings, their juxtaposition has benefits. Exhibits are organized by curators, or people who've made a career out of their ability to recontextualize or remix cultural artifacts in a collective presentation. As viewers, we're then able to consider the art in terms of a common theme that might not be apparent in a particular work until you see it alongside another, and new meanings can be derived and reflected upon. If we're so inclined, we might even start to see every work of art as a complementary part of some undefined, unified whole of past human experience, a trail that leads right to our doorstep and continues on with us, open to anyone who wants to explore it.

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翻译人员: Yuanqing Edberg 校对人员: Stephanie Chen仅仅在过去的几百年里西方文明已经把艺术 放入博物馆中，博物馆至少相似于我们今天所知的公共机关在此之前，艺术对于 大多数人来说有其它目的。今天我们叫它艺术，实际上，主要是人们是如何经历这一宗教审美观绘画，雕塑，纺织和阐释对于它们的时间来说就是媒介，提供生动的图像并且伴随那天的故事。从某种意义上讲，西方艺术与世界上其他文化共同拥有同一个目标。艺术是无法用语言去形容的。那么我们该如何 定义有我们嘴上说的艺术？一般来说，我们在此讨论的是视觉传达的工作就是说超乎了语言范畴也超过了表达或者说是在空间中 排列的视觉元素。证明了图片的力量，或者说图片传达意义的能力，如果我们通过世界上主要的宗教历史来看待艺术会发现更多。在同一时间或者 其他的历史上几乎都有，是经历了某种无象征的阶段。无偶像伦禁止任何 对神圣进行视觉描述。这样做是为了避免盲目崇拜，或混淆神本身和神的表示。可以说，是为了在个人和神的关系上保持真实。然而， 这可能是一个需要维持的挑战，鉴于一种冲动来视觉化的表到我们周围的世界是一个很难抑制的冲动。例如，即使在今天，对真主或先知穆罕穆德 的描述是禁止的，一个抽象庆祝的神可以在阿拉伯样式 或伊斯兰图案中发现，有着娴熟的画工与阿拉伯书法，先知的话是文学和视觉的双重艺术。同样，早期艺术关于基督教和佛教，神展示了基督和佛陀没有人类形体却有符号表示。每种情况下，引用肖像是作为一种敬畏。拟人化表示，或描述成人的形体，最终在宗教中成为普遍仅一世纪以后，在周围文化的影响下。从历史上说，公共视觉艺术欣赏除了传统宗教 或社会功能是一个相对新的概念。今天，我们越来越盲目迷恋。我们去博物馆看过去的艺术，但我们的经验被彻底的从情景中删去，也删去了那些本来应该需要被看到的。这可能是说现代观众缺乏丰富的参与观众经常接触现代艺术，艺术的创造和观众处在的历史阶段有关联，并说着相关的文化语言。也有可能是我们称之为 艺术的历史是一个继续的交谈，我们当代的那些将会成为未来一代经典的过去。这是一个反应了意识形态，神话， 信仰和禁忌的谈话和这么多东西。但是这并不是说为另一个时代工作为那时特定的用途死亡或对当代没有贡献。即使在博物馆不同时期地方的艺术摆在靠在左右，从原来的的设置分离出他们放在一起是有益的。展品是由策展人组织的，或职业人士超出他们的能力来搭配使文物一起展出。作为观众，我们可以考虑艺术在一个不明显的共同主题在一个特定的工作知道你看到它并排，并可以派生新的含义。如果我们有心，我们甚至开始看每个作品作为一个未定义的整体的补充对过去的人的经历，一条小径到我家门口并继续和我们一起，向所有想探索它的人敞开。

**P94 2014-06-17 How bees help plants have sex - Fernanda S. Valdovinos**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=94)

Bees are very busy little matchmakers. Wingmen in every sense of the word. You see, the bees' side of the whole "birds and the bees" business is to help plants find mates and reproduce. In their work as pollinators, honeybees are integral to the production of nearly 1/3 of the food that we eat. And these bees, dutifully helping lonely plants have sex, aren't alone. But rather are part of a very complex network of matchmaking creatures, critical for the pollination of natural ecosystems and crops. Plants in many natural ecosystems need help to have sex. Like many of us, they're too busy to find a relationship. They have too much photosynthesis to do, and they can't find the time to evolve feet and walk to a singles bar. Those places are called meat markets for a reason, because plants can't walk. So they need matchmaker pollinators to transport their pollen grains to flowers of the same plant species, and they pay these pollinators with food. Today, around 170,000 plant species receive pollination services from more than 200,000 pollinator species. Pollinators include many species of bees, butterflies, moths, flies, wasps, beetles, even birds and bats, who together help pollinate many species of trees, shrubs and other flowering plants. In return, flowering plants are an abundant and diverse food source for pollinators. For instance, fossil records suggest bees may have evolved from wasps that gave up hunting after they acquired a taste for nectar. Plant pollinator networks are everywhere. Ecologists record these networks in the field by observing which pollinators visit which plants, or by analyzing the identity of pollen loads on their bodies. Networks, registered in these ways, contain from 20 to 800 species. These networks show a repeated structure, or architecture. Pollinators interact with plants in a very heterogenous way. Most plants are specialists, they have only one or a few matchmakers. Meanwhile, only a few generalist plants hire a diverse team of matchmakers, getting visits from almost all the pollinators of the network. The same occurs with pollinators. Most are specialists that feed on only a few plant species, while a few pollinators, including the honeybee usually, are generalists, busily feeding from and matchmaking for almost all the plant species in that ecosystem. What's interesting is that specialists and generalists across both plants and pollinators, sort themselves out in a particular pattern. Most pollinator networks, for which we have data, are nested. In a nested network, specialists tend to interact more with generalists than with other specialists. This is because if you're a specialist plant, and your only matchmaker also specializes on you as its only food source, you're each more vulnerable to extinction. So, you're better off specializing on a generalist pollinator that has other sources of food to ensure its persistence in bad years. The same goes if you're a specialist pollinator. You're better off in the long run specializing on a generalist plant that gets pollinated by other species in times when you're not around to help. Finally, in addition to nestedness, the networks are usually modular. This means that the species in a network are compartmentalized into modules of plants and animals that interact more with each other than with species in other modules. Think of them like social cliques. A plant or pollinator dying off will effect the species in its module, but those effects will be less severe on the rest of the network. Why's all that important? Because plant pollinator network structure effects the stability of ecosystems. Heterogeneous distribution, nestedness and modularity enable networks to better prevent and respond to extinctions. That's critical because nature is never static. Some species may not show up every year. Plants flower at different times. Pollinators mature on varying schedules. Generalist pollinators have to adapt their preferences depending on who's flowering when. So from one flowering season to the next, the participants and patterns of matchmaking can drastically change. With all those variables, you can understand the importance of generalist pollinators, like bees, to the stability of not only a crop harvest, but the entire network of plants and pollinators we see in nature, and rely on for life. Next time you see a bee fly by, remember that it belongs to a complex network of matchmakers critical to the love lives of plants all around you.

**P94 2014-06-17 How bees help plants have sex - Fernanda S. Valdovinos**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=94)

翻译人员: Yingjie Wu 校对人员: Quanzhou Jiang小小蜜蜂是非常忙碌的红娘，在这世界的每一个角落牵线搭桥。你看，蜜蜂在整个“小鸟和蜜蜂”（俚语：性关系）事件中的作用，就是帮助植物寻到伴侣并进行繁衍。作为授粉昆虫我们所吃食物的近三分之一都离不开蜜蜂对生产的帮助。并且，这些尽职尽责地帮助孤独植物寻找伴侣的蜜蜂们并不是独自在战斗的。它们是一个复杂的“红娘网”中的一部分，对生态体系和作物的授粉起着至关重要的作用。在很多自然生态系统中，植物都需要帮助才能繁殖。就像我们中的很多人一样，它们忙得没空去寻找伴侣，它们有太多的光合作用要进行，并且它们没有时间去进化出双脚，也不能“走”到酒吧。酒吧被称作“‘肉类’市场”（俚语：性市场）是有原因的，因为植物是不能走路的（植物不是肉） :) 。所以它们需要传粉者牵线搭桥，把它们的花粉粒传播给同种植物的花朵，与此同时，它们也给传粉者提供食物。今天，大约有17万种植物都在使用传粉服务，也有超过20万种的传粉者。传粉者包括很多种蜜蜂、蝴蝶、蛾子、苍蝇、胡蜂、甲虫，甚至还有鸟类和蝙蝠。它们齐心协力，帮助了许多种树木，灌木和其他开花植物传粉。作为回报，开花植物给传粉者提供大量丰富的食物来源。比如，化石记录显示，蜜蜂可能是从某些因尝试过花蜜后而放弃猎食的胡蜂进化而来的食。植物和传粉者的互动无处不在，生态学家们实地考察并记录植物和传粉者的关系网，观察哪种传粉者会拜访哪种植物，或分析传粉者身上花粉的种类。这样的一个关系网，可以包含从20到800种物种。这些关系网体现出了一个重复性的框架结构，或可称为艺术建筑。传粉者以很不均匀的方式和植物们接触。大多数植物都是专才，它们只有一种或者很少的红娘。同时，另外不多的一些植物是通才，雇佣了一队形形色色的红娘，并接受关系网中几乎全部传粉者的拜访。同样的情况也发生在传粉者身上；大多数专才都只去很少的植物那儿觅食。但一少部分传粉者，包括最常见的蜜蜂，都是通才，忙碌地为生态系统中的几乎全部植物找对象，也接受几乎所有植物提供的食物。值得一提的是，植物和传粉者中的专才和通才值得一提的是，植物和传粉者中的专才和通才都以一种特定的形式将自己和大众区分开来。我们的数据显示，大多数传粉者关系网都是嵌套的。在一个嵌套的关系网中，专才更倾向于与通才交往更甚于与其他专才交往。这是因为如果你是一棵专才植物，并且你唯一的传粉者也把你当作它唯一的食物来源，那么你们在物种灭绝的压力下都会更脆弱。所以，作为一棵专才植物，你唯一的传粉者如果还能有别的食物来源，这样更能保证它在灾年的存活，对你自身传粉也更有益处。同样的道理也适用于一个专才传粉者。假如你是专才传粉者，并且你唯一的觅食对象是一棵通才植物，那么这样的关系在长期看来对你自身也是有利的。因为在你自己力不从心的时候，其他传粉者也会帮助你的植物传粉。最后，除了嵌套性之外，这些关系网通常都是模块化的。意思是，在关系网中的物种，同一模块中的动物和植物会进行更多的互动，而不常与其他模块的物种互动。为了便于理解，可以把这些模块想象成社会中排外的小团体。某个植物或传粉者的死亡会更多地影响它这个模块中的物种，但对关系网中的其他物种，它的影响就没有那么严重了。那么，关系网到底为什么如此重要呢？因为植物和传粉者之间的关系网结构会影响到整个自然生态系统的稳定性。非均匀分布，嵌套性和模块化使关系网能够更好地预防和应对物种灭绝。这点至关重要的，因为自然从来不是一成不变。有些物种可能不一定每年都会出现，植物在不同的时间段开花，传粉者也有各种各样成长阶段。通才传粉者要根据不同植物的开花时间调整它们对食物的喜好。所以从一个花期到另一个，传粉的参与者和形式都可以发生翻天覆地的变化。了解到所有这些变量我们可以明白通才传粉者，比如蜜蜂，对从某种作物成熟到整个植物-传粉者关系网保持稳定的重要性。这些关系网在自然中随处可见，也是我们所赖以为生的。下次，当你见到一只蜜蜂飞过时，要记得它属于一个复杂的传粉者关系网，并对你周围所有可爱的植物有着至关重要的影响。

**P95 2014-06-17 Why aren't we only using solar power - Alexandros George Charalambide**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=95)

We have some good reasons to completely switch over to solar power. It's cheaper in many cases, and definitely more sustainable than our dependance on traditional power plants that use resources like coal, which will eventually run out. So why don't we replace these traditional plants with solar energy? Because there's one factor that makes solar power very unpredictable: cloud cover. As the sun's rays move towards Earth, some get absorbed by the Earth's atmosphere, some are reflected back into outer space, but the rest make it to the Earth's surface. The ones that aren't deviated are called direct irradiance. The ones that are deflected by clouds are called diffuse irradiance. And those rays that first get reflected by a surface, like a nearby building, before reaching the solar energy system are called reflected irradiance. But before we can examine how clouds affect the sun's rays and electricity production, let's see how these solar energy systems work. First up, we have solar towers. These are made up of a central tower surrounded by a huge field of mirrors that track the sun's path and focus only the direct rays onto a single point on the tower, kind of like an eager beachgoer. The heat generated by these rays is so immense that it can be used to boil water producing steam that drives a traditional turbine, which makes electricity. But when we say solar energy systems, we're usually talking about photovoltaics, or solar panels, which are the systems most commonly used to generate solar power. In solar panels, photons from the sun's rays hit the surface of a panel, and electrons are released to get an electric current going. Solar panels can use all types of irradiance, while solar towers can only use direct irradiance, and this is where clouds become important because depending on their type and location relative to the sun, they can either increase or decrease the amount of electricity produced. For instance, even a few cumulus clouds in front of the sun can reduce the electricity production in solar towers to almost zero because of this dependence on direct rays. In solar panels, those clouds would decrease energy output as well, though not as much because solar panels can use all types of irradiance. However, all this depends on the clouds exact positioning. Due to reflection, or a particular phenomeon called Mie scattering, the sun's rays can actually be focused forward by clouds to create a more than 50% increase in the solar irradiance reaching a solar panel. If this potential increase isn't accounted for, it could damage the solar panel. Why does this matter? Well, you wouldn't want this lesson to stop just because a cloud passed over the panel on your roof. In solar towers, huge tanks of molten salt or oil can be used to store any excess heat and use it when needed, so that's how they manage the problem of fluctuating solar irradiance to smooth out electricity production. But in the case of solar panels, there currently isn't any way to affordably store extra energy. That's where traditional power plants come in because to correct for any fluctuations in these solar powered plants, extra electricity from traditional sources always needs to be available. But then why aren't these tradtional power plants just used as a backup, instead of us humans depending on them as our main sources of energy? Because it's impossible for an employee at a coal fired or a nuclear plant to turn a knob to produce more or less electricity depending on how many clouds there are in the sky. The response time would simply be too slow. Instead, to accommodate these fluctuations, some extra electricity from traditional power plants is always being produced. On clear sky days, that extra electricity might be wasted, but when cloudy skies prevail, it's what fills the gap. This is what we currently depend on for a constant supply of energy. For this reason, a lot of researchers are interested in forcasting the motion and formation of clouds through satellite images or cameras that look up at the sky to maximize the energy from solar power plants and minimize energy waste. If we could accomplish that, you'd be able to enjoy this video powered solely by the sun's rays, no matter what the weather, although if the sun is shining, you may be tempted to venture outside to go and do a different kind of cloud gazing.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=95)

翻译人员: Yi Hou 校对人员: Qiwen Lu我们有很好的理由完全换去太阳能发电。在很多情况下它便宜并且肯定更有益于可持续发展相比于我们现在的发电厂它们利用化石资源，比如煤，但煤总有一天会用完的。那我们为什么不把传统的电厂换成太阳能？因为有一个因素使太阳能不可预知：云遮。太阳光向地球射来有些被大气层吸收，有些反射回太空，但剩下会到达地球表面。没有偏离的光线叫直接辐射。被云偏转的光线叫辐射扩散。首先被一个平面反射的光线，比如一个附近的建筑物，才达到太阳能系统的叫反射辐射。但在我们考查云层怎样影响太阳线和发电前先看太阳能系统是如何工作的。第一是太阳能塔。这是由一个中央塔被镜场围住跟踪太阳的路径把直射的阳光集中到塔上一点，就像渴望去海滩的人。这些光线产出的热量是很强的可以用来烧开水用水蒸气来带动涡轮，来产电。我们这里说的太阳能系统，我们说的是光伏，或太阳能电池板，这是太阳能系统常用来产电的。在太阳能电池板里太阳光线里的光子射到电池板上放出电子电子产生电流。太阳能电子板可以用多种辐射，但太阳能塔只可以用直接辐射，这里就是云的重要处因为云的类型和相对于太阳的位置，可以提高或减少产生的电量。比如，就算有一点积云在太阳前也可以减少太阳塔产的电甚至于到零，因为它需要直射。这些云也会减少太阳能板输出的能量，但不是那么多因为太阳能板可以用多种辐射。但，这些都依赖在云的精确位置。由于反射，或一种特别现象叫 Mie scattering太阳光集中向前放射因为云的关系可以增加50%太阳辐照到达太阳能电池板如果这个提高没有预算到，会把太阳能电池板损坏。这个有什么关系呢？你不会想要这个课程停下就因为云从你的房顶上过去。在太阳能塔里，很大罐的熔盐或油用来储藏多余的热量需要的时候可以用的，就这样管理这个太阳辐照变换的问题使产电平衡。但太阳能板现在还不能储藏多余能源。传统的发电厂在这有用因为要改正电源在太阳能发电厂的变换，电源从传统的发电厂总是可用到。为什么这些传统的发电厂只是当备用，而人类不能依靠这些为主要的能量来源？因为工作人员不可能在煤火或核电厂转动旋钮来产多或少电根据天上的云多还少。反应的时间会很慢。要适应这样的变幻传统的发电厂会多产一些电。天晴时，多出的电会浪费，但天阴时，有用来补。我们现在依靠这个来不断能源供应。这个原因，很多研究家有兴测报云的运动和形成通过卫星图像看天空用的相机来最大化太阳能发电个长的电源最小化电源浪费。如果我们可以完成这个，你会看这个视频仅用太阳供的电，不管气候如何，但阳光灿烂时，你会想向外跑去体会不同样的一种望云。

**P96 2014-06-19 What gives a dollar bill its value - Doug Levinson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=96)

If you tried to pay for something with a piece of paper, you might run into some trouble. Unless, of course, the piece of paper was a hundred dollar bill. But what is it that makes that bill so much more interesting and valuable than other pieces of paper? After all, there's not much you can do with it. You can't eat it. You can't build things with it. And burning it is actually illegal. So what's the big deal? Of course, you probably know the answer. A hundred dollar bill is printed by the government and designated as official currency, while other pieces of paper are not. But that's just what makes them legal. What makes a hundred dollar bill valuable, on the other hand, is how many or few of them are around. Throughout history, most currency, including the US dollar, was linked to valuable commodities and the amount of it in circulation depended on a government's gold or silver reserves. But after the US abolished this system in 1971, the dollar became what is known as fiat money, meaning not linked to any external resource but relying instead solely on government policy to decide how much currency to print. Which branch of our government sets this policy? The Executive, the Legislative, or the Judicial? The surprising answer is: none of the above! In fact, monetary policy is set by an independent Federal Reserve System, or the Fed, made up of 12 regional banks in major cities around the country. Its board of governors, which is appointed by the president and confirmed by the Senate, reports to Congress, and all the Fed's profit goes into the US Treasury. But to keep the Fed from being influenced by the day-to-day vicissitudes of politics, it is not under the direct control of any branch of government. Why doesn't the Fed just decide to print infinite hundred dollar bills to make everyone happy and rich? Well, because then the bills wouldn't be worth anything. Think about the purpose of currency, which is to be exchanged for goods and services. If the total amount of currency in circulation increases faster than the total value of goods and services in the economy, then each individual piece will be able to buy a smaller portion of those things than before. This is called inflation. On the other hand, if the money supply remains the same, while more goods and services are produced, each dollar's value would increase in a process known as deflation. So which is worse? Too much inflation means that the money in your wallet today will be worth less tomorrow, making you want to spend it right away. While this would stimulate business, it would also encourage overconsumption, or hoarding commodities, like food and fuel, raising their prices and leading to consumer shortages and even more inflation. But deflation would make people want to hold onto their money, and a decrease in consumer spending would reduce business profits, leading to more unemployment and a further decrease in spending, causing the economy to keep shrinking. So most economists believe that while too much of either is dangerous, a small, consistent amount of inflation is necessary to encourage economic growth. The Fed uses vast amounts of economic data to determine how much currency should be in circulation, including previous rates of inflation, international trends, and the unemployment rate. Like in the story of Goldilocks, they need to get the numbers just right in order to stimulate growth and keep people employed, without letting inflation reach disruptive levels. The Fed not only determines how much that paper in your wallet is worth but also your chances of getting or keeping the job where you earn it.

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翻译人员: Alex Wang 校对人员: Jenny Yang如果你想要用一张纸来支付什么东西你大概会遇到些麻烦当然，除非你的这张纸是百元大钞。可是，是什么使得这张钞票比一张纸更加有趣有价值呢？毕竟它作为一张纸，并没有什么用处。它不能吃，不能用来造房子，把它烧了还是违法的。那又如何？当然，你大概知道这个问题的答案。一张百元钞票是由政府印制的，并被指定为官方货币，其他纸可不是这样。但这只是使得这张纸合法的途径。另一方面，这张纸之所以有价值是因为它们数量有限。纵观历史，大多数货币，包括美元是与有价值的商品联系在一起的，而货币的流通量，取决于政府中黄金或白银的储备量。但自从1971年美国政府废除了黄金兑换系统后，美元从此成为了“法定货币”，意思是货币本身与其他东西没有关联，它的价值仅仅由政策以及发行量来决定。是那个政府部门来指定这种政策呢？行政部门？立法机构？还是司法机构？出乎意料，它们都不是！事实上，货币政策是由独立的美国联邦储备系统指定的，它也称为美联储，这个系统由全美国内12个设立在主要城市的地区性储备银行组成。储备委员会成员由总统提名，经国会参议院批准后方可上任。美联储所有利润须转交美国财政部。为了使美联储不受变幻莫测的政治因素影响，它不受任何政府部门的直接控制。那美联储为什么不干脆印无数的钞票让每个人都又开心有有钱呢？如果那样，钞票就不再值钱了。想想，货币产生的目的是用来交换商品及服务。在一个经济体中，如果市场中的货币量比其等值的商品和服务上升的快，每一分钱能买到的东西就会比原来少很多。这叫通货膨胀。另一方面，如果货币供给量不变，商品和服务的量增加每一元钱的价值就会增加，这个过程叫做通货紧缩。哪一种情况更糟糕呢？过度的通货膨胀意味着今天在你钱包里的钱明天价值更少，使得你想要赶快把它花掉。这会刺激经济也会促使过度消费以及对食物，燃油等商品的囤积，物价抬高，导致消费人数减少，加剧通货膨胀。但通货紧缩会致使人们想要守住自己的钱，减少消费支出，降低了商业利润，导致失业现象更严重，进而使消费支出越来越少，经济不断地紧缩。所以，大多数经济学家们认为，两种情况到了极端都很危险，轻微且持续的通货膨胀对促进经济增长是必要的。美联储用大量的经济数据来决定流通的货币量这些数据包括历史通胀率国际贸易以及失业率如同Goldilock的故事里说的一样，美联储要让货币供给量恰到好处，才能在避免通货膨胀失控的情况下刺激增长，保持就业率。总之，美联储不仅决定着你钱包里钞票的价值也决定着你是否有机会保住工作得以继续赚钱。

**P97 2014-06-24 Attack of the killer algae - Eric Noel Muñoz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=97)

We've all seen the movies where a monster, created by a scientist in a laboratory, escapes to wreak havoc on the outside world. But what if the monster was not some giant rampaging beast, destroying a city, but just a tiny amount of seaweed with the potential to disrupt entire coastal ecosystems? This is the story of Caulerpa taxifolia, originally a naturally occurring seaweed native to tropical waters. In the 1980s, one strain was found to thrive in colder environments. This trait, combined with its beautiful, bright green color and ability to grow quickly without maintenance made it ideal for aquariums, which it helped keep clean by consuming nutrients and chemicals in the water. Further selective breeding made it even heartier, and soon it was used in aquariums around the world. But it was not long before a sample of this aquarium-developed super algae turned up in the Mediterranean Sea near the famed Oceanographic Museum of Monaco. The marine biologist who found it believed that the museum had accidentally realeased it into the ocean along with aquarium waters, while museum directors claimed it had be carried into the area by ocean currents. Regardless of how it ended up there, the non-native Caulerpa multiplied rapidly, having no natural predators due to releasing a toxin that keeps fish away. And like some mythical monster, even a tiny piece that broke off could grow into a whole new colony. Through water currents and contact with boat anchors and fishing lines, it fragmented and spread throughout Mediterranean coastal cities covering coral reefs. So what was the result of this invasion? Well, it depends on who you ask. Many scientists warned that the spread of Caulerpa reduces biodiversity by crowding out native species of seaweed that are eaten by fish, with the biologist who first discovered its presence dubbing it Killer Algae. Other studies instead claim that the algae actually had a beneficial effect by consuming chemical pollutants -- one reason the aquariums strain was developed. But the disruption of a natural ecosystem by an introduced foreign species can have unpredictable and uncontrollable effects that may not be immediately visible. So when Culerpa taxifolia was discovered at Carlsbad's Agua Hedionda Lagoon, near San Diego in the year 2000, having most likely come from the dumping of home aquarium water into a connecting storm drain, it was decided to stop it before it spread. Tarps were placed over the Culerpa colonies and chlorine injected inside. Although this method killed all other marine life trapped under the tarps, it did succeed in eradicating the algae and native eelgrass was able to emerge in its place. By responding quickly, authorities in California were able to prevent Culerpa from propagating. But another occurrence of the strain, in the coastal wetlands of southeast Australia, was left unchecked and allowed to spread. And unfortunately, a tarp cannot cover the Mediterranean Sea or the Australian coast. Invasive species are not a new problem, and can indeed occur naturally. But when such species are the results of human directed selective breeding or genetic modification and then released into the natural environment, their effect on ecosystems can be far more radical and irreversible. With the proliferation of new technologies and multiple threats to the environment, it is more important than ever for scientists to monitor and evaluate the risks and dangers, and for the rest of us to remember that what starts in our backyard can effect ecosystems half a world away.

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翻译人员: Muxing Zhang 校对人员: Yuanqing Edberg我们都在电影中看到过由科学家在实验室创造出来的某个怪兽，出逃并蹂躏了我们的世界。但是，如果这个毁灭城市的生物不是 某些巨大狂暴的怪兽，而仅仅是一小簇有着破坏整个沿海生态系统的能力的海藻呢？这便是杉叶蕨藻的故事，追溯其源，它来源于热带水域，是一种自然生长的原生海藻。在八十年代，发现了一簇生长在寒冷环境中的海藻。他们还有着美丽的、亮绿色外表，并且无需养护，迅速生长是水族箱中的理想的清道夫，因为它们可以吸收水中的养料和一些化学物质，精选培育的品种就更贴心了。很快，便广泛用于世界各地的水族馆中了。但不久，在地中海区域发现了这种为了适应水族馆 特别培育的超级海藻，就在著名的摩纳哥海洋博物馆附近。发现海藻的海洋生物学家相信这是海洋博物馆在倾倒水族箱中的水时无意将海藻也一同倒入了海洋之中，然而博物馆负责人坚称它们是随着洋流飘落到这里的。不究其源，这种外来杉叶海藻迅速繁殖，没有自然天敌，因为它们释放出一种毒素以驱赶鱼群像某种神秘怪兽，即使掉落的一小片海藻都能长成一个新的完整海藻群落通过水流作用，或者携挂在船锚和钓鱼线上，海藻在整个地中海海岸城市传播生长开来。覆盖在珊瑚礁上。这样的入侵，会导致怎样的结果呢？这取决于对于谁人而言。很多科学家警告说，杉叶海藻的蔓延会侵占本地海草物种的生存地， 导致生物多样性锐减，而本地海草是鱼类的食物。因此最先发现海藻存在的 生物学家称呼它们为海藻杀手另一些研究却声称这些海藻实际上是有益的它们能吸收一些化学污染物－－正是如此，才培育了水族馆专用海藻。但是通过引入外来物种对自然生态系统的破坏有着不可预见，亦不可控制的结果，也许在短期内无法察觉到这些破坏。所以在2000年，杉叶海藻被发现出现在圣地亚哥附近的卡尔斯巴德的黑迪翁达礁湖中，它们可能是，家庭水族箱在倾倒废水时通过连接的排水管道传播的，人们决定采取措施控制其蔓延。防水布被铺放在海藻群上并注入了氯气虽然这项举措杀死了所有防水布之下的海洋生物，但是，根除海藻行动的确成功了而且使得本地的鳗草在此地生存。加州当局反应迅速，海藻的疯长得以控制。但是海藻的另一股势力在澳洲西南部的海岸湿地处迅速蔓延，无法控制。而不幸的是，一块防水布 无法覆盖整个地中海，或者是澳洲海岸。物种入侵并不是一个新难题。在大自然中时有发生。但是当这一入侵物种经过人工挑选培育或者基因优化后之后被投放回大自然，他们对生态系统的影响将是更彻底而又无法挽回的。随着新技术不断衍生，对自然环境出现了越来越多的威胁，比以往任何时候更重要的是科学家应当关注考量所有的风险危害。对于我们来说应当牢记那些种植在后院的植物或许会影响到另外一个半球的生态系统。

**P98 2014-06-24 How to speak monkey - The language of cotton-top tamarins - Anne Sava**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=98)

Living with her family high above the ground in the northern tropical forests of Colombia, you will find Shakira, a cotton-top tamarin with a penchant for conversation. Say, "Hola!" Though you may not realize it, this one pound monkey communicates in a highly sophisticated language of 38 distinct calls based on variations of chirps and whistles. The response she just gave is known as a "B chirp", a call often directed at humans. To appreciate the complexities of Shakira's language, let's learn a few chirps and whistles, then examine how their combinations form grammatically structured sequences. The chirp Shakira used to greet us comes from a class of calls known as single frequency modulated syllables. This class is made up of short duration calls, or chirps, and long duration calls, like screams and squeals. Researchers have determined that there are eight different types of chirps categorized by stem upsweep, duration, peak frequency, and frequency change. In addition, each chirp has its own unique meaning. For example, Shakira's "C chirp" is used when she is approaching food, where as her "D chirp" is only used when she has the food in hand. Single whistles also exhibit a unique intention with each call and just as there are eight different chirps, there are five different whistles. Based on frequency modulation, single whistles are subdivided into four categories: squeaks, initially modulated whistles, terminally modulated whistles, and flat whistles. The language's quality of unique intention is wonderfully exemplified by the category of initially modulated whistles. These whistles change based on the proximity of Shakira to other members of her family. If Shakira is greater than .6 meters from her family, she'll sound a large initally modulated whistle. But if she's less than .6 meters from her family, she'll sound a small initially modulated whistle. Now that we've learned a few chirps and whistles, Shakira wants to show off by taking you through a quick day in her life with these calls. While heading towards a feeding tree for her first meal of the day, she says, (monkey noise), a call most often used in relaxed investigations. However, suddenly she spots the shadow of a hawk. "E chirp" for alarm. This call alerts her family to the presence of this predator, and Shakira jumps to the safety of an inner branch. The coast seems clear, so Shakira makes her way towards her dad. Wait, wait. Who is that? Ah, it's her younger brother, Carlos. Cotton-top tamarins often squeal during play wrestling. Uh-oh. He's playing a little too roughly, and Shakira screams, alerting her parents to help her. Her dad makes his way towards the ball of rolling fur and her brother stops. Shakira shakes herself and scratches herself to get the hair on her head back in place. Then Shakira spots another group of unfamiliar tamarins and hears their normal long call. She turns to her family. (Monkey noise) Did you catch that? First there was a chirp, then a whistle. This is what's known as a combination vocalization, a phrase that contains both a chirp and a whistle. These are two calls strung together to convey a message. The combination of these two elements alerts her family to the presence of another group, the "F chirp", and the distance they are away, the normal long call whistle. In other words, Shakira just said a sentence. Her simple demonstration is just the tip of the iceberg. She's got trills, chatters, multiple whistle calls, more combination vocalizations, even twitters. Yet sadly enough, we may not get to hear everything she has to say. Mixed in with chirping sonatas from high above is the constant thud of a machete chopping trees. Shakira's habitat in Colombia is being cut down, piece by piece, and if we don't work to protect the critically endangered cotton-top tamarin, it will become extinct in our lifetime. If the chirp from one tamarin to the next has proven to be more than just idle chit chat, imagine what else we have left to discover. Imagine what else Shakira can tell us.

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翻译人员: Debroah White 校对人员: Feifei Yan在哥伦比亚北部的热带丛林中她和家人住在高高的树上她叫夏奇拉一只喜欢喋喋不休的棉顶狨猴说“哈喽！"可能你都没注意到这种一磅左右的小猴子用一种非常高级复杂的语言交流由多达38种不同的叫声组成包含各种啁啾和哨叫刚才她给出的回应被称为“B啁啾”一种常用来跟人类打招呼的呼叫为了一感夏奇拉语言的复杂性让我们先来了解几个啁啾声和哨叫声之后再看它们的组合是怎么形成语法结构序列的夏奇拉用来和我们打招呼的啁啾是由一组音节组成被称为单频调制音这组音节由短音音调，比如啁啾和长音音调，比如尖叫声，一起组成研究人员发现有8中不同的啁啾是根据升调、音长、峰值频率 和频率变化划分出来的另外，每一种啁啾有它自己独特的含义比如说，当夏奇拉的“C啁啾”会用在她获取食物的时候而“D啁啾”只有在她手中有食物时才会使用单信号哨叫 也在每次呼叫中表达独特的意思就如存在着8种不同的啁啾哨叫也有5种之分根据频率调制哨叫也被细分成4个子类：吱吱声初始调制哨叫终极调制哨叫以及平哨这种语言表达含义时的清晰性完全可以用初始调制哨叫的种类来说明这些哨叫会根据夏奇拉与她家人之间的距离远近而改变如果夏奇拉与她家人之间的距离 远于 0.6 米她就会发出高度初始调制哨叫但如果她与家人的距离小于 0.6 米她就会发出轻度初始调制哨叫现在我们既然已经了解了几种 啁啾和哨叫夏奇拉灰常想跟你炫耀一下 她的语言功底她要带你体验一下 她从早到晚所发出的声音当她跳到一棵书上开始她的早餐时她说，(猴子的叫声)这是一种多用于放松的探查的叫声然而，她突然发觉一直大鹰的影子她发出报警声“E啁啾"这声音警示她家人：捕食者靠近了！夏奇拉自己也赶紧跳入 密枝深处的安全地带现在该没事了所以夏奇拉向她的爸爸靠近等等，等等，那个小家伙是谁？啊哈，是她的弟弟卡洛斯棉顶狨猴玩摔跤的时候通常会发出尖叫啊哦，卡洛斯有点粗暴了 夏奇拉开始尖叫想让她父母来帮她她爸爸朝着扭打成一团毛球走去她弟弟识相地停了下来夏奇拉抖了抖身子伸手捋了捋她头上的毛恢复她的发型之后，夏奇拉发现了另一群 不太熟悉的棉顶狨猴听了听它们的长叫她转向她的家人(猴子叫声)你听出来了吗？首先是个啁啾 然后是个哨叫这被称为组合发声一个由一声啁啾和一声哨叫组成的“短语”这两声串起来表达一条信息她把这两个声音元素合在一起通知她的家人另一个群体存在 她用“F啁啾”并同时说明这个群体与他们的距离她用惯用的长口哨换句话说，夏奇拉刚刚说了句话她这句简单的话只是它们语言的冰山一角她还有有颤音，饶舌，多样的哨叫更有多种组合发音，甚至有吱吱喳喳然而，让人难过的是，我们可能永远也听不尽她说得每一件事伴随树木高处啁啾的还有持续不断的砍伐树木的轰隆声夏奇拉在哥伦比亚的家正在被砍伐一棵又一棵的树倒下如果我们不采取行动保护濒临灭绝的棉顶狨猴它们会在我们有生之年绝迹的如果棉顶狨猴之间的啁啾被证明不仅仅是闲聊那么简单想象一下还有多少是我们有待发现的想象一下夏奇拉还告诉了我们什么

**P99 2014-06-30 A guide to the energy of the Earth - Joshua M. Sneideman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=99)

Energy is all around us, a physical quantity that follows precise natural laws. Our universe has a finite amount of it; it's neither created nor destroyed but can take different forms, such as kinetic or potential energy, with different properties and formulas to remember. For instance, an LED desk lamp's 6 Watt bulb transfers 6 Joules of light energy per second. But let's jump back up into space to look at our planet, its systems, and their energy flow. Earth's physical systems include the atmosphere, hydrosphere, lithosphere, and biosphere. Energy moves in and out of these systems, and during any energy transfer between them, some is lost to the surroundings, as heat, light, sound, vibration, or movement. Our planet's energy comes from internal and external sources. Geothermal energy from radioactive isotopes and rotational energy from the spinning of the Earth are internal sources of energy, while the Sun is the major external source, driving certain systems, like our weather and climate. Sunlight warms the surface and atmosphere in varying amounts, and this causes convection, producing winds and influencing ocean currents. Infrared radiation, radiating out from the warmed surface of the Earth, gets trapped by greenhouse gases and further affects the energy flow. The Sun is also the major source of energy for organisms. Plants, algae, and cyanobacteria use sunlight to produce organic matter from carbon dioxide and water, powering the biosphere's food chains. We release this food energy using chemical reactions, like combustion and respiration. At each level in a food chain, some energy is stored in newly made chemical structures, but most is lost to the surroundings, as heat, like your body heat, released by your digestion of food. Now, as plants are eaten by primary consumers, only about 10% of their total energy is passed on to the next level. Since energy can only flow in one direction in a food chain, from producers on to consumers and decomposers, an organism that eats lower on the food chain, is more efficient than one higher up. So eating producers is the most efficient level at which an animal can get its energy, but without continual input of energy to those producers, mostly from sunlight, life on Earth as we know it would cease to exist. We humans, of course, spend our energy doing a lot of things besides eating. We travel, we build, we power all sorts of technology. To do all this, we use sources like fossil fuels: coal, oil, and natural gas, which contain energy that plants captured from sunlight long ago and stored in the form of carbon. When we burn fossil fuels in power plants, we release this stored energy to generate electricity. To generate electricity, heat from burning fossil fuels is used to power turbines that rotate magnets, which, in turn, create magnetic field changes relative to a coil of wire, causing electrons to be induced to flow in the wire. Modern civilization depends on our ability to keep powering that flow of electrons. Fortunately, we aren't limited to burning non-renewable fossil fuels to generate electricity. Electrons can also be induced to flow by direct interaction with light particles, which is how a solar cell operates. Other renewable energy sources, such as wind, water, geothermal, and biofuels can also be used to generate electricity. Global demand for energy is increasing, but the planet has limited energy resources to access through a complex energy infrastructure. As populations rise, alongside rates of industrialization and development, our energy decisions grow more and more important. Access to energy impacts health, education, political power, and socioeconomic status. If we improve our energy efficiency, we can use our natural resources more responsibly and improve quality of life for everyone.

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翻译人员: Winter Wei 校对人员: Xiaoou Chen我们周围充满了能量，一种严格遵循自然规律的物理质量。宇宙中的能量是有限的；能量不会产生也不会毁灭，但能以不同形式存在，如动能和势能，有不同的性质和公式要记。比如，一个LED（发光二极管）灯的6瓦灯泡每秒转移6焦耳的光能。但让我们回到宇宙空间看一看我们的星球，它的系统，及其能量流。地球的物理系统包括大气层，水圈岩石圈，和生物圈。能量在这些系统之间出入流动，能量在它们之间转换的时候，有些在周围事物间流失了，比如热、光、声、震动，或活动。我们星球的能量来自于内部和外部的能源；地热能来自于放射性同位素以及地球自转时产生的旋转能，这些是内部能源。而太阳则是最主要的外部能源，影响了一些如天气和气候的系统。阳光不同程度地温暖着表面与大气层，这就引起了对流，引起了风并影响了海洋气流。红外线辐射，从地球温暖的表面散发出来被温室气体笼罩住从而进一步影响能量流动。太阳也是一个主要的能源对于有机体而言。植物、海藻类，和蓝细菌用阳光从二氧化碳和水中产生有机物质，为生物圈的食物链提供能量。我们由化学反应释放食物中的能量，比如氧化和呼吸。在食物链的每一层，一些能量都被储存于新产生的化学结构中，但大部分能量都流失在周遭了，一些成为热量，如你身体散发的热量，在你身体消化食物的时候被释放出来。当植物被主要消费者吃掉的时候，全部能量中只有大概10%被传输到下一层。由于在食物链里能量只向一个方向流动，从生产者到消费者再到分解者，吃食物链中比之低级的生物，比高层的效率更高。所以动物得到能量的方式中，吃生产者是效率最高的。但如果生产者不能持续得到能量供应，主要是从阳光中，我们所知的地球生命将不复存在。我们人类用我们的能量做许多吃东西以外的事情。我们旅行，我们做东西，我们发明各种科技。为了做这些事，我们使用矿物燃料：煤炭、石油，和天然气，这些都含有能量是常年从阳光中所吸取的能量并以碳的形式保存着。当我们在动力厂燃烧矿物燃料时，我们就释放出这些保存的能量用来发电。在发电过程中，燃烧矿物燃料产生的热量用来给涡轮发电涡轮旋转磁铁，这样就产生了相对于线圈的磁场变化，于是在电线里产生电子。现代文明依赖于我们持续为供电提供能量。幸运的是，我们并不局限于燃烧不可再生的矿物燃料来发电。电子也可以被促使流动当直接与光子接触当时候，这也是太阳能电池的操作原理。其他的可再生能量资源，比如风能、水能、地热能，和生物燃料都可以用来发电。地球对能源对要求在增长，但地球上只有有限的资源是可通过复杂的资源结构得到的。当人口在增长，工业的发展也在随之增长，我们对于能源的决定也变的越发重要。得到能源影响着健康、教育、政权，和社会经济的处境。如果我们能提高能源效率，我们就能更可靠的使用天然资源并提高每个人的生活质量。

**P100 2014-06-30 What you might not know about the Declaration of Independence - Kenne**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=100)

"All men are created equal and they are endowed with the rights to life, liberty and the pursuit of happiness." Not so fast, Mr. Jefferson! These words from the Declaration of Independence, and the facts behind them, are well known. In June of 1776, a little more than a year after the war against England began with the shots fired at Lexington and Concord, the Continental Congress was meeting in Philadelphia to discuss American independence. After long debates, a resolution of independence was approved on July 2, 1776. America was free! And men like John Adams thought we would celebrate that date forever. But it was two days later that the gentlemen in Congress voted to adopt the Declaration of Independence, largely written by Thomas Jefferson, offering all the reasons why the country should be free. More than 235 years later, we celebrate that day as America's birthday. But there are some pieces of the story you may not know. First of all, Thomas Jefferson gets the credit for writing the Declaration, but five men had been given the job to come up with a document explaining why America should be independent: Robert Livingston, Roger Sherman, Benjamin Franklin and John Adams were all named first. And it was Adams who suggested that the young, and little known, Thomas Jefferson join them because they needed a man from the influential Virginia Delegation, and Adams thought Jefferson was a much better writer than he was. Second, though Jefferson never used footnotes, or credited his sources, some of his memorable words and phrases were borrowed from other writers and slightly tweaked. Then, Franklin and Adams offered a few suggestions. But the most important change came after the Declaration was turned over to the full Congress. For two days, a very unhappy Thomas Jefferson sat and fumed while his words were picked over. In the end, the Congress made a few, minor word changes, and one big deletion. In the long list of charges that Jefferson made against the King of England, the author of the Declaration had included the idea that George the Third was responsible for the slave trade, and was preventing America from ending slavery. That was not only untrue, but Congress wanted no mention of slavery in the nation's founding document. The reference was cut out before the Declaration was approved and sent to the printer. But it leaves open the hard question: How could the men, who were about to sign a document, celebrating liberty and equality, accept a system in which some people owned others? It is a question that would eventually bring the nation to civil war and one we can still ask today.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=100)

翻译人员: Jieyao Yuan 校对人员: Tingyu Qiu"每个人生来就是平等的”“他们被赋予生存、自主和追求幸福的权利。“别着急，杰斐逊先生！这些话来源于《独立宣言》，它背后的事实众所周知。1776年6月，也就是反英格兰战争的一年多后，这场战争以莱克星顿和康科德的枪声为导火索。大陆会议在费城召开，讨论美国独立。经过长时间的讨论，独立议案终于在1776年7月2日通过。美国自由了！约翰·亚当斯这些人心想我们将会永远庆祝这一天了。然而两天后，国会议员才投票通过了《独立宣言》，其中很大一部分是由托马斯·杰斐逊撰写的，阐述了国家为什么应该独立的所有原因。在235多年以后的今天，我们庆祝这一天为美国的国庆日。但是有一些故事你可能是不知道的。首先，托马斯·杰斐逊流芳百世，因为他撰写了《独立宣言》。但其实有五个人都参与了工作，他们提交一份文件来解释为什么美国应该独立。罗伯特·李维顿、罗杰·谢尔曼、本杰明·富兰克林和约翰·亚当斯的名字都排在托马斯·杰斐逊之前。正是亚当斯建议年轻、不为人知的托马斯·杰斐逊加入他们，因为他们需要一个来自有影响力的弗吉尼亚代表团的人，而且亚当斯认为杰斐逊在写作方面比他好很多。第二，尽管杰斐逊从未用过脚注或者写出资源的贡献，但其实他的一些著名词句都借鉴了其他作者的话语并做了细小改动而已。之后，富兰克林和亚当斯提出了一些建议，但是最重要的改变来自于《独立宣言》移交国会以后。整整两天，托马斯·杰斐逊很不开心地坐着边生闷气边听议员对他的草案挑三拣四。最后，国会修改了很小一部分的语句，并删除了一大块。在杰斐逊所列的一长串反对大英帝国的控诉中，《独立宣言》的作者包含了这样一个观点，乔治亚三世要为贩卖奴隶负责，这阻止了美国废除奴隶制度。那不仅仅是不正确的，而且国会也不想在开国文件中提到奴隶。因此涉及的这一段在《独立宣言》被批准并送往印刷之前就被删除了。不过这遗留下来了一个难题：签署文件的人们怎么可以在庆祝自由和平等的同时，接受一个一些人拥有另一些人的社会？这是一个最后将美国推入内战而且我们现在仍然可以质疑的问题。

**P101 2014-07-02 The time value of money - German Nande**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=101)

They say, 'Time is money,' but what does one really have to do with the other? Meet Sheila! She just got her first big bonus. Sheila knows exactly what she wants to do with that money. She's had her eye on a nice convertible for a while now. Yes, Sheila, that's a nice car! Oh, looks like Sheila is a little short. But wait! She has an idea. Sheila is a smart cookie. She knows that if she deposits the money for a year instead of buying the car today, she will earn interest. Then she'll be able to afford the car. Sheila knows that the value of her deposit one year from now will equal the money deposited today plus the interest earned. We call Sheila's money deposited today the present value of money. And the value of Sheila's deposit next year is the future value of money. What connects one to the other? The interest rate, also known as the time value of money. Now, with a little bit of rearranging, we can figure out the future value of Sheila's money with this equation. So in a year, the future value will be $11,000. Well, it's been a year! And there's Sheila, with enough money to buy the car. Sheila really understands the future value of money. Now, I just hope she understands the speed limit! Now, meet Timmy. He's also gotten his bonus. The money seems to be burning a hole in his pocket. Yes, Timmy, that's a nice car that will surely impress people. Oh! Looks like you're a little short. Maybe you can follow Sheila's example. You see, Timmy, just like Sheila, after the first year, you'll have $11,000. But Timmy, that is still not enough to buy that fancy car. Why don't you leave the money deposited for another year? Let's see how your deposit will be doing in two years. With a little bit of rearranging, it becomes the value of your money next year, times one plus the interest rate. We can then convert the future value one year from now to the present value times one plus the interest rate. We can even simplify this further by just squaring the value of one plus the interest rate. Sorry, Timmy, you'll have more money after two years, but you still can't afford the car! I don't know how many more years you'll have to wait, but I can tell you one way we can figure it out. Do you see that little number two in the equation? Any number that you put in there is the number of years that you are waiting, also known as the period. Sure, Timmy, we can see how much you'll have in five years. Let's connect future value and present value across five years. Let's watch the period increase from two to five. After 5 years, you'll have $16,105.10. Sorry, Timmy, you have to wait a little longer. 10 years? Yeah! Let's see if you'll be able to buy the car then. Not quite. Well, Timmy, it looks like you'll need 26 years to afford this car. You should ask Sheila for a ride to the beach. Maybe a bicycle will suit you better? I hear the bus is pretty cheap!

**P101 2014-07-02 The time value of money - German Nande**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=101)

翻译人员: Yichi Liu 校对人员: Becky Zhao人们都说：“时间就是金钱。”但是，他们两者之间到底有什么联系呢？这是茜拉！她刚刚拿到了她的第一笔奖金。茜拉很清楚的知道她要怎么花这一笔钱。她看中一辆漂亮的敞篷车有一段时间了。是的，茜拉，这是一辆很好的车！噢，看起来茜拉的钱不太够。但是，等一等！茜拉有办法。茜拉是一个聪明的女孩儿。茜拉知道，如果她今天先不买车，而是把钱存入银行一年，她会得到一些利息。然后她就卖得起车了。茜拉知道，一年之后，这些钱的总价值相当于今天所存的钱加上未来一年积攒的利息。我们把茜拉今天存入银行的钱叫做现值。明年茜拉从银行取出的钱叫做终值。是什么把两者联系在一起呢？利率，也被认为是金钱的时间价值。现在，只要改变一下数值，我们可以通过这个公式，计算出茜拉的钱的终值。一年之后，这笔钱的终值是11,000美元。好了，一年过去了！茜拉现在有足够的钱去买那辆车。茜拉真是懂得利用钱的终值。我希望她也同样明白什么是限速！现在，让我们来认识一下蒂米。他也拿到了一笔奖金。蒂米是一个很能烧钱的人。是的，蒂米，这辆车绝对能吸引眼球。噢，看起来你的钱不太够。你也许可以学习茜拉。你看，蒂米，就像茜拉这样，一年以后，你会拥有11,000美元。但是蒂米，这些钱还是不够买豪车。不如你把钱再多存一年吧？让我们看看两年后这笔钱会发生什么变化。只要稍微重新计算一下，把原值乘以1加上利率，就可以得到一年后这笔钱的价值。然后把得到的数值再乘以1加上利率，可以得到两年以后的价值。我们甚至只需要通过计算1加利率的平方来进一步的简化这个过程。不好意思，蒂米，虽然两年后你会有更多的钱，但你还是买不起那辆车！我不知道你还得等多少年，但是我可以告诉你其中一个计算的方法。你看到公式里那个小小的数字二了吗？那个数字代表了你还需要等待几年，也被叫做周期。没问题，蒂米，我们可以看看五年后你会有多少钱。让我们用五年的时间将终值和现值联系起来。将周期从二增加到五。五年之后，你会有16,105.10美元对不起，蒂米，你还需要再等久一点。10年？好的！让我们看看到那时你能不能买这辆车。还差一点。蒂米，看起来，你需要26年的时间才能买得起这辆车。你应该问问茜拉能不能载你去海滩。也许，自行车更适合你？我知道公交车也特别的便宜！

**P102 2014-07-03 How heavy is air - Dan Quinn**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=102)

Transcriber: Jessica Ruby Reviewer: Caroline Cristal You may not realize it, but from the moment you got out of bed today to the point where you sat down to watch this video, you've essentially been swimming. Why? Because air is a fluid just like water. It has waves and eddies. It flows. And when you push air out of the way, it rushes around you into a wake. So why don't we notice it most of the time? We commonly think of air as empty space. But while one cubic centimeter of interstellar space, the volume in the tip of your pinky finger, contains roughly one atom, the same volume of air has about 10 quintillion molecules. If that sounds hard to wrap your head around, it happens to be about the same as the number of insects alive on the planet, all crawling, climbing, and flying over each other in an enormous, tightly packed swarm. When this swarm of molecules runs into things, it exerts a force, pressing against the boundaries of the fluid, like water pressing against the glass of a bottle. This is known as air pressure. And while air is lighter than water, all those molecules still get pretty heavy, with the total air filling a typical school gym, weighing about as much as an adult elephant. So when you walk into a gym, how come you're not immediately crushed by the elephant of air in the room? Well, first of all, because most of it is pressing on the floor and the walls, and the part that is pressing on you is pushed back by the pressure inside you! You see, the air, as well as the water and everything else, that fills our bodies exerts an amount of pressure equal to that of the air outside. Of course, this is no accident. It's precisely what allows us to survive in the normal atmosphere, and what makes it more difficult at high altitudes or deep water. And we normally don't feel the air pressing on us because it's generally uniform. So even though different amounts of air molecules are hitting you at different times, the swarm is so thick that all those little differences average out. What happens when air pressure isn't uniform? This means that the molecules are pushing harder in one region of air than another, driving the air flow from the higher pressure region to the lower. We feel this flow directly as wind, and the pressure systems that meteorologists are always going on about are responsible for other weather changes, from the mundane to the catastrophic. But differences in air pressure do more than just let us complain about the weather; they're the very reason we're alive. We breathe by lowering the pressure in our lungs, allowing air to rush in. So the next time you take a deep breath, think of the unfathomable number of air molecules you're commanding to move. We look up at the night sky to ponder the infinity of space, but unless you're watching this video from that deep space, there are more air molecules in and around your body than there are grains of sand in all the world's beaches and deserts, stars in the visible universe, or both of those numbers combined. The vastness of the universe is right in front of you and inside you.

**P102 2014-07-03 How heavy is air - Dan Quinn**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=102)

翻译人员: Kai Cui 校对人员: Becky Zhao你或许没有意识到，但从你今天起床的那一刻到你坐在这里观看这个视频，从本质上说， 其实你是在游泳。为什么？因为空气是流动的， 就像水一样。它也有波浪和漩涡。它会流动。当你在空气中破浪而行，它会在你的后面形成漩涡。那么我们为什么大部分 情况下都意识不到它？我们通常会把空气当作真空。但是， 一立方厘米的外太空空间，相当于你小拇指 指尖大小的体积，大约只会包含一个原子，同样体积的空气有10×10的18次幂个分子。如果你对这个数量级没有概念，这大约相当于地球上所有昆虫的数量，那么一大群爬来爬去、 飞来飞去的虫子，紧密地堆积在一起。当这些分子相互撞击，它们向周围的边界施加压力，就像水对玻璃杯壁施加的压力。这就是所谓的大气压。尽管空气比水要轻，这些分子还是 具有相当的重量，一个标准体育馆内所有的空气，重量相当于一头成年的大象。那么当你走进体育馆的时候，怎么没有被里面的空气大象压垮呢？首先，空气的压力大部分 施加在地板和墙壁上，落在你身上的压力被你体内的压力抵消了！你看， 空气就和水及其它我们体内的，物质一样， 它们也在施加一定的压力与外部空气的压力相同。当然，这并非凑巧。正是因为这个原因， 我们才得以在大气中存活，但是在高海拔和深水中我们就能感受到压力。通常情况下 我们感受不到压力因为它们基本上是相等的。所以，尽管在不同的时间有不同数量的空气分子撞击到你，但由于数量实在太大这种小小的差异无法体现出来。如果空气的压力不一致将会如何？这说明空气分子的压力 在一个地区强过另外一个地区，导致空气从高压区流向低压区。我们最直接的感受是刮风，气象学家经常谈到的压力系统是各种天气变化的主要原因，从日常的天气到灾难性的天气。但是，气压之间的差别其作用不仅仅是让我们抱怨坏天气；它恰恰是我们得以生存的原因。我们降低肺里的气压才可以呼吸，让空气得以进入。所以下次你做深呼吸的时候，想想那些无数的空气分子在听你调遣。我们仰望夜空思索宇宙的无限，但除非你是在外太空看这个视频，有更多的空气分子围绕在你身边它们的数量比地球上所 有的沙滩和沙漠中的沙子，和天上可见的星星数量，加起来还要多。广阔的宇宙就在你眼前也在你的身体里。

**P103 2014-07-07 Inside the ant colony - Deborah M. Gordon**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=103)

Think about all the things that need to happen for a human settlement to thrive: obtaining food, building shelter, raising children and more. There needs to be a way to divide resources, organize major efforts and distribute labor efficiently. Now imagine having to do this without any sort of planning or higher level communication. Welcome to the ant colony. Ants have some of the most complex social organization in the animal kingdom, living in structured colonies containing different types of members who perform specific roles. But although this may sound similar to some human societies, this organization doesn't arise from any higher level decisions, but is part of a biologically programmed cycle. In many species, all the winged males and winged virgin queens from all the nearby colonies in the population each leave from their different nests and meet at a central place to mate, using pheromones to guide each other to a breeding ground. After mating, the males die off, while females try to establish a new colony. The few that are successful settle down in a suitable spot, lose their wings, and begin laying eggs, selectively fertilizing some using stored sperm they've saved up from mating. Fertilized eggs grow into female workers who care for the queen and her eggs. They will then defend the colony and forage for food, while unfertilized eggs grow into males whose only job is to wait until they are ready to leave the nest and reproduce, beginning the cycle again. So how do worker ants decide what to do and when? Well, they don't really. Although they have no methods of intentional communication, individual ants do interact with one another through touch, sound and chemical signals. These stimuli accomplish many things from serving as an alarm to other ants if one is killed, to signaling when a queen is nearing the end of her reproductive life. But one of the most impressive collective capabilities of an ant colony is to thoroughly and efficiently explore large areas without any predetermined plan. Most species of ants have little or no sense of sight and can only smell things in their vicinity. Combined with their lack of high level coordination, this would seem to make them terrible explorers, but there is an amazingly simple way that ants maximize their searching efficiency; by changing their movement patterns based on individual interactions. When two ants meet, they sense each other by touching antennae. If there are many ants in a small area this will happen more often causing them to respond by moving in more convoluted, random paths in order to search more thoroughly. But in a larger area, with less ants, where such meetings happen less often, they can walk in straight lines to cover more ground. While exploring their environment in this way, an ant may come across any number of things, from threats or enemies, to alternate nesting sites. And some species have another capability known as recruitment. When one of these ants happens to find food, it will return with it, marking its path with a chemical scent. Other ants will then follow this pheromone trail, renewing it each time they manage to find food and return. Once the food in that spot is depleted, the ants stop marking their return. The scent dissipates and ants are no longer attracted to that path. These seemingly crude methods of search and retrieval are, in fact, so useful that they are applied in computer models to obtain optimal solutions from decentralized elements, working randomly and exchanging simple information. This has many theoretical and practical applications, from solving the famous traveling salesman problem, to scheduling computing tasks and optimizing Internet searches, to enabling groups of robots to search a minefield or a burning building collectively, without any central control. But you can observe these fascinatingly simple, yet effective, processes directly through some simple experiments, by allowing ants to enter empty spaces of various sizes and paying attention to their behavior. Ants may not be able to vote, hold meetings or even make any plans, but we humans may still be able to learn something from the way that such simple creatures are able to function so effectively in such complex ways.

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翻译人员: Tina Deng 校对人员: zicheng zhou思考下要使一个人类定居点繁荣需要发生的所有事：获得食物，建造居所，生儿育女，等等。这需要有一个方法来分配资源，组织主要力量以及高效地分配劳动力现在想像下在无任何计划或更高层次交流的情况下来做这件事。欢迎来到蚂蚁群落。在动物王国中，蚂蚁有着某种最为复杂的社会组织，（它们）住在有结构的群落中，包含不同类型的成员这些成员有明确角色。尽管这听上去和某种人类社会很相似，然而这个组织并非由任何更高层次的决定而产生，而是生物程序循环的一部分。在许多（蚂蚁）亚种中，来自种群中所有附近的群落的有翅雄蜂和有翅未交配蜂皇分别离开它们不同的巢穴在一个中间地聚集交配利用外激素引导对方到繁殖地。交配后，雄蜂死去，而雌蜂则尝试建立一个新的群落。少数能在一个合适的地点成功定居（的雌蜂），失去翅膀，并开始产卵，有选择的使一些在交配中保留并储藏的精子受精受精的卵子长成雌性工蜂负责照顾蜂皇和她的卵。然后它们负责保卫群落以及储存食物，而未受精的卵长成雄蜂它们唯一的工作是等待直至他们准备好离开蜂巢以及繁殖，重新开始这一循环。那么工蜂怎么决定该做什么及何时做这些事呢？嗯，他们其实并不决定。尽管他们没有内部交流的方法，个体蚂蚁确实通过接触、声音和化学信号与其他蚂蚁互动。这些刺激伴随着许多事：从警告其他蚂蚁另一只蚂蚁被杀，到当蜂皇已临近生育期末时发出信号。但蚂蚁群落最令人印象深刻的收集能力之一是无任何先决计划下彻底而有效地勘查大块区域。多数蚂蚁亚种仅有有限视觉或没有视觉而且只能闻到他们附近的东西。加上他们缺乏高层面的协调，这使他们貌似糟糕的勘探者，但有一个令人惊叹的简单方法使蚂蚁能最大化他们的搜索效率；（这就是）以个体互动为依据改变他们的移动模式。当两只蚂蚁相遇，他们通过碰触触角来感知对方。如果在小块区域内有许多蚂蚁，这将发生的更为频繁导致他们通过更迂回和随机的移动路径来响应（彼此）来使搜索更彻底。但在大块区域中仅有少量蚂蚁，这样的碰面则发生的不那么频繁它们能够走直线来覆盖更多地面。当用这种方式勘察他们环境时，一只蚂蚁会遇到各式各样的事，从威胁或敌人，到可选的巢穴点。一些亚种有另外一个能力，称为招募。当这些蚂蚁中的一只碰巧找到食物时，它会带回食物，用一种化学气味来标记路径，然后其他蚂蚁会跟随这一外激素（标记的）路径，并在他们每次能找到食物并返回时更新这一路径。一旦地点中的食物耗尽，这些蚂蚁便停止标记他们的回程。气味散发，蚂蚁们便不会再被吸引到这条路径上。事实上，这种看似原始的搜索和回收方法应用于计算机模型上非常有用，(例如)从分散元素中获得最优解决方法，随机工作和交换简单信息。这在理论上和实际上有很多应用，从解决著名的销售人员差旅问题，到计算机任务进度安排和最优化网络搜索，以及使多组机器人能够勘察矿区或在无任何中央控制下，整体焚烧某一建筑。但你可以直接通过一些简单实验来观察这些令人陶醉的简单而有效的过程，通过让蚂蚁进入不同大小的空旷区域并注意他们的行为。蚂蚁可能不会选举，开会甚至列计划，但如此简单的生物却能用这些复杂方式高效实现功能，我们人类仍能从这一方法中学到东西。

**P104 2014-07-10 What makes tattoos permanent - Claudia Aguirre**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=104)

Tattoos have often been presented in popular media as either marks of the dangerous and deviant or trendy youth fads. But while tattoo styles come and go, and their meaning has differed greatly across cultures, the practice is as old as civilization itself. Decorative skin markings have been discovered in human remains all over the world, with the oldest found on a Peruvian mummy dating back to 6,000 BCE. But have you ever wondered how tattooing really works? You may know that we shed our skin, losing about 30-40,000 skin cells per hour. That's about 1,000,000 per day. So, how come the tattoo doesn't gradually flake off along with them? The simple answer is that tattooing involves getting pigment deeper into the skin than the outermost layer that gets shed. Throughout history, different cultures have used various methods to accomplish this. But the first modern tattooing machine was modeled after Thomas Edison's engraving machine and ran on electricity. Tattooing machines used today insert tiny needles, loaded with dye, into the skin at a frequency of 50 to 3,000 times per minute. The needles punch through the epidermis, allowing ink to seep deep into the dermis, which is composed of collagen fibers, nerves, glands, blood vessels and more. Every time a needle penetrates, it causes a wound that alerts the body to begin the inflammatory process, calling immune system cells to the wound site to begin repairing the skin. And it is this very process that makes tattoos permanent. First, specialized cells called macrophages eat the invading material in an attempt to clean up the inflammatory mess. As these cells travel through the lymphatic system, some of them are carried back with a belly full of dye into the lymph nodes while others remain in the dermis. With no way to dispose of the pigment, the dyes inside them remain visible through the skin. Some of the ink particles are also suspended in the gel-like matrix of the dermis, while others are engulfed by dermal cells called fibroblasts. Initially, ink is deposited into the epidermis as well, but as the skin heals, the damaged epidermal cells are shed and replaced by new, dye-free cells with the topmost layer peeling off like a heeling sunburn. Blistering or crusting is not typically seen with professional tattoos and complete epidermal regeneration requires 2-4 weeks, during which excess sun exposure and swimming should be avoided to prevent fading. Dermal cells, however, remain in place until they die. When they do, they are taken up, ink and all, by younger cells nearby, so the ink stays where it is. But with time, tattoos do fade naturally as the body reacts to the alien pigment particles, slowly breaking them down to be carried off by the immune system's macrophages. Ultraviolet radiation can also contribute to this pigment breakdown, though it can be mitigated by the use of sunblock. But since the dermal cells are relatively stable, much of the ink will remain deep in the skin for a person's whole life. But if tattoos are embedded in your skin for life, is there any way to erase them? Technically, yes. Today, a laser is used to penetrate the epidermis and blast apart underlying pigment colors of various wavelengths, black being the easiest to target. The laser beam breaks the ink globules into smaller particles that can then be cleared away by the macrophages. But some color inks are harder to remove than others, and there could be complications. For this reason, removing a tattoo is still more difficult than getting one, but not impossible. So a single tattoo may not truly last forever, but tattoos have been around longer than any existing culture. And their continuing popularity means that the art of tattooing is here to stay.

**P104 2014-07-10 What makes tattoos permanent - Claudia Aguirre**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=104)

翻译人员: Kai Cui 校对人员: Yangyezi Cao纹身，在大众媒体中经常被当作危险和怪异的标志或者是时髦的年轻风尚但是尽管流行的纹身图案经常变换在不同文化环境中 代表的含义也差别巨大但纹身这种行为 却像人类的文明本身一样古老装饰性的皮肤标记在世界各地的人类遗迹中都有发现其中最古老的是 公元前6000年的秘鲁木乃伊但你是否疑惑过 纹身的原理到底是什么？你或许知道，我们也会脱皮每个小时会代谢掉3到4万个皮肤细胞一天大约是1百万个皮肤细胞那么，纹身怎么没有随着 皮肤细胞的代谢而剥落呢？简单的回答是, 纹身的过程是把颜料植入外层可以脱落的皮肤之下纵观历史, 不同的文化有不同的纹身方法但是第一台现代纹身机器脱胎于托马斯爱迪生发明的雕刻机靠电力运行今天所使用的纹身机是把沾有颜料的细针刺入皮肤以每分钟50到3000次的频率震动针刺透表皮让颜料深入真皮真皮之下 是胶原纤维、神经、腺体、血管等等针的每一下刺入，都会造成伤口身体会立即开始对抗炎症的反应召唤免疫细胞到伤口处修复皮肤就是在这个过程中, 纹身图案得以永久保留首先，巨噬细胞会吃掉外来物质， 试图清理有可能出现的炎症当这些细胞在淋巴系统中运动有一部分携带着大量颜料进入淋巴结另外一些依然留在表皮之下由于再没有其它方式去除颜料细胞中的颜料 因此在皮肤下面清晰可见有些颜料颗粒 悬浮在胶质的真皮结构中而其它颜料颗粒 被叫做成纤维细胞的真皮细胞吞噬其实，纹身的过程也会把颜料植入表皮但是随着皮肤的自我修复， 损坏的表皮细胞脱落被新的、没有颜料的细胞所替代如同表层皮肤被阳光灼伤一样脱落专业的纹身过程不大会出现 肿胀和结痂的现象完整的表皮自我修复需要2到4周在此期间应当尽量避免 过度日照和游泳以防止纹身褪色真皮细胞依然存在，直到死去死去之后，它们体内的颜料 被附近新生的细胞所携带所以颜料不会被代谢出体外但随着时间推移, 纹身的确会自然褪色 因为身体会对外来的色素颗粒 产生反应缓慢地将其分解， 由免疫系统的巨噬细胞带出体外紫外线照射也可以加速颜料的分解当然，防晒霜可以起到一些保护作用但由于真皮细胞相对稳定大部分颜料会伴随人的一生 存在于皮肤之下但是如果纹身将会伴你一生， 那么有没有办法将其擦除？从技术角度讲，是有的今天，可以用激光来穿透表皮分解掉隐藏在内部的、 具有不同波长的颜料颗粒黑色最容易被分解激光把颜料块击碎，变成更小的颗粒巨噬细胞可以将其清除但是有些颜色很难消除而且会出现并发症所以擦除纹身依然比刺上纹身难很多但也并非绝无可能所以一个纹身不一定会伴你一生但纹身的存在 远比任何一种现存的文化更加古老而且人们对其的热衷， 会让这种艺术继续存在下去

**P105 2014-07-11 It's a church. It's a mosque. It's Hagia Sophia. - Kelly Wall**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=105)

They say that if walls could talk, each building would have a story to tell, but few would tell so many fascinating stories in so many different voices as the Hagia Sophia, or holy wisdom. Perched at the crossroads of continents and cultures, it has seen massive changes from the name of the city where it stands, to its own structure and purpose. And today, the elements from each era stand ready to tell their tales to any visitor who will listen. Even before you arrive at the Hagia Sophia, the ancient fortifications hint at the strategic importance of the surrounding city, founded as Byzantium by Greek colonists in 657 BCE. And successfully renamed as Augusta Antonia, New Rome and Constantinople as it was conquered, reconquered, destroyed and rebuilt by various Greek, Persian and Roman rulers over the following centuries. And it was within these walls that the first Megale Ekklesia, or great church, was built in the fourth century. Though it was soon burned to the ground in riots, it established the location for the region's main religious structure for centuries to come. Near the entrance, the marble stones with reliefs are the last reminders of the second church. Built in 415 CE, it was destroyed during the Nika Riots of 532 when angry crowds at a chariot race nearly overthrew the emperor, Justinian the First. Having barely managed to retain power, he resolved to rebuild the church on a grander scale, and five years later, the edifice you see before you was completed. As you step inside, the stones of the foundation and walls murmur tales from their homelands of Egypt and Syria, while columns taken from the Temple of Artemis recall a more ancient past. Runic inscriptions carved by the Vikings of the emperor's elite guard carry the lore of distant northern lands. But your attention is caught by the grand dome, representing the heavens. Reaching over 50 meters high and over 30 meters in diameter and ringed by windows around its base, the golden dome appears suspended from heaven, light reflecting through its interior. Beneath its grandiose symbolism, the sturdy reinforcing Corinthian columns, brought from Lebanon after the original dome was partially destroyed by an earthquake in 558 CE, quietly remind you of its fragility and the engineering skills such a marvel requires. If a picture is worth a thousand words, the mosaics from the next several centuries have the most to say not only about their Biblical themes, but also the Byzantine emperors who commissioned them, often depicted along with Christ. But beneath their loud and clear voices, one hears the haunting echoes of the damaged and missing mosaics and icons, desecrated and looted during the Latin Occupation in the Fourth Crusade. Within the floor, the tomb inscription of Enrico Dandolo, the Venetian ruler who commanded the campaign, is a stark reminder of those 57 years that Hagia Sophia spent as a Roman Catholic church before returning to its orthodox roots upon the Byzantine Reconquest. But it would not remain a church for long. Weakened by the Crusades, Constantinople fell to the Ottomans in 1453 and would be known as Istanbul thereafter. After allowing his soldiers three days of pillage, Sultan Mehmed the Second entered the building. Though heavily damaged, its grandeur was not lost on the young sultan who immediately rededicated it to Allah, proclaiming that it would be the new imperial mosque. The four minarets built over the next century are the most obvious sign of this era, serving as architectural supports in addition to their religious purpose. But there are many others. Ornate candle holders relate Suleiman's conquest of Hungary, while giant caligraphy discs hung from the ceiling remind visitors for the first four caliphs who followed Muhammad. Though the building you see today still looks like a mosque, it is now a museum, a decision made in 1935 by Kemal Ataturk, the modernizing first president of Turkey following the Ottoman Empire's collapse. It was this secularization that allowed for removal of the carpets hiding the marble floor decorations and the plaster covering the Christian mosaics. Ongoing restoration work has allowed the multiplicity of voices in Hagia Sophia's long history to be heard again after centuries of silence. But conflict remains. Hidden mosaics cry out from beneath Islamic calligraphy, valuable pieces of history that cannot be uncovered without destroying others. Meanwhile, calls sound from both Muslim and Christian communities to return the building to its former religious purposes. The story of the divine wisdom may be far from over, but one can only hope that the many voices residing there will be able to tell their part for years to come.

**P105 2014-07-11 It's a church. It's a mosque. It's Hagia Sophia. - Kelly Wall**

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翻译人员: Denise Tso 校对人员: Zhiting Chen听说，如果墙壁会讲话， 每一栋建筑物都会诉说自己的故事,但是，能用各式各样的声音 讲述不同故事的恐怕非圣索菲亚大教堂 （史称君士坦丁堡）莫属。站在州与州、文化与文化的交界，她见证了很多重大改变， 从她身处城市的名字，到本身建筑结构和用途。成就她的每一个特点，今天，都准备好跟愿意倾听的来访者 诉说自己的故事了。即便你还没踏进君士坦丁堡， 她周边古老的防御工事已暗示了她所在的城市 在军事上曾是那么重要。希腊人于公元前657年在这里定居， 并把这片土地叫做拜占庭，在往后几百年里，她的名字也从奥古斯塔安东尼亚 变成新罗马，再变成康斯坦丁堡，那是因为她经过了希腊、波斯 以及罗马统治者接连几个世纪不断的侵占、破坏 以及重建所致。就是在这重重围墙里，第一所马格拉阿拉斯亚， 即“大教堂”于四世纪建成了。尽管不久后，她在暴乱中夷为平地，“大教堂”的位置成为未来几百年该地兴建主要宗教建筑的地点。在入口附近，刻有浮雕的大理石是第二间教堂的遗迹。这座教堂于公元415年兴建， 于532年的尼卡暴动中毁于一旦。当时，愤怒的群众 在一场双轮马车竞技中几乎推翻了皇帝查士丁尼一世。好不容易保住皇位的他，决定把教堂建造得更加辉煌宏大，五年后，我们眼前这建筑奇迹终于完工。当我们走进里面， 堆砌地基和墙壁的石头向我们轻诉家乡埃及和叙利亚的传说；而取自阿尔忒弥斯神庙的石柱 则在回忆更古老的过去；皇帝的菁英守卫刻下那些神秘的维京语铭文为我们传递那遥远北岸的传说。但是，我们的目光总会停留在 那代表天堂的壮丽穹顶。穹顶高50米，直径30米以上，有多扇窗户环绕基底，金黄的圆顶像从天堂悬挂下来，穿插进来的光线在教堂内部反射。在这浮华的象征底下， 坚实的科林斯支柱(古典建筑的一种柱式)在公元558年的一次地震后， 从黎巴嫩运来，用以加固圆顶，因为当时，原来的穹顶 有一部分被地震损坏，这些柱子的存在轻轻地提醒我们 它的脆弱，以及建造这建筑奇迹背后 所需的工程技术。如果一幅画胜过千言万语，那么这里晚几个世纪出现的 镶嵌画可说的就更多了，这些画不但有圣经主题，还有委托制作这些作品的拜占庭皇帝，这些皇帝都伴随基督出现在画中。不过在他们嘹亮的声音背后，我们听到损毁或遗失的镶嵌画和画里圣像 在第四次十字军东征的拉丁侵占时被亵渎、被掠夺所回响的 萦绕心头、令人神伤的声音。地板之下，是刻上恩里科·丹多洛 名字的坟墓，即负责指挥这次战役的威尼斯指挥官，它的存在鲜明的提醒访客 在那57年间君士坦丁堡被用作罗马天主教堂，后来才在拜占庭重夺该地后 回归原本东正教的根。但是，它作为教堂的日子没有很久。几次十字军东征削弱了它所在的城市康斯坦丁堡， 1453年，该地最后败在奥斯曼帝国的手上，并从此名为伊斯坦堡。在允许士兵三日三夜的洗劫后，苏丹穆罕默德二世进入君士坦丁堡教堂。尽管教堂被严重损坏，但在这位年轻苏丹的眼中， 它气势犹存，于是他就立刻把教堂重新献给阿拉，宣布它将是新的御用清真寺。四座宣礼塔在之后一个世纪建成，他们成为该世纪最明显的印记，不但拥有宗教作用（召唤信众礼拜）， 还在建筑上起了承托的功效。不过君士坦丁堡里 属于这个时期的特色还有很多，譬如华丽的烛台诉说 苏莱曼一世攻占匈牙利的故事，从教堂顶部悬挂下来的 伊斯兰书法巨盘提醒人们继承穆罕默德的 最初四位统治者。虽然今天我们所见的君士坦丁堡仍然像一座清真寺， 它现在已经变为博物馆了，在1935年做出这个决定的是凯末而·阿塔蒂而克，他是在奥斯曼帝国倒下后现代土耳其的第一任总统。正因为这样的转变 使得宗教影响在当地降低，人们能收起铺在大理石地板上的 装饰地毯以及移除遮盖基督教鑲嵌画的石膏。持续不断的修复 让君士坦丁堡长远的历史里各种各样的声音在好几世纪的沉默后得以被人们听见。但是，冲突依然继续。隐藏在伊斯兰书法下的鑲嵌画大声呼喊，历史珍贵的片段无法在 不毁灭彼此的情况下得以发掘。同时，伊斯兰和基督教组织都要求把建筑还原到它原来的宗教用途。这个天赐的智慧的故事 可能离总结还有一段路，不过我们只能祈求 常驻那儿的许多声音都能在未来的日子里 讲述自己的故事。

**P106 2014-07-14 The many meanings of Michelangelo's Statue of David - James Earle**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=106)

When we think of classic works of art, the most common setting we imagine them in is a museum. But what we often forget is that much of this art was not produced with a museum setting in mind. What happens to an artwork when it's taken out of its originally intended context? Take the example of Michelangelo's Statue of David, depicting the boy hero who slew the giant philistine, Goliath, armed with only his courage and his slingshot. When Michelangelo began carving a block of pure white marble to communicate this famous Biblical story, the city of Florence intended to place the finished product atop their grand cathedral. Not only would the 17 foot tall statue be easily visible at this height, but its placement alongside 11 other statues of Old Testament heroes towering over onlookers would have a powerful religious significance, forcing the viewer to stare in awe towards the heavens. But by the time Michelangelo had finished the work, in 1504, the plans for the other statues had fallen through, and the city realized that lifting such a large sculpture to the roof would be more difficult than they had thought. Furthermore, the statue was so detailed and lifelike, down to the bulging veins in David's arm and the determination on his face, that it seemed a shame to hide it so far from the viewer. A council of politicians and artists convened to decide on a new location for the statue. Ultimately voting to place it in front of the Palazzo della Signoria, the town hall and home of the new Republican government. This new location transformed the statue's meaning. The Medici family, who for generations had ruled the city through their control of banking, had recently been exiled, and Florence now saw itself as a free city, threatened on all sides by wealthy and powerful rivals. David, now the symbol of heroic resistance against overwhelming odds, was placed with his intense stare, now a look of stern warning, focused directly towards Rome, the home of Cardinal Giovanni de Medici. Though the statue itself had not been altered, its placement changed nearly every aspect of it from a religious to a political significance. Though a replica of David still appears at the Palazzo, the original statue was moved in 1873 to the Galleria dell'Accademia, where it remains today. In the orderly, quiet environment of the museum, alongside numerous half-finished Michelangelo sculptures, overt religious and political interpretations fall away, giving way to detached contemplation of Michelangelo's artistic and technical skill. But even here, the astute viewer may notice that David's head and hand appear disproportionately large, a reminder that they were made to be viewed from below. So, not only does context change the meaning and interpretation of an artwork throughout its history, sometimes it can make that history resurface in the most unexpected ways.

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翻译人员: Kai Cui 校对人员: Xiaoou Chen当我们想到经典的艺术作品我们想象中最常见的场景， 是它们被放置在博物馆里但我们往往忽略的事实是，大部分艺术作品在创作时，并未把博物馆设想成背景当一件艺术品从创作时的背景中被移走，会怎么样呢？让我们用米开朗基罗的大卫雕像来举例大卫是手刃非利士族巨人的年轻英雄他的装备只有弹弓和他的勇气当米开朗基罗开始在一块纯白的大理石上动工来表现这个著名的圣经故事时佛罗伦萨市打算把完工后的作品放在大教堂的顶端不仅仅是因为这座17英尺高的雕像在这么高的地方可供清晰瞻仰另外一个目的是把它和其它11座《旧约全书》中的英雄雕 像并排放置，俯视瞻仰者在人们面前营造出一种强大的宗教气氛迫使人们怀着敬畏的心情仰视天堂但是当米开朗基罗在1504年完成这个作品时其它雕像的计划纷纷流产另外，佛罗伦萨发现，把这 么大的一座雕像抬到房顶比他们原先设想的要难很多而且，雕像细致入微、栩栩如生大卫手臂上鼓起的青筋和脸上坚毅的表情清晰可见让人们只能远距离观看似乎太可惜了当地的政治家议会和艺术家们召开会议，讨论一个放置雕像的新地点最终，经过投票，决 定把它放在领主宫前那是当时的市政厅和 新的共和党政府所在地这个新地点改变了雕像的含义梅第奇家族几代人通过控制银行体系统治着这座城市，他们刚刚被流放佛罗伦萨认为自己是一个自由的城市在富有和强大的敌人环伺下四面楚歌大卫，作为英勇抵抗强大异族的象征其炯炯的目光是一种严肃的警告，直接针对罗马红衣主教乔凡尼德梅第奇的老家雕像还是那座雕像位置的变化几乎改变了它的一切含义从宗教意义变为政治意义尽管领主宫前依然树立着 一座大卫雕像的复制品但原作在1873年被搬到学院美术馆，一直到今天在博物馆安静、有秩序的环境中加上那些米开朗基罗无 数最终未能完成的作品它的宗教和政治含义逐渐淡去浮现出来的是米开朗基罗对艺术和雕刻技巧的超然关注但即使在这里，机敏的观众或许会发现大卫的头和手不成比例地稍大这提醒人们，这座雕像原 本是供人从下向上瞻仰的.所以，背景不但会改变一件艺术作品在历史中的含义和解释有时候它还会让历史以一种未曾预料的方式浮现出来

**P107 2014-07-15 How quantum mechanics explains global warming - Lieven Scheire**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=107)

You've probably heard that carbon dioxide is warming the Earth, but how does it work? Is it like the glass of a greenhouse or like an insulating blanket? Well, not entirely. The answer involves a bit of quantum mechanics, but don't worry, we'll start with a rainbow. If you look closely at sunlight separated through a prism, you'll see dark gaps where bands of color went missing. Where did they go? Before reaching our eyes, different gases absorbed those specific parts of the spectrum. For example, oxygen gas snatched up some of the dark red light, and sodium grabbed two bands of yellow. But why do these gases absorb specific colors of light? This is where we enter the quantum realm. Every atom and molecule has a set number of possible energy levels for its electrons. To shift its electrons from the ground state to a higher level, a molecule needs to gain a certain amount of energy. No more, no less. It gets that energy from light, which comes in more energy levels than you could count. Light consists of tiny particles called photons and the amount of energy in each photon corresponds to its color. Red light has lower energy and longer wavelengths. Purple light has higher energy and shorter wavelengths. Sunlight offers all the photons of the rainbow, so a gas molecule can choose the photons that carry the exact amount of energy needed to shift the molecule to its next energy level. When this match is made, the photon disappers as the molecule gains its energy, and we get a small gap in our rainbow. If a photon carries too much or too little energy, the molecule has no choice but to let it fly past. This is why glass is transparent. The atoms in glass do not pair well with any of the energy levels in visible light, so the photons pass through. So, which photons does carbon dioxide prefer? Where is the black line in our rainbow that explains global warming? Well, it's not there. Carbon dioxide doesn't absorb light directly from the Sun. It absorbs light from a totally different celestial body. One that doesn't appear to be emitting light at all: Earth. If you're wondering why our planet doesn't seem to be glowing, it's because the Earth doesn't emit visible light. It emits infared light. The light that our eyes can see, including all of the colors of the rainbow, is just a small part of the larger spectrum of electromagnetic radiation, which includes radio waves, microwaves, infrared, ultraviolet, x-rays, and gamma rays. It may seem strange to think of these things as light, but there is no fundamental difference between visible light and other electromagnetic radiation. It's the same energy, but at a higher or lower level. In fact, it's a bit presumptuous to define the term visible light by our own limitations. After all, infrared light is visible to snakes, and ultraviolet light is visible to birds. If our eyes were adapted to see light of 1900 megahertz, then a mobile phone would be a flashlight, and a cell phone tower would look like a huge lantern. Earth emits infrared radiation because every object with a temperature above absolute zero will emit light. This is called thermal radiation. The hotter an object gets, the higher frequency the light it emits. When you heat a piece of iron, it will emit more and more frequencies of infrared light, and then, at a temperature of around 450 degrees Celsius, its light will reach the visible spectrum. At first, it will look red hot. And with even more heat, it will glow white with all of the frequencies of visible light. This is how traditional light bulbs were designed to work and why they're so wasteful. 95% of the light they emit is invisible to our eyes. It's wasted as heat. Earth's infrared radiation would escape to space if there weren't greenhouse gas molecules in our atmophere. Just as oxygen gas prefers the dark red photons, carbon dioxide and other greenhouse gases match with infrared photons. They provide the right amount of energy to shift the gas molecules into their higher energy level. Shortly after a carbon dioxide molecule absorbs an infrared photon, it will fall back to its previous energy level, and spit a photon back out in a random direction. Some of that energy then returns to Earth's surface, causing warming. The more carbon dioxide in the atmosphere, the more likely that infrared photons will land back on Earth and change our climate.

**P107 2014-07-15 How quantum mechanics explains global warming - Lieven Scheire**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=107)

翻译人员: Xiangyu Zheng 校对人员: Shan Liu你可能听说过二氧化碳正在让地球变暖但这是什么原理呢？二氧化碳像是温室的玻璃？或者像是隔热的毛毯？其实不全是这样。答案关系到一些量子力学的知识，但是不用担心让我们从彩虹说起如果你透过三棱镜仔细观察被分散的阳光你会看到光谱中有一些暗掉的缺口 一部分颜色的波段消失了它们去哪里了？在到达我们的眼睛之前很多气体就已经吸收掉波谱中特定的一些频段例如，氧气夺走了一些深红色光线钠夺取了黄色的两个波段但为什么这些气体会吸收特定颜色的光呢？我们现在就要进入量子学领域了每个原子和分子都有一定数量的电子能量等级使电子从基态跃迁到一个更高的能级分子需要获得一个特定量的能量不能多，也不能少分子从光线中获得这种能量光线里含有数不胜数的能量层级光由被称为“光子”的微小粒子组成每个光子里储存的能量与其颜色对应红色光线能量较低，波长较长紫色光线能量较高，波长较短阳光提供了彩虹里所有颜色的光子所以一个气体分子可以选择带有它们所需的特定能量值的光子用以把分子提升到下一个能级匹配上之后光子将消失，因为分子获取了它的能量从而造成了光谱里的缺口如果一个光子携带的能量太多或太少分子就只好让它飞过这就是玻璃透明的原因玻璃里的原子和可见光里的波段不匹配所以这些光子全部直接通过那么，二氧化碳选择吸收哪些光子呢？彩虹光谱中的哪一条黑线能解释全球变暖呢？其实，不在那儿二氧化碳不直接从阳光中吸收光线它吸收的光线来自一个完全不同的天体一个看起来根本不发光的天体：地球如果你在想为什么我们的星球看起来不发光那是因为地球不发射可见光它发射的是红外光我们眼睛能看得见的光包括彩虹里的所有颜色都只是电磁辐射大光谱里的一小部分大光谱里有无线电波，微波红外线，紫外线，X射线和伽马射线把这些都当成是光线可能有点奇怪但是可见光和电磁射线之间没有根本的区别它们都是能量只不过在能级上有高低之分其实，我们用自身的局限来定义“可见光”是有点自大的毕竟，蛇类看得见红外线鸟类看得见紫外线如果我们的眼睛能看见1900兆赫的光线那么一个移动电话将会变成手电而一个手机信号塔将看起来像个大灯笼地球发出红外射线因为每个温度在绝对零度之上的物体都会发出光线这被称作“热辐射”一个物体越热它发出的光线频率越高当你加热铁的时候它将会发出越来越高频率的红外光然后，当温度达到450摄氏度时它发出的光将达到可见光范围刚开始，它看起来是赤热的红色得到更多热量时它发的光将变白发出可见光波段里所有的光这是传统灯泡的设计原理也是为什么它们如此浪费能源它们发出的光中95%都是我们眼睛看不见的光它以热量的形式浪费掉了如果我们的大气层中没有温室气体分子的话地球的红外射线会逃到太空中就像氧气偏爱深红色光子一样二氧化碳和其它温室气体和红外线光子匹配它们提供了正好合适的能量用来使气体分子升到它们更高一层的能级当一个二氧化碳分子吸收了红外光子之后不久它便会回到之前的能级并分离出一个光子，以随机的方向射出这些能量的一部分就返回了地球表面导致变暖大气层里的二氧化碳越多红外光子反回到地球表面的可能性就越大使我们的气候随之改变

**P108 2014-07-16 What happens when you get heat stroke - Douglas J. Casa**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=108)

In 1985, 16-year-old Douglas Casa, ran the championship 10,000 meter track race at the Empire State Games. Suddenly, with just 200 meters to go, he collapsed, got back up and then collapsed again on the final straightaway, with his body temperature at dangerous levels. He had suffered an exertional heat stroke. Fortunately, with immediate and proper treatment, he survived the potentially fatal episode and has since helped save 167 people in similar circumstances. From ancient soldiers on the battlefield to modern day warriors on the gridiron, exertional heat stroke, or sunstroke, has long been a serious concern. And unlike classical heat stroke, which affects vulnerable people such as infants and the elderly during heat waves, exertional heat stroke is caused by intense exercise in the heat, and is one of the top three killers of athletes and soldiers in training. When you exercise, nearly 80% of the energy you use is transformed into heat. In normal circumstances, this is what's known as compensable heat stress. And your body can dissipate the heat as quickly as it's generated through cooling methods like the evaporation of sweat. But with uncompensable heat stress, your body is unable to lose enough heat due to overexertion or high temperatures in humidity, which raises your core temperature beyond normal levels. This causes the proteins and cell membranes to denature, creating cells that no longer function properly and begin to leak their contents. If these leaky cells proliferate through the body, the results can be devastating. Including liver damage, blood clot formation in the kidneys, damage to the gastrointestinal tract and even the failure of vital organs. So how do you diagnose an exertional heat stroke? The main criterion is a core body temperature greater than 40 degrees Celsius observed along with physical symptoms such as increased heart rate, low blood pressure and rapid breathing or signs of central nervous system disfunction such as confused behavior, aggression or loss of consciousness. The most feasible and accurate way to assess core body temperature is with a rectal thermometer as other common temperature-taking methods are not accurate in these circumstances. As far as treatment goes, the most important thing to remember is cool first, transport second. Because the human body can withstand a core temperature above 40 degrees Celsius for about 30 minutes before cell damage sets in, it's essential to initiate rapid cooling on site in order to lower it as quickly as possible. After any athletic or protective gear has been removed from the victim, place them in an ice water tub while stirring the water and monitoring vitals continuously. If this is not possible, dousing in ice water and applying wet towels over the entire body can help. But before you start anything, emergency services should be called. As you wait, it's important to keep the victim calm while cooling as much surface area as possible until emergency personnel arrive. If medical staff are available on site, cooling should continue until a core temperature of 38.9 degrees Celsius is reached. The sun is known for giving life, but it can also take life away if we're not careful, even affecting the strongest among us. As Dr. JJ Levick wrote of exertional heat stroke in 1859, "It strikes down its victim with his full armor on. Youth, health and strength oppose no obstacle to its power." But although this condition is one of the top three leading causes of death in sports, it has been 100% survivable with proper care.

**P108 2014-07-16 What happens when you get heat stroke - Douglas J. Casa**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=108)

翻译人员: Han Zhang 校对人员: zicheng zhou1985年，16岁的道格拉斯 卡薩正在帝国赛事的万米长跑中竞赛。突然，在离终点只有两百米时， 他倒下了。他爬了起来， 可是在最后冲刺时又倒下了他的体温处于危险水平。他因运动过度而中暑了。可幸的是， 由于他及时接受了适当的治疗道格拉斯活了下来并从此，救活了167名 由于类似原因受伤的人。从古代战场上的士兵到现代球场上的战士运动型中暑，也称日射病， 一直是他们的一大担忧。与传统型中暑不同的是， 它不止会伤及脆弱的人群例如热浪波及的老人与婴儿。运动型中暑是在酷热中 激烈运动所造成的并且是运动员与受训军人的 三大杀手之一。当你在运动时，你所用掉的 百分之八十的能量被转化为热量。正常情况下，这被称为可偿性热应激。此时，你的身体可以通过 挥发汗水等方法将转化出来的热量及时散去。但是如果你得了无偿性热应激你的身体将无法 及时散发热量，原因可能是运动过度 或环境炎热、潮湿。这会使你的体核温度 超出正常水平。这使细胞膜中的蛋白质变质，使细胞无法正常运作并开始泄露内含物。如果这些漏水的细胞遍布体内后果将不堪设想。有可能造成肝脏受损， 肾脏内血栓，肠胃损坏，甚至内脏衰竭。要如何诊断运动型中暑呢？主要是看体核温度 是否超过40摄氏度其他症状包括心跳加快，低血压以及呼吸急促或是中枢神经系统失调的迹象例如行为混乱， 具有攻击性或丧失意识。最可行且准确的 测量体核温度的方法是使用直肠体温计因为其它测温方法 在这种情况下并不准确。就治疗而言要记住：先冷却，后移动。人体核心温度高于40摄氏度 的时间上限大约是30分钟。 在此之后细胞将开始损毁。所以务须当场着手降温才能确保体温能迅速降下来。先把患者身上的防具 与运动装备卸下来，再将患者浸入冰水之中， 并不停搅动冰水同时持续观察生命迹象。如果无法做到这点，那么用冰水冲刷病患以及 用湿毛巾覆盖全身也有所帮助。但在施救前， 记得传呼急救服务。在等待救护的时候， 要确保患者保持冷静同时尽可能冷却患者全身直至急救专员到达现场。如果在场有医疗人员， 冷却应该继续直到体核温度降至 38.9摄氏度为止。人们说太阳赋予了我们生命但若我们不够谨慎， 它也能夺走生命就连我们之中最坚强的人也一样正如 JJ 勒维克医生 在1859年写到的一样：“运动型中暑 连全副武装的患者也能打倒。青春，健康与气力 都无法抵挡它的力量。”可是尽管运动型中暑 是体育界的三大死因之一在得到妥当治疗的情况下 存活率却是百分之一百。

**P109 2014-07-17 Under the hood - The chemistry of cars - Cynthia Chubbuck**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=109)

There are over one billion cars in the world today, getting people where they need to go, but cars aren't just a mode of transportation, they're also a chemistry lesson waiting to be taught. The process of starting your car begins in the engine cylinders, where a spritz of gasoline from the fuel injector and a gulp of air from the intake valve mix together before being ignited by a spark, forming gases that expand and push the piston. But combustion is an exothermic reaction, meaning it releases heat. Lots of it. And while much of this heat escapes through the tail pipe, the heat that remains in the engine block needs to be absorbed, transported, and dissipated to protect the metal components from deforming or even melting. This is where the cooling system comes in. A liquid gets circulated throughout the engine, but what kind of liquid can absorb all that heat? Water may seem like an obvious first choice. After all, its specific heat, the amount of energy required to raise the temperature of a given amount by one degree Celsius, is higher than that of any other common substance. And we have a lot of heat energy to absorb. But using water can get us into deep trouble. For one thing, its freezing point is zero degrees Celsius. Since water expands as it freezes, a cold winter night could mean a cracked radiator and a damaged engine block, a chilling prospect. And considering how hot car engines can get, the relatively low boiling point of 100 degrees Celsius can lead to a situation that would get anyone steamed. So, instead of water, we use a solution, a homogeneous mixture consisting of a solute and a solvent. Some of the solution's properties will differ depending on the proportion of solute present. These are called colligative properties, and as luck would have it, they include freezing point depression and boiling point elevation. So, solutions have both a lower freezing point and a higher boiling point than pure solvent, and the more solute is present, the bigger the difference. So, why do these properties change? First of all, we need to understand that temperature is a measure of the particle's average kinetic energy. The colder the liquid, the less of this energy there is, and the slower the molecules move. When a liquid freezes, the molecules slow down, enough for their attractive forces to act on each other, arranging themselves into a crystal structure. But the presence of solute particles gets in the way of these attractions, requiring a solution to be cooled down further before the arrangement can occur. As for the boiling point, when a liquid boils, it produces bubbles filled with its vapor, but for a bubble to form, the vapor pressure must become as strong as the atmosphere constantly pushing down on the surface of the liquid. As the liquid is heated, the vapor pressure increases, and when it becomes equal to the atmospheric pressure, the bubbles form and boiling occurs. A solution's vapor pressure is lower than that of pure solvent, so it must be heated to an even higher temperature before it can match the strength of the atmosphere. As an added bonus, the pressure in the radiator is kept above atmospheric pressure, raising the boiling point by another 25 degrees Celsius. The solution commonly used for a car's cooling system is a 50/50 mixture of ethylene glycol and water, which freezes at -37 degrees Celsius and boils at 106 degrees Celsius. At the highest recommended proportion of 70 to 30, the freezing point is even lower at -55 degrees Celsius, and the boiling point rises to 113 degrees Celsius. As you can see, the more ethylene glycol you add, the more protection you get, so why not go even higher? Well, it turns out you can have too much of a good thing because at higher proportions, the freezing point actually starts to go back up. The properties of the solution head towards the properties of ethylene glycol, which freezes at -12.9 degrees Celsius, a higher temperature than we attained with the solution. The solution flows through the engine, absorbing heat along the way. When it reaches the radiator, it's cooled by a fan, as well as air rushing through the front of the car before returning to the hot engine compartment. So, an effective and safe engine coolant must have a high specific heat, a low freezing point, and a high boiling point. But instead of searching all over the world for the perfect liquid to solve our problem, we can create our own solution.

**P109 2014-07-17 Under the hood - The chemistry of cars - Cynthia Chubbuck**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=109)

翻译人员: xuanyu shi 校对人员: Jenny Yang如今世界上有十亿辆车，它们可以把人们带到需要去的地方但是车子并不只是一种交通工具它们本身也是一门需要去学习的化学课车子的启动过程从发动机气缸开始，汽油从喷油器中喷出然后大量的空气进入进气阀在被火花点燃之前混合在一起以此形成气体,扩大和推动活塞但燃烧是一个放热反应,这意味着释放热量。而且是很多热量然而当这些热量从排气尾管释放的时候，剩余在引擎的热量需要吸收、运输和释放来避免金属部件变形甚至融化。这就是冷却系统的由来。让一种液体在整个引擎边上流通,但是哪一种液体可以吸收那样的热量呢？显然水会是第一选择。毕竟，它的比热容，也就是一定质量的物质每提高一摄氏度所需的能量比任何其他的常见物质的比热容都高而且我们有很多需要吸收的能量但是用水来冷却会带来更大的麻烦首先，水的冰点是零摄氏度由于水在结冰的时候会扩大体积，一个寒冷冬天的夜晚也就意味着一个破碎的散热器和一个损坏的引擎这是一个令人心寒的前景考虑到引擎可以承受的热量相对100摄氏度较低的沸点会导致一种后果，那就是人们会被蒸熟所以，我们用了一种溶液取代了水一种由溶质和溶剂组成的均匀的混合物。其中一些溶质的特性是根据溶剂的量而改变的。这些特性被称为溶液的依数性，幸运的是它们可以降低凝固点和提高沸点。因此，溶液相对于纯溶剂有着较低的凝固点以及较高的沸点，而且溶质越多，差别越大。那么为什么这些特性会改变呢？首先，我们需要理解，温度是测量粒子的平均动能。液体温度越低，这种能量越少，而且水分子的运动速度也会变慢。当液体结冰时，分子运动速度减慢，速度慢到足以让它们的引力来进行相互作用自行地排成一个晶体结构但溶质粒子的存在阻碍了这些引力,需要一种溶液在自行排列前冷却下来。至于沸点,在液体沸腾时,它产生气泡并充满了蒸汽,但要形成气泡 蒸汽压必须要变得很强因为大气不断压低表面的液体。随着液体加热,蒸汽压会增强,然后当蒸汽压和大气压是一样的时候就会产生气泡 发生沸腾的现象。溶液的蒸汽压比纯溶剂要低,所以溶液必须 加热到一个更高的温度以此来和大气压强抗衡还有一个额外的好处,在散热器的压力一直保持比大气压强的状态再高25摄氏度就可以达到沸点。通常在冷却系统中采取的溶液是用一种50/50的乙二醇和水的混合物,这种混合物的凝固点是零下37摄氏度，沸点是106摄氏度。在最受推崇的70/30的比例当中,凝固点比零下55摄氏度还低，沸点将提高到113摄氏度。由此看来，添加的乙二醇越多，保护的能力越强， 所以为什么不用更多的乙二醇呢？好吧，结果是你不可能有太多的好东西因为在很高的比例中，凝固点的温度实际上又会升高。溶液的属性和乙二醇的属性相对应,都在零下12.9摄氏度结冰，比我们获得的溶液的温度高。该溶液流过发动机，在这过程中吸收热量。当溶液流到散热器的时候，溶液被风扇冷却下来，还有从车头吹过来的风也使得溶液冷却下来这些都是在溶液返回到热的引擎室之前发生的。所以，一个高效安全的发动机冷却液必须要有一个高的比热容， 低的凝固点，还有一个高的沸点。但是我们不需要满世界去找那种完美的液体来解决问题，我们自己可以创造溶液。

**P110 2014-07-18 How playing an instrument benefits your brain - Anita Collins**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=110)

Did you know that every time musicians pick up their instruments, there are fireworks going off all over their brain? On the outside, they may look calm and focused, reading the music and making the precise and practiced movements required. But inside their brains, there's a party going on. How do we know this? Well, in the last few decades, neuroscientists have made enormous breakthroughs in understanding how our brains work by monitoring them in real time with instruments like fMRI and PET scanners. When people are hooked up to these machines, tasks, such as reading or doing math problems, each have corresponding areas of the brain where activity can be observed. But when researchers got the participants to listen to music, they saw fireworks. Multiple areas of their brains were lighting up at once, as they processed the sound, took it apart to understand elements like melody and rhythm, and then put it all back together into unified musical experience. And our brains do all this work in the split second between when we first hear the music and when our foot starts to tap along. But when scientists turned from observing the brains of music listeners to those of musicians, the little backyard fireworks became a jubilee. It turns out that while listening to music engages the brain in some pretty interesting activities, playing music is the brain's equivalent of a full-body workout. The neuroscientists saw multiple areas of the brain light up, simultaneously processing different information in intricate, interrelated, and astonishingly fast sequences. But what is it about making music that sets the brain alight? The research is still fairly new, but neuroscientists have a pretty good idea. Playing a musical instrument engages practically every area of the brain at once, especially the visual, auditory, and motor cortices. As with any other workout, disciplined, structured practice in playing music strengthens those brain functions, allowing us to apply that strength to other activities. The most obvious difference between listening to music and playing it is that the latter requires fine motor skills, which are controlled in both hemispheres of the brain. It also combines the linguistic and mathematical precision, in which the left hemisphere is more involved, with the novel and creative content that the right excels in. For these reasons, playing music has been found to increase the volume and activity in the brain's corpus callosum, the bridge between the two hemispheres, allowing messages to get across the brain faster and through more diverse routes. This may allow musicians to solve problems more effectively and creatively, in both academic and social settings. Because making music also involves crafting and understanding its emotional content and message, musicians often have higher levels of executive function, a category of interlinked tasks that includes planning, strategizing, and attention to detail and requires simultaneous analysis of both cognitive and emotional aspects. This ability also has an impact on how our memory systems work. And, indeed, musicians exhibit enhanced memory functions, creating, storing, and retrieving memories more quickly and efficiently. Studies have found that musicians appear to use their highly connected brains to give each memory multiple tags, such as a conceptual tag, an emotional tag, an audio tag, and a contextual tag, like a good Internet search engine. How do we know that all these benefits are unique to music, as opposed to, say, sports or painting? Or could it be that people who go into music were already smarter to begin with? Neuroscientists have explored these issues, but so far, they have found that the artistic and aesthetic aspects of learning to play a musical instrument are different from any other activity studied, including other arts. And several randomized studies of participants, who showed the same levels of cognitive function and neural processing at the start, found that those who were exposed to a period of music learning showed enhancement in multiple brain areas, compared to the others. This recent research about the mental benefits of playing music has advanced our understanding of mental function, revealing the inner rhythms and complex interplay that make up the amazing orchestra of our brain.

**P110 2014-07-18 How playing an instrument benefits your brain - Anita Collins**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=110)

翻译人员: Shanshan (Alice) Lin 校对人员: lin quan你知道吗？ 每当音乐家们举起他们的乐器，他们的脑海便炸起了一朵朵烟花？他们表面看来， 也许镇定且聚精会神地，读着乐谱并按要求 进行着精准熟练的演奏。但是在他们大脑内部， 有一场狂欢正在上演。我们是如何知道这一切的呢？嗯，在过去的几十年里，通过核磁共振成像 和正子放射断层扫描仪等对大脑的实时监测， 神经科学家对我们的大脑如何运作已经有了巨大的突破。当人们连着这些仪器，开始活动， 例如阅读或是完成数学习题，大脑中每一个被激活的相应区域， 都能被观测到。但是当研究人员让实验者听音乐时，他们看到了烟花。大脑的多个区域被同时唤起，当大脑处理声音的时候，会把它拆分开来去理解音乐元素 像旋律和节奏，然后再把他们放回到一起 合成统一的音乐体验我们的大脑完成这项工作，仅在我们刚听到音乐 和脚开始跟着打拍子的瞬息之间。但是当科学家开始将 观测对象从音乐听众转移到音乐家的大脑时，这场后院的小烟火变成了嘉年华。事实证明听音乐的时候大脑进行了一场非常有趣的活动，演奏音乐的大脑活动 相当于进行了一次全身运动。神经科学家观察到大脑多个区域被激发，以复杂并相互关联且快速惊人的次序同步处理不同的信息。但音乐能激发大脑功能的原因是什么呢？相关研究才刚刚起步，但神经科学家已经有了相当好的想法。演奏一件乐器能几乎同时把大脑所有区域都唤醒，尤其是视觉，听觉和运动皮层。与其他运动相比，规律的， 结构性的演奏练习加强了这些大脑机能， 让我们能将这些优势运用到其他活动中。欣赏音乐和演奏音乐最明显的区别在于后者需要较好的动作技能，需要同时运用到大脑左右半球它同时结合了语言和数学精度这些多由大脑左半球参与，而新奇有创意的内容则由右脑参与。鉴于这些原因， 演奏音乐对于提高脑胼胝体其容量及活跃度，胼胝体是连接两个大脑半球的桥梁，能使信息在大脑内 通过多样的路径更快的传输，这可能使音乐家在学术和社交环境中更有效和独具创意的解决问题。由于创造音乐也涵盖制作和理解其中的情感化的内容和信息，所以音乐家们通常 具有高级别的执行能力，一类相互关联的任务，涵盖了计划，策略，注意细节，以及需要针对认知和情感进行同步分析这种能力也影响着记忆系统的工作。并且，事实上， 音乐家展现了更加高超的记忆能力，他们具备更快更有效的 创造，储存，恢复记忆功能。研究发现音乐家们 能运用他们高度连结的大脑来给每段记忆赋予多个标签，比如概念标签，情绪标签，声音标签，和语境标签就像一个强大的互联网搜索引擎一样。那我们如何得知这些好处 是音乐特有的呢？它与运动或绘画有何区别呢？或者说喜欢音乐的人本身即是非常聪明的人？神经科学家已经研究过这些问题， 但是目前，他们发现从艺术和美学方面看学习演奏乐器是和其他已研究的活动有着不同， 包括其他的艺术。并且在若干随机研究的参与者中在一开始有着同样认知和神经处理水平的人那些经过一段时间音乐学习与其他人相比， 大脑内多个区域得到提升这项音乐演奏对于大脑有益的最新研究，让我们进一步了解了大脑的功能，揭示了那些内在节奏和复杂的旋律在我们的大脑中所上演的美妙乐章。

**P111 2014-07-18 What light can teach us about the universe - Pete Edwards**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=111)

How and when did our universe begin? How did it get to look like this? How will it end? Humans have been discussing these questions for as long as they've been around without ever reaching much agreement. Today, cosmologists are working hard to find the answers. But how can anyone hope to find concrete answers to such profound questions? And how is it possible to explore and study something as huge as the universe, most of which we'll never be able to reach? The answer is light. And although light from distant parts of the universe can take billions of years to reach us, it carries six unique messages that, when put together, can disclose an amazing amount of information to astronomers who know how to look for it. Just as sunlight can be split up into the familiar rainbow, splitting the light from distant objects exposes different patterns of colors depending on its source. This distinctive light barcode can reveal not only an object's composition, but also the temperature and pressure of its constituent parts. There's even more we can discover from light. If you've ever stood on a train platform, you might have noticed that the train sounds different depending on its direction with the pitch ascending when it approaches you and descending when it speeds away. But this isn't because the train conductor is practicing for a second career. Rather, it's because of something called the Doppler effect where sound waves generated by an approaching object are compressed, while those from a receding object are stretched. But what has this to do with astronomy? Sound does not travel through a vacuum. In space, no one can you hear you scream! But the same Doppler effect applies to light whose source is moving at exceptional speed. If it's moving towards us, the shorter wavelength will make the light appear to be bluer. While light from a source that's moving away will have a longer wavelength, shifting towards red. So by analyzing the color pattern in the Doppler shift of the light from any object observed with a telescope, we can learn what it's made of, how hot it is and how much pressure it's under, as well as whether it's moving, in what direction and how fast. And these six measurements, like six points of light, reveal the history of the universe. The first person to study the light from distant galaxies was Edwin Hubble, and the light he observed was redshifted. The distant galaxies were all moving away from us, and the further away the were, the faster they were receding. Hubble had discovered our universe is expanding, providing the first evidence for the Big Bang theory. Along with the idea that the visible universe has been constantly expanding from a densely packed single point, one of this theory's most important predictions is that the early universe consisted of just two gases: hydrogen and helium, in a ratio of three to one. And this prediction can also be tested with light. If we observe the light from a remote, quiet region of the universe and split it, we do indeed find the signatures of the two gases in just those proportions. Another triumph for the Big Bang. However, many puzzles remain. Although we know the visible universe is expanding, gravity should be applying the brakes. But recent measurements of light from distant dying stars show us that they're farther away than predicted. So the expansion of the universe is actually accelerating. Something appears to be pushing it, and many scientists believe that something is dark energy, making up over 2/3 of the universe and slowly tearing it apart. Our knowledge of the behavior of matter and the precision of our instruments means that simply observing distant stars can tell us more about the universe than we ever thought possible. But there are other mysteries, like the nature of dark energy upon which we have yet to shed light.

**P111 2014-07-18 What light can teach us about the universe - Pete Edwards**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=111)

翻译人员: Qingqing Mao 校对人员: Erli Cai宇宙是何时、又是如何诞生的？它如何变成我们所见的这样？它将如何结束？人类自始以来一直都在讨论这些问题，但是向来没有明确的结论。如今，宇宙学家正努力寻找答案。但是，对于如此深刻的问题，如何能期望得到确定的答案呢？还有，要如何才可能探索和研究宇宙这般大的事物呢？要知道我们永远无法到达宇宙中的大部分地区。答案是光。虽然来自宇宙中遥远区域的光需要数十亿年才能到达我们这里，但是这些光携带了六种独特的信号， 如果将这些信息整合起来天文学家就可以从中揭示出大量的信息，而天文学家知道如何去寻找这些信号。就像太阳光可以被分离为我们所熟知的彩虹，分离来自遥远天体的光也能发现不同的颜色模式，这种模式取决于光的源头。这一独特的光条形码不仅可以揭示天体的化学组成，还可以告诉我们其各部分的温度和压力。我们还可以从光里发现更多。如果你曾站在一个火车站台上，你可能会发现不同方向的火车听起来不同，当火车朝向你时听起来音调较高而远离时听起来音调较低。但是这不是因为火车司机在玩。而是由于多普勒效应——接近中的物体所发出的声波会被压缩而远离中的物体所发出的声波会被拉长。可是，这和天文学有什么关系？声音无法在真空中传播。 在太空中，没人能听到你的呼喊！但是，当光源以特定的速度运动时， 其发出的光也有多普勒效应。如果光源朝我们移动，光的波长会变短，使其变得更蓝。当光源远离我们时，光的波长会变长，使其趋于红色。因此，对于任何通过望远镜所观测的天体，我们可以分析其带有多普勒效应的颜色模式，由此可知天体的成分、温度和压力，同时可知它是否运动、运动的方向和运动速度。这六种测量，就像光的六个点，揭示了宇宙的历史。第一个研究来自遥远星系的光的人是埃德温·哈勃，他所观测到的光是被红移的。遥远的星系都在远离我们，越远的星系其远离速度越快。哈勃由此发现了宇宙正在膨胀，这也是大爆炸理论的第一个证据。除了说可见宇宙从一个密度极高的点开始持续膨胀以外，这一理论的重要预言之一是早期宇宙只有两种气体：氢气和氦气，其比例约为三比一。这一预言也可以通过光来验证。如果我们观测来自宇宙中一个遥远而安静的区域的光 并把它分离开来，我们的确发现了这两种气体所留下的信号，且呈现正确的比例。大爆炸理论的又一胜利。然而，还有很多疑问。虽然我们知道可见的宇宙正在膨胀，但引力会踩下刹车。但是针对来自遥远的濒死恒星的光的测量告诉我们它们比预想的还要远。因此，宇宙膨胀实际上正在加速。看来有什么东西正在推动它，很多科学家相信这是暗能量，暗能量构成了2/3的宇宙，并在缓慢地撕开宇宙。我们对于物质行为的知识 以及我们的仪器所具有的精度，意味着仅仅通过观测遥远的恒星就能告诉我们宇宙的很多故事，远超我们过去的想象。但是还有其它未解之谜，比如暗能量的本质至今我们还是一无所知。

**P112 2014-07-18 What's hidden among the tallest trees on Earth - Wendell Oshiro**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=112)

Some people can't see the forest for the trees, but before Stephen Sillett, no one could see or even imagine the forest in the trees. Stephen was an explorer of new worlds from the start. He spent his boyhood in Harrisburg, Pennsylvania reading Tolkien and playing Dungeons and Dragons with his brother Scott. But when the Sillett family visited their grandparent's cabin near Gettysburg, their grandmother Helen Poe Sillett, would take the boys into the nearby mountains and forests to bird-watch. They called Grandma Sillett Poe, and she taught the boys to identify songbirds, plants and even lichens, creatures that often look like splotches of carpet glued to the shady sides of rocks and tree trunks. Looking upwards, both boys found their callings. Scott became a research scientist specializing in migratory birds. Stephen was more interested in the trees. The tangle of branches and leaves attracted his curiosity. What could be hidden up there? By the time Stephen was in college, that curiosity pulled him skyward to the tallest trees on Earth: the ancient coast redwoods of Northern California. Rising from trunks up to 20 feet in diameter, redwoods can grow up to 380 feet, or 38 stories, over a 2,000 year lifetime. But no one had thought to investigate the crowns of these natural skyscrapers. Were there more than just branches up there? Stephen decided to find out firsthand. In 1987, Stephen, his brother Scott and his friend Marwood drove from Reed College in Oregon to Prairie Creek Redwoods State Park in Northern California. Deep inside the park, Stephen picked the tallest redwood he could find. Its lowest branches were almost 100 feet up, far beyond his reach. But he saw a younger, shorter redwood growing next to the target tree. With a running start, he leapt and grabbed the lowest branch, pulled himself up and scurried upwards. He was free climbing without ropes or a harness, one misstep meant death. But up he went, and when he reached the peak, he swayed and leapt across the gap of space onto a branch of the target tree and into a world never seen before. His buddy Marwood followed him up, and the two young men free climbed high into the redwood's crown. Stephen came across lichens like Grandma Poe had shown him as a boy. He noticed that the higher he went, the thicker the branches were, not the case with most trees. He found moist mats of soil many inches thick, made from fallen needles, bark, other plant debris and dust from the sky piled on the tops of the large branches. He even found reiterations: new redwood tree trunks growing out from the main trunk. The redwood had cloned itself. When Stephen reached the pinnacle, he rested on a platform of crisscrossing branches and needles. Growing in the soil mat was a huckleberry bush with ripe berries! He ate some and waited for his friend. Stephen had discovered a new world hundreds of feet above the ground. His climb led to more excursions, with safety equipment, thank goodness, up other ancient redwoods as he mapped and measured the architecture of branches and additional trunks in the canopy of an entire grove. Stephen became an expert in the ecology of the tallest trees on Earth and the rich diversity of life in their crowns, aerial ecosystems no one had imagined. There are ferns, fungi and epiphytic trees normally found at ground level like Douglas firs, hemlocks and tan oaks whose roots had taken hold in the rich wet soil mats. Invertebrates such as ants, bumblebees, mites, beetles, earthworms and aquatic crustacean copepods make their homes alongside flowering plants like rhododendrons, currant and elderberry bushes. Ospreys, spotted owls, and jays search the canopy for food. Even the marbled murrelet, a Pacific seabird, flies many miles from the ocean to nest there. Squirrels and voles peek out of penthouse burrows. And the top predator? The mighty wandering salamander! Sillett's research has changed how we think about tall trees, and bolstered the case for their conservation, not just as impressive individual organisms but as homes to countless other species. So when you look up into the branches and leaves of a tree, ask, "What else is up there?" A new world might be just out of reach. So leap for it.

**P112 2014-07-18 What's hidden among the tallest trees on Earth - Wendell Oshiro**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=112)

翻译人员: Ning Du 校对人员: Simon Sun有些人一叶障目（只见树木不见森林）但是在史蒂芬斯雷特之前, 没有人能看到或甚至想象到树上的森林史蒂芬从小就是个探险家他在宾州的哈里斯堡度过童年那时他常常跟他的兄弟读托尔金，玩龙和地下城游戏。当斯利特一家拜访祖父母在盖茨堡的小屋时他们的祖母海伦 波伊 斯利特，会带着男孩子们去附近的山林中看鸟.他们叫她斯利特·波伊祖母，波伊祖母教了这些孩子们如何辨认鸣鸟，植物甚至是地衣。以及那些长在石头背面和树干上像地毯上的斑点的生物。向上看去，两个孩子觉得有什么东西在召唤他们。斯科特成为了一名研究候鸟的科学家，而史蒂夫对这些树更感兴趣。混杂的枝叶唤起了他无限的好奇心。树顶藏着什么呢？史蒂夫还在上大学的时候，这种好奇心让他无限向往天空，向往那些高耸入云的大树，那些冠绝世界，长在北加州海边的古老红杉树。红杉能在超过2000年的生命周期中，长到直径20英尺直径380英尺或38层楼那么高。但是从没有人想到要去研究这些如天然摩天大楼一般的树顶世界。那会只有树枝么？史蒂夫决定迈出第一步去探寻。1987年, 史蒂夫和他哥哥斯科特以及朋友麦伍德从俄勒冈的里德学院开车驶向北加州的草原溪红杉国家公园.在公园深处，史蒂夫选了一棵他能找到的最高的红杉。最矮的树枝也有100英尺高，远远超越了他能够到的范围。但是他看到了一棵更年轻更矮的红杉，就在这棵树边上，一个助跑，他一跃而起抓住了最矮的树枝，把自己拉了上去，然后开始向上攀爬。他没借助任何绳子或背带，进行着自由攀爬，一个失足就可能导致死亡。但是他一路向上，当他到达树顶的时候，他摇晃着跳到过了与目标树之间的缝隙，跳到了目标树的一个树枝上，然后进入了一个他前所未见的世界。他的朋友麦伍徳跟着他爬了上来，这两个年轻人通过自由攀爬到达了这棵树的树冠。史蒂夫看到了童年时波伊祖母教他认识过的地衣，他开始注意到，他爬的越高，树枝越稀松，这并非常见的情况。他发现潮湿的表面有几英寸厚的土壤是由掉落的叶子，树皮，其他植物残骸或来自天上的尘埃组成，堆在了一些巨大树干的表面。他甚至发现了一些重复生长的现象：新红杉的树干长在原来的主干上。红杉进行了自我复制。当史蒂夫到达顶点的时候，他在一个由树枝也针叶纵横交织组成的平台上休息。在树冠的土壤上竟然长着越橘类的灌木，甚至还结了果！他摘了一些果子吃，然后等着他的朋友爬上来。史蒂夫在离地几百英尺的高空发现里一个新天地。这次攀爬让他更热衷于树木攀爬，谢天谢地，之后他都准备了安全措施。在这些古老的红杉之上，史蒂夫绘制并测量了了树枝的结构以及树顶的“小果园”。史蒂夫就此成为了这些地球上最高的树的树顶生态系统专家以及树冠生物多样性的专家，而这些空中生态系统是之前没人想象到的。其中包括地面常见的蕨类，真菌类以及附生类植物，例如道格拉斯松树，铁杉和谭橡树，这些植物的根都深深生长在潮湿又营养丰富的土壤中。无脊椎动物，如蚂蚁，黄蜂，螨虫，甲虫，蚯蚓和一些水生甲壳桡足类生物在上面的开花植物中安家，包括杜鹃花，红醋栗以及接骨木灌木丛。鱼鹰，斑点猫头鹰和松鸡在树冠中寻找食物。甚至云石海雀，一种太平洋海鸟，也会从他们海边的巢穴飞越数公里来此。松鼠和野鼠也会经常从树顶的洞穴出来放风。那顶级猎食动物呢？ 上面有巨大的蝾螈在四处闲逛寻找机会。斯利特的研究彻底改变了我们对于高大树木的看法，同时肯定了他们之前对话中的观点，树顶世界并非只有个别令人惊奇的生命有机体，而是数以亿计物种的家。所以当你看到这些枝叶的时候, 肯定会问到"里面会是什么样?"也许新天地只有一步之遥, 何不一跃赴之?

**P113 2014-07-23 The history of the barometer (and how it works) - Asaf Bar-Yosef**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=113)

Aristotle famously said, "Nature fears of empty space" when he claimed that a true vacuum, a space devoid of matter, could not exist because the surrounding matter would immediately fill it. Fortunately, he turned out to be wrong. A vacuum is a key component of the barometer, an instrument for measuring air pressure. And because air pressure correlates to temperature and rapid shifts in it can contribute to hurricanes, tornadoes and other extreme weather events, a barometer is one of the most essential tools for weather forecasters and scientists alike. How does a barometer work, and how was it invented? Well, it took awhile. Because the theory of Aristotle and other ancient philosophers regarding the impossibility of a vacuum seemed to hold true in everyday life, few seriously thought to question it for nearly 2,000 years -- until necessity raised the issue. In the early 17th century, Italian miners faced a serious problem when they found that their pumps could not raise water more than 10.3 meters high. Some scientists at the time, including one Galileo Galilei, proposed that sucking air out of the pipe was what made water rise to replace the void. But that its force was limited and could lift no more than 10.3 meters of water. However, the idea of a vacuum existing at all was still considered controversial. And the excitement over Galileo's unorthodox theory, led Gasparo Berti to conduct a simple but brilliant experiment to demonstrate that it was possible. A long tube was filled with water and placed standing in a shallow pool with both ends plugged. The bottom end of the tube was then opened and water poured out into the basin until the level of the water remaining in the tube was 10.3 meters. With a gap remaining at the top, and no air having entered the tube, Berti had succeeded in directly creating a stable vacuum. But even though the possibility of a vacuum had been demonstrated, not everyone was satisfied with Galileo's idea that this empty void was exerting some mysterious yet finite force on the water. Evangelista Torricelli, Galileo's young pupil and friend, decided to look at the problem from a different angle. Instead of focusing on the empty space inside the tube, he asked himself, "What else could be influencing the water?" Because the only thing in contact with the water was the air surrounding the pool, he believed the pressure from this air could be the only thing preventing the water level in the tube from dropping further. He realized that the experiment was not only a tool to create a vacuum, but operated as a balance between the atmospheric pressure on the water outside the tube and the pressure from the water column inside the tube. The water level in the tube decreases until the two pressures are equal, which just happens to be when the water is at 10.3 meters. This idea was not easily accepted, as Galileo and others had traditionally thought that atmospheric air has no weight and exerts no pressure. Torricelli decided to repeat Berti's experiment with mercury instead of water. Because mercury was denser, it fell farther than the water and the mercury column stood only about 76 centimeters tall. Not only did this allow Torricelli to make the instrument much more compact, it supported his idea that weight was the deciding factor. A variation on the experiment used two tubes with one having a large bubble at the top. If Galileo's interpretation had been correct, the bigger vacuum in the second tube should have exerted more suction and lifted the mercury higher. But the level in both tubes was the same. The ultimate support for Torricelli's theory came via Blaise Pascal who had such a mercury tube taken up a mountain and showed that the mercury level dropped as the atmospheric pressure decreased with altitude. Mercury barometers based on Torricelli's original model remained one of the most common ways to measure atmospheric pressure until 2007 when restrictions on the use of mercury due to its toxicity led to them no longer being produced in Europe. Nevertheless, Torricelli's invention, born of the willingness to question long accepted dogmas about vacuums and the weight of air, is an outstanding example of how thinking outside of the box -- or the tube -- can have a heavy impact.

**P113 2014-07-23 The history of the barometer (and how it works) - Asaf Bar-Yosef**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=113)

翻译人员: zicheng zhou 校对人员: rayma smith当亚里士多德发现,真空,即没有物质的空间是不存在的的时候他说过一句话"自然惧怕虚无"真空之所以不存在是因为其附近的物质会立即填补这个空间幸运的是,亚里士多德被证明是错的真空是气压计,一种测量空气压力的仪器的重要组成部分由于气压是受温度影响的气压的突然改变可以引起飓风，龙卷风和其它极端天气现象气压计是天气预报者和从事类似工作的科学家不可或缺的的工具之一.气压计是如何工作的,它又是怎么被发明的呢?这个过程可得花一些时间了,因为亚里士多德和其他古哲学家的学说认为真空在现实生活中是不可能存在的.所以2000年来几乎没人想过去质疑这个理论直到对气压计的迫切需求把这个问题再次摆在人们眼前.在17世纪,，意大利采矿者面临着严重的问题因为他们发现他们的水泵无法将水提升超过10.3米当时的的科学家们，包括伽利略都认为水被提上来是因为管中空气被抽掉了，需要水去填补空间但是这个力是有限的，只能将水提高最多10.3米.无论如何，真空是否存在的问题依然被认为是有争议的对于伽利略这种非传统的理论的兴奋盖斯帕罗伯提做了一个简单但是天才的实验来证明真空是可能的他把一根长管子装满水两边封住立起来置于浅水池上然后打开管子底部水则会流出来到盆子里去直到在管中的水只剩下10.3米这样在管子顶端就留下了一段没有空气进入的空间伯堤成功地直接制造了一个稳定的真空状态但即便真空的存在已经得到了展示也并不是所有人都赞同伽利略的观点因为这种真空是神秘的并且只以有限的力量作用于水.托里拆利，伽利略年轻的学生和朋友决定通过不同的角度来看待这个问题他没有专注于管子顶端的空间而是问自己：“还有什么可以影响水下降的高度呢?"因为唯一和池子里的水有所关联的就是池子附近的空气所以他认为空气的压力是唯一阻止管子里的水继续下降的东西他意识到这个实验不仅仅是创造真空的工具还可以用作一个天平用来平衡管子外部的大气压力与管子内部水柱的压力。管子中的水位会持续下降直到两边压力相等这个平衡的高度刚好是10.3米这个主意并不容易被接受因为伽利略和其他人一直以来都认为大气是没重量，没压力的托里拆利决定重复伯堤的实验他用的是水银而不是水因为水银比水密度大，它比水下降得更厉害水银柱最终只停在了76厘米高这不仅让托里拆利把实验仪器变小了还证明了重力是决定性因素在此基础上的另一个实验使用了两根管子，其中一根顶端有个大泡泡如果伽利略的想法是对的，第二根管子中应当存在更大的真空空间应该提供更多吸力，把水银抬得高一点但是两边的高度是一样的托里拆利实验最根本的支持来自于帕斯卡所做的实验帕斯卡在山上做出了汞柱实验并且发现汞柱的高度会降低随着海拔降低，气压降低建立在托里拆利原模型上的水银气压计一直到2007年还是测量大气压强最普遍的方法07年以后由于水银的毒性,它的使用受到了限制也不能在欧洲继续生产无论如何，托里拆利的发明—产生于他对长期以来被人接受的有关真空和空气重量的老教条的乐意质疑这是一个告诉人们:跳出条条框框去思考问题是非常有意义的事的很好的例子.

**P114 2014-07-24 The coelacanth - A living fossil of a fish - Erin Eastwood**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=114)

The dead coming back to life sounds scary. But for scientists, it can be a wonderful opportunity. Of course, we're not talking about zombies. Rather, this particular opportunity came in the unlikely form of large, slow-moving fish called the coelacanth. This oddity dates back 360 million years, and was believed to have died out during the same mass extinction event that wiped out the dinosaurs 65 million years ago. To biologists and paleontologists, this creature was a very old and fascinating but entirely extinct fish, forever fossilized. That is, until 1938 when Marjorie Courtenay-Latimer, a curator at a South African museum, came across a prehistoric looking, gleaming blue fish hauled up at the nearby docks. She had a hunch that this strange, 1.5 meter long specimen was important but couldn't preserve it in time to be studied and had it taxidermied. When she finally was able to reach J.L.B. Smith, a local fish expert, he was able to confirm, at first site, that the creature was indeed a coelacanth. But it was another 14 years before a live specimen was found in the Comoros Islands, allowing scientists to closely study a creature that had barely evolved in 300 million years. A living fossil. Decades later, a second species was found near Indonesia. The survival of creatures thought extinct for so long proved to be one of the biggest discoveries of the century. But the fact that the coelacanth came back from the dead isn't all that makes this fish so astounding. Even more intriguing is the fact that genetically and morphologically, the coelacanth has more in common with four-limbed vertebrates than almost any other fish, and its smaller genome is ideal for study. This makes the coelacanth a powerful link between aquatic and land vertebrates, a living record of their transition from water to land millions of years ago. The secret to this transition is in the fins. While the majority of ocean fish fall into the category of ray-finned fishes, coelacanths are part of a much smaller, evolutionarily distinct group with thicker fins known as lobe-finned fish. Six of the coelacanth's fins contain bones organized much like our limbs, with one bone connecting the fin to the body, another two connecting the bone to the tip of the fin, and several small, finger-like bones at the tip. Not only are those fins structured in pairs to move in a synchronized way, the coelacanth even shares the same genetic sequence that promotes limb development in land vertebrates. So although the coelacanth itself isn't a land-walker, its fins do resemble those of its close relatives who first hauled their bodies onto land with the help of these sturdy, flexible appendages, acting as an evolutionary bridge to the land lovers that followed. So that's how this prehistoric fish helps explain the evolutionary movement of vertebrates from water to land. Over millions of years, that transition led to the spread of all four-limbed animals, called tetrapods, like amphibians, birds, and even the mammals that are our ancestors. There's even another powerful clue in that unlike most fish, coelacanths don't lay eggs, instead giving birth to live, young pups, just like mammals. And this prehistoric fish will continue to provide us with fascinating information about the migration of vertebrates out of the ocean over 300 million years ago. A journey that ultimately drove our own evolution, survival and existence. Today the coelacanth remains the symbol of the wondrous mysteries that remain to be uncovered by science. With so much left to learn about this fish, the ocean depths and evolution itself, who knows what other well-kept secrets our future discoveries may bring to life!

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翻译人员: Qin Yu 校对人员: Cissy Yun死尸还魂听起来很可怕但对科学家来说，这可是绝佳的机会当然，这里所说的可不是僵尸这死而复生的机会极少会出现指的是庞大又迟缓的腔棘鱼这个怪物可以追溯到三亿六千万年前曾被认为在一场大灭绝中消失了六千五百万年前的那场恐龙大灭绝在生物学家和古生物学家看来 这种生物虽然古老又神奇但却永远地灭绝了，只剩下化石直到1938年，南非的一个博物馆长 Marjorie-Courtenay-Latimer偶遇一条在附近码头被拖网渔船捕到 长相很远古，闪着蓝光的鱼直觉告诉她，这条1.5米长的鱼有着重要的意义但她却没时间及时保存它以研究和制作标本当她终于找到一位 当地的鱼类专家J.L.B.史密斯时专家一眼就确认了该生物就是腔棘鱼但是又过了14年， 人们才在科摩罗群岛发现了一个活体这让科学家有机会仔细研究这种300万年中，没有进化过的生物真是活化石啊几十年后，第二条鱼在印尼附近被发现很久以来腔棘鱼都被认为已经灭绝， 它们的幸存被证明是20世纪最重大的发现之一但腔棘鱼的令人震惊之处还不仅仅是它的起死回生更神奇的是，比起几乎所有其它的的鱼， 它从基因或是形态上和四肢的脊椎动物更相近而它较小的基因组也很适合研究这让腔棘鱼成功连接了 水生生物和陆生脊椎动物它更是鲜活地记录了数百万年前， 前者向后者的转变转变的秘密在于鱼鳍大多数的海洋鱼类都属于鳍刺鱼而腔棘鱼属于一小支进化得很独特的鱼类——有着更宽大鱼鳍的肉鳍鱼腔棘鱼身上有六个鱼鳍的结构 与我们的四肢相似，都是一根骨头连着身体再由两根骨头连向鳍尖鳍尖又有几根像手指一样的小骨头腔棘鱼不仅把鳍长成一对一对 以协调运动甚至连促进四肢发育的基因序列也与陆生脊椎动物的相同因此，虽然腔棘鱼本身不在路上行走但它的鱼鳍却与其近亲的极为相似。那些近亲首次拖着自己的身体登上陆地凭借的是灵活有力的鱼鳍为后来的陆地的主人们搭起了进化的桥梁这也是为什么这种史前的鱼类解释了脊椎动物从水到陆的迁移几百万年以来，这种转变使得所有四足动物拓展了自己的足迹比如两栖类，鸟类，甚至是我们的祖先哺乳类还有一条强有力的证据是：不同于大多数鱼类，腔棘鱼不产卵而是像哺乳动物一样生崽相信这种史前鱼类将会继续带给我们惊喜告诉我们，脊椎动物 在3亿多年前离开海洋的故事那场推动了人类自身的进化与生存的迁徙今天，腔棘鱼仍是一个有待探索的自然之谜关于这条鱼，关于深海甚至关于进化本身 都还有太多等待着我们去发现也许未来又会有 其它不为人知的秘密被发现，被唤醒

**P115 2014-07-24 The nurdles' quest for ocean domination - Kim Preshoff**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=115)

Meet the nurdles. They may be tiny, look harmless, and sound like a bunch of cartoon characters, but don't be fooled. These little guys are plotting ocean domination. Nurdles are some of the planet's most pervasive pollutants, found in lakes, rivers, and oceans across the globe. The tiny factory-made pellets form the raw material for every plastic product we use. And each year, billions of pounds of nurdles are produced, melted, and molded into toys, bottles, buttons, bags, pens, shoes, toothbrushes, and beads. They are everywhere. And they come in many guises, multi-colored and many-shaped, they range in size from just a few millimeters to mere specks that are only visible through a microscope. But their real advantage in the quest for ocean domination is their incredible endurance, which allows them to persist in an environment for generations because their artificial makeup makes them unable to biodegrade. So, just as long as they don't get into the environment, we have nothing to worry about, right? The problem is nurdles have a crafty way of doing exactly this. Produced in several countries and shipped to plastic manufacturing plants the world over, nurdles often escape during the production process, carried by runoff to the coast or during shipping when they're mistakenly tipped into the waves. Once in the water, nurdles are swiftly carried by currents, ultimately winding up in huge circulating ocean systems called gyres, where they convene to plan their tactics. The Earth has five gyres that act as gathering points, but the headquarters of nurdle ocean domination are in the Pacific Ocean, where the comparative enormity of the gyre and the resulting concentration of pollution is so huge that it's known as The Great Pacific Garbage Patch. Here, nurdles have good company. This gyre draws in all kinds of pollution, but because they don't biodegrade, plastics dominate, and they come from other sources besides nurdles, too. You know those tiny beads you see in your face wash or your toothpaste? They're often made of plastic, and after you flush them down the drain, some also end up in this giant garbage patch, much to the delight of the nurdles, building up their plastic army there. And then there are the large pieces of unrecycled plastic litter, like bottles and carrier bags, transported by runoff from land to sea. Over time, these plastic chunks turn into a kind of nurdle, too, but one that's been worn down by the elements, not made in a factory. And as if they weren't threatening enough, the rough, pitted surfaces of these microplastics, the name we give to all those collective plastic bits, water-born chemicals stick, or adhere, to them, making them toxic. This gathering has grown so immense that the oceanic garbage patch can shift from around the size of Texas to something the size of the United States. But while this toxic tornado is circulating, the birds, fish, filter feeders, whales, and crustaceans around it are just going about their daily business, which means they're looking for food. Unfortunately for them, tiny bits of floating plastic look a lot like fish eggs and other enticing bits of food. But once ingested, microplastics have a very different and terrible habit of sticking around. Inside an animal's stomach, they not only damage its health with a cocktail of toxins they carry but can also lead to starvation because although nurdles may be ingested, they're never digested, tricking an animal into feeling like it's continually full and leading to its eventual death. When one organism consumes another, microplastics and their toxins are then passed up through the food chain. And that's how, bit by bit, nurdles accomplish their goal, growing ever more pervasive as they wipe out marine life and reshape the ocean's ecosystems. So, how to break this cycle? The best solution would be to take plastics out of the equation altogether. That'll take a lot of time but requires only small collective changes, like more recycling, replacing plastics with paper and glass, and ditching that toothpaste with the microbeads. If we accomplish these things, perhaps over time fewer and fewer nurdles will turn up at that giant garbage patch, their army of plastics will grow weaker, and they'll surrender the ocean to its true keepers once more.

**P115 2014-07-24 The nurdles' quest for ocean domination - Kim Preshoff**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=115)

翻译人员: Yanning Gu 校对人员: Matt Chan介绍一下——Nurdles[塑料颗粒］它们可能很小，看起来无害，而且名字听起来像是一群卡通人物但别被骗了这些小家伙正在密谋占领海洋塑料颗粒是地球上最常见的污染物出现在全世界的江河湖海这些微小的工业颗粒所构成的原材料被用于生产我们使用的所有塑料制品每一年，无数的塑料颗粒被生产、融化、重塑成为玩具、塑料瓶、纽扣、手提袋、钢笔、鞋子、牙刷和小珠子它们无处不在它们的外表、颜色和形状千变万化它们可能有几毫米长也可能是一个只能在显微镜下才能看见的小点但，它们用来占领海洋的真正杀手锏是极强的耐用度人为加工的过程可以让它们在自然环境中存在无数年而不被降解那么，只要它们不进入自然环境，我们就没有什么好担心的，对吗？问题在于，狡猾的塑料颗粒总能找到进入自然环境的方法塑料颗粒一般生产于不同的国家并被运送到其他地区的塑料制造工厂在生产过程中，它们可能顺着排放水到达海岸成功脱逃在运输过程中，也可能掉进海里被海浪卷走一旦进入海洋，塑料颗粒会迅速地被水流带走最终进入海洋循环系统，就是所谓的［环流］邪恶的计划就此展开地球上有五大环流，都是塑料颗粒的聚集点但［塑料颗粒海洋侵略计划］的总部位于太平洋在这里，巨大的环流带来污染的极度集中故也被称为［太平洋垃圾带］塑料颗粒在这里聚集起来环流也会带来其他种类的污染物但以无法降解的塑料制品为主它们不仅仅来自塑料颗粒，也来自其他地方比如你的洗面奶和牙膏里的细小柔珠它们一般是塑料制的在你将它们冲入下水道之后，有一些也会进入这个巨大的垃圾带使塑料大军更加壮大也有一些未被回收利用的大件的塑料垃圾，比如塑料瓶和手提袋顺着河流从陆地到达海洋一段时间之后，这些大块的塑料也会变成一种塑料颗粒但这种塑料颗粒是用于磨损造成的，而非工厂制造然而更可怕的是在这些［微型塑料］，即细小塑料颗粒的粗糙表面会吸附有一些水溶性化学物质使其变成变成有毒物质这个海上垃圾聚集带正在飞速扩张面积从德克萨斯州大小到如今一个美国这么大当这些有毒物质随着环流循环生活在附近的鸟类、鱼类、滤食性动物、鲸鱼和甲壳纲动物正在像平常一样活动、捕食不幸的是小小的悬浮塑料看起来就像是鱼籽或者其他诱人的食物但是一旦被吞下微型塑料便难以摆脱在动物的胃里，塑料颗粒所携带的毒性会损害动物体的健康而且还可能会导致饥饿因为即使塑料小球被吞下，也无法被消化只会使动物误认为自己很饱却最终被饿死当有机体被更高等的动物吃掉时微型塑料和它们的毒性由于富集作用，会顺着食物链传递下去这就是塑料颗粒如何一步一步地实现它们侵占海洋的计划它们在消灭海洋生物的同时变得更加强大甚至重塑了整个海洋生态系统那么，我们该如何阻止这个恶性循环呢？最好的解决办法就是让塑料从世界上消失这需要很长的时间但是只需要我们每个人都做出一些小小的改变比如回收塑料制品，用纸和玻璃替代它们还有，丢掉含有柔珠成分的牙膏如果我们能做到这些，也许假以时日出现在环流垃圾带的塑料大军的数量会越来越少它们的破坏力也会大大减弱有朝一日，或许能将海洋重新还给它真正的主人

**P116 2014-07-25 How do tornadoes form - James Spann**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=116)

They call me the tornado chaser. When the wind is up and conditions are right, I get in my car and follow violent storms. "Crazy," you say? Perhaps, but really I chase these sky beasts to learn about them. I want to share with you what I know. Tornadoes are rapidly rotating columns of air that form inside storms that connect with the ground via a funnel of cloud. When that happens, they tear across the Earth, posing a huge threat to life and property. Because of this, there's a great deal of research into these phenomena, but the truth is, there's still a lot we don't know about how tornadoes form. The conditions that may give rise to one tornado won't necessarily cause another. But we have learned a lot since people first started recording tornadoes, like how to recognize the signs when one is brewing in the sky. Are you coming along for the ride? Tornadoes begin with a thunderstorm but not just any thunderstorm. These are especially powerful, towering thunderstorms called supercells. Reaching up to over 50,000 feet, they bring high force winds, giant hailstones, sometimes flooding and great flashes of lightning, too. These are the kinds of storms that breed tornadoes, but only if there are also very specific conditions in place, clues that we can measure and look out for when we're trying to forecast a storm. Rising air is the first ingredient needed for a tornado to develop. Any storm is formed when condensation occurs, the byproducts of the clouds. Condensation releases heat, and heat becomes the energy that drives huge upward drafts of air. The more condensation and the bigger the storm clouds grow, the more powerful those updrafts become. In supercells, this rising airmass is particularly strong. As the air climbs, it can change direction and start to move more quickly. Finally, at the storm's base, if there is a lot of moisture, a huge cloud base develops, giving the tornado something to feed off later, if it gets that far. When all these things are in place, a vortex can develop enclosed by the storm, and forming a wide, tall tube of spinning air that then gets pulled upwards. We call this a mesocyclone. Outside, cool, dry, sinking air starts to wrap around the back of this mesocyclone, forming what's known as a rear flank downdraft. This unusual scenario creates a stark temperature difference between the air inside the mesocyclone, and the air outside, building up a level of instability that allows a tornado to thrive. Then, the mesocyclone's lower part becomes tighter, increasing the speed of the wind. If, and that's a big if, this funnel of air moves down into that large, moist cloud base at the bottom of the parent storm, it sucks it in and turns it into a rotating wall of cloud, forming a link between the storm that created it and the Earth. The second that tube of spinning cloud touches the ground, it becomes a tornado. Most are small and short-lived, producing winds of 65-110 miles per hour, but others can last for over an hour, producing 200 mile per hour winds. They are beautiful but terrifying, especially if you or your town is in its path. In that case, no one, not even tornado chasers like me, enjoy watching thing unfold. Just like everything, however, tornadoes do come to an end. When the temperature difference disappears and conditions grow more stable, or the moisture in the air dries up, the once fierce parent storm loses momentum and draws its tornado back inside. Even so, meteorologists and storm chasers like me will remain on the lookout, watching, always watching to see if the storm releases its long rope again.

**P116 2014-07-25 How do tornadoes form - James Spann**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=116)

翻译人员: Sunny Wang 校对人员: Shelley Krishna Tsang他们称我是“龙卷风追逐者”。当风来了，其他条件又刚好合适的时候，我就会钻进我的车里去追逐暴风。也许你会说：“疯了吧你？” 但其实我追赶这些空中野兽是为了了解他们。在此，我想跟大家分享一下我所了解的。龙卷风是在大风内部形成的 高速旋转的空气柱，通过一个漏斗形的云状物 和地面连接起来。当龙卷风形成之后， 它们就会快速席卷地面，对生命和财产造成巨大威胁。正因如此，有大量针对 这种天气现象的研究，但是事实上是，我们还是对 龙卷风的成因知之甚少。我们所了解的形成龙卷风的条件，即使都满足， 也不一定会形成另一次龙卷风。但是从人们第一次记录龙卷风以来， 我们已经学到了不少东西。比如：当它还在天上酝酿形成的时候， 我们怎么识别龙卷风将要来临的信号。你准备要参与其中了么？龙卷风的开始是雷暴， 但是却不止是普通的雷暴。非常强大，非常激烈的雷暴， 被称为超级雷暴云。超级雷暴云有五万多尺的厚度， 它能带来强风，巨大的冰雹， 有时会引起洪水和雷鸣。这就是孕育着龙卷风的暴风雨，但是只有在一些特殊条件 也到位的时候龙卷风才会形成。当我们想要预测风暴时， 还有一些我们可以用来衡量和寻找的线索。上升气流是形成龙卷风 所需要的第一个要素。当凝结发生的时候风暴就形成了，风暴是云的副产品。凝结释放热量，热量成为驱动大量气流上升的能量。凝结程度越大， 并且形成风暴的云团越大时那些上升气流也就越强。在超级雷暴云中， 这些上升的气团格外的强大。当气流上升的时候， 它可以改变方向并且开始以更快的速度移动。最终，在风暴云团的底部， 如果有很多的水分，就会形成一个巨大的云底， 为之后的龙卷风提供能量， 前提是如果真的到了这一步。当所有这些东西都准备就绪的时候， 一个涡旋会在风暴包围中形成，继而形成一个宽大高耸的高速旋转空气柱， 之后被向上拉动。我们称其为“中气旋”。外部那些又干又冷的下沉气体开始在“中气旋”后侧环绕，形成一个“后侧下环流”。这种特殊的情景使“中气旋” 内外部的气体间产生了非常明显的温差，由此造成的更高一级的不稳定性 使龙卷风更加猖狂。接着，“中气旋”靠下的部分会更紧绷，以此给风加速。基于足够的假设， 这个漏斗形的气团向下移动到在母风暴底端的 巨大又潮湿的云的下边界（云底），云底会将其吸入， 并且把它变成一个旋转的云墙，这个云墙把产生它的母风暴 和地面连接起来。在这个旋转的中空的云 与地面接触的一瞬间，就形成了龙卷风。大部分的龙卷风都是小规模的而且短暂的， 产生65到110英里每小时的风。但是有一些龙卷风能持续超过1小时， 产生200英里每小时的风。龙卷风是美丽又令人生畏的，尤其是，如果你或者你的村子 在它移动的路线上。在这种情况下，没有人， 甚至像我这种“风暴追逐者”也不会享受龙卷风一步步的发展。但是又像所有的东西一样， 龙卷风总是有结束的时候。当温差消失并且 其他条件都稳定下来的时候，抑或是是气体中的水分干燥下来的时候，那个原本猛烈的母风暴就会失去它的动力， 然后把它的龙卷风重新拉回去。即使这样，气象学家和那些像我一样的“风暴追逐者” 也还是会继续守望，观察，一直观察看风暴是否会再次扬鞭。

**P117 2014-07-28 How do you know you exist - James Zucker**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=117)

How do you know you're real? It's an obvious question until you try to answer it, but let's take it seriously. How do you really know you exist? In his "Meditations on First Philosophy," René Descartes tried to answer that very question, demolishing all his preconceived notions and opinions to begin again from the foundations. All his knowledge had come from his sensory perceptions of the world. Same as you, right? You know you're watching this video with your eyes, hearing it with your ears. Your senses show you the world as it is. They aren't deceiving you, but sometimes they do. You might mistake a person far away for someone else, or you're sure you're about to catch a flyball, and it hits the ground in front of you. But come on, right here and now, you know what's right in front of you is real. Your eyes, your hands, your body: that's you. Only crazy people would deny that, and you know you're not crazy. Anyone who'd doubt that must be dreaming. Oh no, what if you're dreaming? Dreams feel real. You can believe you're swimming, flying or fighting off monsters with your bare hands, when your real body is lying in bed. No, no, no. When you're awake, you know you're awake. Ah! But when you aren't, you don't know you aren't, so you can't prove you aren't dreaming. Maybe the body you perceive yourself to have isn't really there. Maybe all of reality, even its abstract concepts, like time, shape, color and number are false, all just deceptions concocted by an evil genius! No, seriously. Descartes asks if you can disprove the idea that an evil genius demon has tricked you into believing reality is real. Perhaps this diabolical deceiver has duped you. The world, your perceptions of it, your very body. You can't disprove that they're all just made up, and how could you exist without them? You couldn't! So, you don't. Life is but a dream, and I bet you aren't row, row, rowing the boat merrily at all, are you? No, you're rowing it wearily like the duped, nonexistent doof you are/aren't. Do you find that convincing? Are you persuaded? If you aren't, good; if you are, even better, because by being persuaded, you would prove that you're a persuaded being. You can't be nothing if you think you're something, even if you think that something is nothing because no matter what you think, you're a thinking thing, or as Descartes put it, "I think, therefore I am," and so are you, really. (Airplane engine)

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翻译人员: Kai Cui 校对人员: Zhiting Chen你如何意识到自己的真实存在？这是个显而易见的问题 但回答起来不容易，让我们严肃地讨论一下。你如何才能真正意识到自己的存在？勒内•笛卡尔在他的《第一哲学 沉思集》中，试图回答这个问题，他推翻了所有先入为主的概念， 从根源上重新思考。他所有的知识都来源于他的感官 对这个世界的洞察。你也是这样，对吗？你知道自己在用眼睛看这个 视频，用你的耳朵听声音你的感官告诉你 这个世界是什么样子的。感觉器官并没有欺骗你， 但有时候也会欺骗。从远处看，你或许会 把一个人当作另外一个人，或者你确定可以抓住飞来的棒球， 可是它却掉在地上。但是不管怎样，此时此刻， 你知道面前的一切都是真实的。你的眼睛、你的手、 你的身体，组成了你。只有疯子才会不承认这个事实， 你知道自己不是疯子。对这一点持怀疑态度的人 一定是在做梦。噢对了，如果你真的是在做梦呢？梦给人真实的感觉。你觉得自己在游泳、在飞翔、 在赤手空拳地和怪物搏斗，可你的身体依然躺在床上。不不不，你在醒过来之后 知道自己是清醒的。可是，当你睡着的时候， 你并不知道自己是睡着的，所以你并不能证明 你现在不是在做梦。或许你感知到的自己的身体， 其实并不存在。或许所有的现实， 甚至那些抽象的概念，包括时间、形状、颜色和数字， 都不是真实的，所有的一切都是 一个邪恶天才捏造出来的。严肃地说，不是这样笛卡尔在书中问到，你是否可以 证明的确没有一个邪恶的天才欺骗你相信周围的世界是真实的。或许这个邪恶的骗子 真的欺骗了你。让你相信周围的世界， 相信自己的感知、自己的身体。既然无法证明这一切都不是捏造出来的，那 么你怎么能在没有这一切的环境中生存呢？你不能，所以你并不是 在这样的环境中生存的。生活就是一场梦，我相信你绝不是 永远兴高采烈地划着这艘船，对吗？当然不是，你就像一个受骗的傻瓜，或者像一个你 是或不是的一个根本不存在蠢货，疲惫不堪地划船。这么说有道理吗？你被说服了吗？如果还没有被说服，很好， 如果已经被说服，那更好了，因为如果被说服了，说明 你是一个有思想的存在。如果你认为自己是某种事物， 那就不能说你什么都不是。即使你认为自己是“什么都不是”因为无论你怎样认为， 你都是一个有思想的个体。或者就像笛卡尔所说：“我思故我在。”你也是这样，真的。

**P118 2014-07-31 What causes antibiotic resistance - Kevin Wu**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=118)

What if I told you there were trillions of tiny bacteria all around you? It's true. Microorganisms called bacteria were some of the first life forms to appear on Earth. Though they consist of only a single cell, their total biomass is greater than that of all plants and animals combined. And they live virtually everywhere: on the ground, in the water, on your kitchen table, on your skin, even inside you. Don't reach for the panic button just yet. Although you have 10 times more bacterial cells inside you than your body has human cells, many of these bacteria are harmless or even beneficial, helping digestion and immunity. But there are a few bad apples that can cause harmful infections, from minor inconveniences to deadly epidemics. Fortunately, there are amazing medicines designed to fight bacterial infections. Synthesized from chemicals or occurring naturally in things like mold, these antibiotics kill or neutralize bacteria by interrupting cell wall synthesis or interfering with vital processes like protein synthesis, all while leaving human cells unharmed. The deployment of antibiotics over the course of the 20th century has rendered many previously dangerous diseases easily treatable. But today, more and more of our antibiotics are becoming less effective. Did something go wrong to make them stop working? The problem is not with the antibiotics but the bacteria they were made to fight, and the reason lies in Darwin's theory of natural selection. Just like any other organisms, individual bacteria can undergo random mutations. Many of these mutations are harmful or useless, but every now and then, one comes along that gives its organism an edge in survival. And for a bacterium, a mutation making it resistant to a certain antibiotic gives quite the edge. As the non-resistant bacteria are killed off, which happens especially quickly in antibiotic-rich environments, like hospitals, there is more room and resources for the resistant ones to thrive, passing along only the mutated genes that help them do so. Reproduction isn't the only way to do this. Some can release their DNA upon death to be picked up by other bacteria, while others use a method called conjugation, connecting through pili to share their genes. Over time, the resistant genes proliferate, creating entire strains of resistant super bacteria. So how much time do we have before these superbugs take over? Well, in some bacteria, it's already happened. For instance, some strands of staphylococcus aureus, which causes everything from skin infections to pneumonia and sepsis, have developed into MRSA, becoming resistant to beta-lactam antibiotics, like penicillin, methicillin, and oxacillin. Thanks to a gene that replaces the protein beta-lactams normally target and bind to, MRSA can keep making its cell walls unimpeded. Other super bacteria, like salmonella, even sometimes produce enzymes like beta-lactams that break down antibiotic attackers before they can do any damage, and E. coli, a diverse group of bacteria that contains strains that cause diarrhea and kidney failure, can prevent the function of antibiotics, like quinolones, by actively booting any invaders that manage to enter the cell. But there is good news. Scientists are working to stay one step ahead of the bacteria, and although development of new antibiotics has slowed in recent years, the World Health Organization has made it a priority to develop novel treatments. Other scientists are investigating alternate solutions, such as phage therapy or using vaccines to prevent infections. Most importantly, curbing the excessive and unnecessary use of antibiotics, such as for minor infections that can resolve on their own, as well as changing medical practice to prevent hospital infections, can have a major impact by keeping more non-resistant bacteria alive as competition for resistant strains. In the war against super bacteria, deescalation may sometimes work better than an evolutionary arms race.

**P118 2014-07-31 What causes antibiotic resistance - Kevin Wu**

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翻译人员: Yumeng Guo 校对人员: Yuanqing Edberg如果我告诉你，你周围有数以万亿计的细菌，你会怎么想？这是真的。细菌这种微生物，是地球上最初出现的几种生命形态之一。尽管只由一个细胞构成，细菌的生物量要比地球上全部植物和动物加起来还要多。而且它们几乎无处不在：地上、水里、你家厨房的台子上、你的皮肤上，甚至你的体内。但是，不要惊慌。尽管你体内的细菌数量要比你身体的细胞的数量多十倍，很多细菌是无害的，甚至是有益的，有些细菌帮助消化食物，有些可增加免疫力。但也有些有害细菌会引起感染，轻则造成身体不适，重则引起致命的流行病。幸运的是，人类已发明了神奇的药物来抗击细菌感染。这种药物即抗生素，它由化学物质人工合成，或在霉菌中自然形成。这些抗生素通过干扰细菌细胞壁合成，或介入像蛋白质合成等重要的生理活动来抑制或杀灭细菌，抗生素在发挥作用时不会对身体细胞产生伤害。20世纪抗生素的使用使以前被看作是致命的疾病得以轻松治愈。但今天，越来越多的抗生素逐渐失效。哪里出问题了？抗生素的失效与其本身无关，而是与其“抗击”的细菌有关，其中的奥妙来自达尔文自然选择学说。同其他生物体类似，单个细菌会有随机的基因突变。很多这样的基因突变对生物体自身是有害或无效的，但时有发生的是，基因突变会为其带来生存的优势。对单个细菌而言，使其对特定抗生素产生抗药性的基因突变会让它获得极大的生存优势。无抗药性的细菌被消灭后，（这在含抗生素较多的环境中极易发生，如医院）越来越多的空间和资源使得抗药性细菌生存下去，并将有抗药性的基因传递给后代。繁殖不是细菌产生抗药性的唯一途径；许多细菌在消亡前会释放出DNA，其他细菌会将该DNA摄为己有，也有些细菌采用一种叫“接合”的方法，通过连接菌毛来分享基因。一段时间以后，抗药性基因大量繁殖，形成超级细菌菌株。那么，有多少时间留给我们阻止超级细菌的形成？对一些细菌而言，超级细菌已经形成了。例如，金黄色酿脓葡萄球菌的某些菌株（这种细菌会引发各种疾病，如皮肤感染、肺炎、败血症）已经转变为MRSA（耐甲氧西林金黄色葡萄球菌），对β-内酰胺抗生素（如青霉素、甲氧西林、苯唑青霉素）有耐药性。这是因为突变的基因代替了β-内酰胺抗生素通常靶向和联结的蛋白质，MRSA（耐甲氧西林金黄色葡萄球菌）才得以保持 其细胞壁的畅通。其他超级细菌，如沙门氏菌，有时甚至可产生类似β-内酰胺的酶，在抗生素发挥作用前分解抗生素。又如大肠杆菌的某些可造成腹泻或肾衰竭的菌株，可通过有效地阻止任何物质进入其细胞来使抗生素（如喹诺酮）失效。但也有好消息。科学家们努力的步伐先于细菌产生抗药性的“步伐”，而且尽管近几年新抗生素的发展速度减慢，WHO（世界卫生组织）已赋予发展新型疗法优先权。其他科学家在研究替代方法，如噬菌体疗法，或使用疫苗来预防感染。最重要的是，限制不必要和过量的抗生素使用，如轻微感染可靠自愈、改变用药习惯来阻止医院获得性感染，可极大程度上改善现状，因为无抗药性的细菌的存活对抗药性细菌而言是竞争关系。在抵抗超级细菌的“战争”中，抑制其增长有时要比一个进化的“军备竞赛”有效。

**P119 2014-08-04 The secret lives of baby fish - Amy McDermott**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=119)

What you're looking at isn't some weird x-ray. It's actually a baby yellow tang surgeonfish at two months old. And you thought your childhood was awkward. But here is the same fish as an adult, a beautiful inhabitant of the Indian and Pacific Oceans' coral reefs and one of the most popular captive fish for salt water aquariums. Of the 27,000 known fish species, over a quarter live on coral reefs that make up less than 1% of the Earth's surface. But prior to settling down in this diverse tropical environment, baby coral reef fish face the difficult process of growing up on their own, undergoing drastic changes, and the journey of a lifetime before they find that reef to call home. The life cycle for most of these fish begins when their parents spew sperm and eggs into the water column. This can happen daily, seasonally, or yearly depending on the species, generally following lunar or seasonal tidal patterns. Left to their fate, the fertilized eggs drift with the currents, and millions of baby larvae hatch into the world. When they first emerge, the larvae are tiny and vulnerable. Some don't even have gills yet and must absorb oxygen directly from the water through their tissue-thin skin. They may float in the water column anywhere from minutes to months, sometimes drifting thousands of miles across vast oceans, far from the reefs where they were born. Along the way, they must successfully avoid predators, obtain food, and ride the right currents to find their way to a suitable adult habitat, which might as well be a needle in vast haystack of ocean. So, how did they accomplish this feat? Until recently, marine biologists thought of larval fish as largely passive drifters, dispersed by ocean currents to distant locales. But in the last 20 years, new research has suggested that larvae may not be as helpless as they seem, and are capable of taking their fate in their own fins to maximize their chances of survival. The larvae of many species are unexpectedly strong swimmers, and can move vertically in the water column to place themselves in different water masses and preferentially ride certain currents. These fish may be choosing the best routes to their eventual homes. When searching for these homes, evidence suggests that larvae navigate via a complex suite of sensory systems, detecting both sound and smell. Odor, in particular, allows larvae to distinguish between different environments, even adjacent reefs, helping guide them toward their preferred adult habitats. Many will head for far-flung locales miles away from their birth place. But some will use smell and other sensory cues to navigate back to the reefs where they were born, even if they remain in the larval stage for months. So, what happens when larvae do find a suitable coral reef? Do they risk it all in one jump from the water column, hoping to land in exactly the right spot to settle down and metamorphose into adults? Not exactly. Instead, larvae appear to have more of a bungee system. Larvae will drop down in the water column to check out a reef below. If conditions aren't right, they can jump back up into higher water masses and ride on, chancing that the next reef they find will be a better fit. But this is the point where our knowledge ends. We don't know the geographic movements of individual larva for most species. Nor do we know which exact environmental cues and behaviors they use to navigate to the reefs they will call home. But we do know that these tiny trekkers are more than the fragile and helpless creatures science once believed them to be. The secret lives of baby fish remain largely mysterious to us, unknown adventures waiting to be told.

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翻译人员: Lu Dai 校对人员: Feifei Yan现在你所看见的不是奇怪的X射线它其实是一个两个月大的黄色刺尾鱼宝宝你可能会觉得你的童年很糟糕但这是同一种鱼成年后的样子是一种寄居在印度洋和太平洋的珊瑚礁里的 美丽物种也是被捕捉到咸水水族馆里最受欢迎的一种在已知的27,000两万七千种鱼类中， 有超过四分之一的鱼类生活在只占地球表面不到百分之一的珊瑚礁中不过在定居在这多样的热带环境中之前珊瑚礁鱼宝宝们面对着独立生长的艰辛历程它们在经历了剧烈的变动和一生的旅程后才能找到可以被称作家的珊瑚礁大多数这种鱼的生命周期从它他们的父母将精子和卵子喷入水柱时开始根据鱼的不同种类， 这个过程可以在每天，每季或是每一年发生一般都遵循月亮或是季节潮汐的变化受精的卵子听天由命，随着洋流漂流成千上万的鱼幼崽被孵化来到这个世上最开始的时候，它们又小又脆弱有一些甚至连腮都没有必须通过他它们极薄的皮肤 从水里直接呼吸氧气它们在水柱中随处漂流，从几分钟到几个月有时会在茫茫大海中漂流上千英里远离那些它们出生的珊瑚礁这一路上，它们必须成功的躲避捕食者寻到食物，还要赶上正确的洋流以便到达一个适合成年鱼类栖息的地方这个过程有时就像大海捞针一样那么，它们是怎样完成这个壮举的呢直到最近，海洋生物学家都认为鱼苗大都是被动的漂流者依靠洋流分散到远处但是最近在二十年中，新的研究发现这些鱼苗也许并不像它们看起来那么无助它们可以依靠它们的鳍决定自己的命运并且将它们的生存几率最大化许多种类的鱼苗游动能力都出乎预料它们可以在水柱中垂直移动，将自己带到不同的水体中它们还会倾向搭乘一些特定的洋流这些鱼类可能在选择 到达最终家园地的最优路径当它们在搜寻它们的最终家园时有证据表明这些鱼苗通过一套复杂的感官系统进行导航这套系统能够探测声音和气味尤其是气味，可以让鱼苗区分不同的环境即使是相邻的珊瑚礁也可以被分辨从而帮助它们找到更加合适的栖息地很多鱼都漂向距离出生地几英里远的地方不过也有一些鱼依靠嗅觉和其他的感官线索回到了它们出生的珊瑚礁即使它们会在鱼苗阶段停留几个月那么，在鱼苗们找了合适的珊瑚礁之后呢？它们会抱着能够准确着陆的信心孤注一掷的从水柱中跳出然后变成成年的鱼么？不一定事实上，鱼苗似乎拥有一个更像是蹦极的系统它们跳入水柱，检查下面的珊瑚礁如果环境不理想，它们就会重新跳起进入更高的水体，继续前进期待下一个珊瑚礁会是更合适的栖息地不过这些就是我们所了解的全部了我们既不知道 大多数鱼类的单个鱼苗的地理移动也不知道它们用来寻找合适的珊瑚礁的确切的环境线索和行为但是我们知道，这些幼小的“徒步”旅行者绝不仅仅是科学所一度认定的脆弱无助的生物这些鱼宝宝们的神秘生活对人类来说，仍充满了未知等待我们去发现

**P120 2014-08-05 What happens when you remove the hippocampus - Sam Kean**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=120)

On September 1st, 1953, William Scoville used a hand crank and a cheap drill saw to bore into a young man's skull, cutting away vital pieces of his brain and sucking them out through a metal tube. But this wasn't a scene from a horror film or a gruesome police report. Dr. Scoville was one of the most renowned neurosurgeons of his time, and the young man was Henry Molaison, the famous patient known as "H.M.", whose case provided amazing insights into how our brains work. As a boy, Henry had cracked his skull in an accident and soon began having seizures, blacking out and losing control of bodily functions. After enduring years of frequent episodes, and even dropping out of high school, the desperate young man had turned to Dr. Scoville, a daredevil known for risky surgeries. Partial lobotomies had been used for decades to treat mental patients based on the notion that mental functions were strictly localized to corresponding brain areas. Having successfully used them to reduce seizures in psychotics, Scoville decided to remove H.M.'s hippocampus, a part of the limbic system that was associated with emotion but whose function was unknown. At first glance, the operation had succeeded. H.M.'s seizures virtually disappeared, with no change in personality, and his IQ even improved. But there was one problem: His memory was shot. Besides losing most of his memories from the previous decade, H.M. was unable to form new ones, forgetting what day it was, repeating comments, and even eating multiple meals in a row. When Scoville informed another expert, Wilder Penfield, of the results, he sent a Ph.D student named Brenda Milner to study H.M. at his parents' home, where he now spent his days doing odd chores, and watching classic movies for the first time, over and over. What she discovered through a series of tests and interviews didn't just contribute greatly to the study of memory. It redefined what memory even meant. One of Milner's findings shed light on the obvious fact that although H.M. couldn't form new memories, he still retained information long enough from moment to moment to finish a sentence or find the bathroom. When Milner gave him a random number, he managed to remember it for fifteen minutes by repeating it to himself constantly. But only five minutes later, he forgot the test had even taken place. Neuroscientists had though of memory as monolithic, all of it essentially the same and stored throughout the brain. Milner's results were not only the first clue for the now familiar distinction between short-term and long-term memory, but show that each uses different brain regions. We now know that memory formation involves several steps. After immediate sensory data is temporarily transcribed by neurons in the cortex, it travels to the hippocampus, where special proteins work to strengthen the cortical synaptic connections. If the experience was strong enough, or we recall it periodically in the first few days, the hippocampus then transfers the memory back to the cortex for permanent storage. H.M.'s mind could form the initial impressions, but without a hippocampus to perform this memory consolidation, they eroded, like messages scrawled in sand. But this was not the only memory distinction Milner found. In a now famous experiment, she asked H.M. to trace a third star in the narrow space between the outlines of two concentric ones while he could only see his paper and pencil through a mirror. Like anyone else performing such an awkward task for the first time, he did horribly. But surprisingly, he improved over repeated trials, even though he had no memory of previous attempts. His unconscious motor centers remembered what the conscious mind had forgotten. What Milner had discovered was that the declarative memory of names, dates and facts is different from the procedural memory of riding a bicycle or signing your name. And we now know that procedural memory relies more on the basal ganglia and cerebellum, structures that were intact in H.M.'s brain. This distinction between "knowing that" and "knowing how" has underpinned all memory research since. H.M. died at the age of 82 after a mostly peaceful life in a nursing home. Over the years, he had been examined by more than 100 neuroscientists, making his the most studied mind in history. Upon his death, his brain was preserved and scanned before being cut into over 2000 individual slices and photographed to form a digital map down to the level of individual neurons, all in a live broadcast watched by 400,000 people. Though H.M. spent most of his life forgetting things, he and his contributions to our understanding of memory will be remembered for generations to come.

**P120 2014-08-05 What happens when you remove the hippocampus - Sam Kean**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=120)

翻译人员: Siyun Zhou 校对人员: Francis Ma在 1953 年，9 月 1 日威廉·斯科维尔使用 一个起动手柄和一个廉价电钻在一个年轻男子的头骨上钻孔 切除了他脑部的重要部分并且用金属管子把它们吸走但是这并不是恐怖电影场景 或者一个可怕的警察报告斯科维尔医生是那时候最有名 的神经外科医生之一这位年轻男子是亨利·莫莱森 被熟知为「H.M.」的有名病人他的病例为我们了解大脑如何运作 提供了神奇的认识儿时，亨利在一次意外中 撞裂了他的头骨很快他开始癫痫发作，昏迷 和丧失控制身体的能力在常年出现这种经常偶发性发作， 甚至高中退学后这个绝望的年轻人找到了 斯科维尔医生一个因冒险手术而闻名的敢干的人部分前脑叶白质切除术 常年用于治疗精神患者理论基础是大脑功能是严格局部化于相应大脑区域的曾成功使用它们减少精神病患者发作斯科维尔决定移除 H.M. 的海马组织它是人脑边缘系统的一部分 与情感相关但是具体功能仍然不清楚刚开始，手术成功了H.M.的发作几乎消失了 和个人性格没有改变而且他的智力甚至提高了但是很快出现了一个问题： 他的记忆被打乱了除了失去他早年的大部分记忆H.M. 不能形成新的记忆 他会忘记日期重复说话，甚至连续吃很多顿饭当斯科维尔通知其他专家 结果，韦尔德·潘菲尔德派了他的博士学生布伦达·米尔纳 在亨利父母家研究 H.M. 的情况H.M. 现在整天做奇怪的事重复看经典电影她发现通过一系列的测试和访谈不仅对记忆研究产生巨大贡献它重新定义了记忆的内涵米尔纳的其中一个发现 透露了明显的事实虽然 H.M. 不能够形成新的记忆， 他仍然保留信息足够长时间来完成一个句子 或者找到浴室当米尔纳给他一个随机数字他使用15分钟记住它通过经常重复这个数字但是仅仅五分钟后， 他忘记这个测试曾经发生过神经科学家曾想过记忆是整体的所有记忆大体一样 而且保存在整个大脑中米尔纳的结果并不是第一个 得出现在相似的关于长期记忆和短期记忆区别的线索但是展示了每个记忆使用大脑不同区域我们现在知道记忆的形成涉及很多步骤在瞬间感受数据在大脑皮层 被神经元短暂转录它传递到海马组织在那里通过特殊蛋白质加工来加强 皮质突触连接如果经历足够强烈或者我们间歇性地 在前几天经常回忆海马组织会把记忆传递回去大脑皮层 形成永久存储H.M. 的大脑可以形成首要的印象但是没有海马组织进行记忆巩固他们逐渐毁坏 就像信息乱写在沙上但是这并不是米尔纳发现的唯一记忆分区在一个当今闻名的实验中她要求H.M.在两个星星的线条空隔间 临摹出第三个星星但他只可以通过镜子看到他的纸和笔像其他所有第一次进行 这个尴尬任务的人一样他做得很糟糕但惊讶的是，他在重复尝试后进步了甚至虽然他并没有之前尝试的记忆他的无意识运动中心记忆了 意识大脑忘记的信息米尔纳发现关于名字、日期 和事实的陈述性记忆和关于骑自行车或者签自己名字的 程序性记忆不同而且我们现在知道程序性记忆依赖更多基底神经节和小脑这些结构仍然保留在H.M.的大脑中「懂得那样」和「懂得怎样」的区别从此成为了所有记忆研究的基础H.M.在82岁时安详地卒于疗养院这些年来，他被多于100位 神经科学家研究使他的大脑成为历史上 最多人研究的大脑当他死亡的时候，他的 大脑被保存和扫描然后被切成多于2000块 独立的切片并且被照相来生成一个细致到 神经元个体级别的电子图过程全部现场直播并且有40万群众观看尽管H.M.花费大半生在忘事但他和他对人类了解记忆的贡献会被每一代人永记

**P121 2014-08-06 What can Schrödinger's cat teach us about quantum mechanics - Josh Sa**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=121)

Consider throwing a ball straight into the air. Can you predict the motion of the ball after it leaves your hand? Sure, that's easy. The ball will move upward until it gets to some highest point, then it will come back down and land in your hand again. Of course, that's what happens, and you know this because you have witnessed events like this countless times. You've been observing the physics of everyday phenomena your entire life. But suppose we explore a question about the physics of atoms, like what does the motion of an electron around the nucleus of a hydrogen atom look like? Could we answer that question based on our experience with everyday physics? Definietly not. Why? Because the physics that governs the behavior of systems at such small scales is much different than the physics of the macroscopic objects you see around you all the time. The everyday world you know and love behaves according to the laws of classical mechanics. But systems on the scale of atoms behave according to the laws of quantum mechanics. This quantum world turns out to be a very strange place. An illustration of quantum strangeness is given by a famous thought experiment: Schrödinger's cat. A physicist, who doesn't particularly like cats, puts a cat in a box, along with a bomb that has a 50% chance of blowing up after the lid is closed. Until we reopen the lid, there is no way of knowing whether the bomb exploded or not, and thus, no way of knowing if the cat is alive or dead. In quantum physics, we could say that before our observation the cat was in a superposition state. It was neither alive nor dead but rather in a mixture of both possibilities, with a 50% chance for each. The same sort of thing happens to physical systems at quantum scales, like an electron orbiting in a hydrogen atom. The electron isn't really orbiting at all. It's sort of everywhere in space, all at once, with more of a probability of being at some places than others, and it's only after we measure its position that we can pinpoint where it is at that moment. A lot like how we didn't know whether the cat was alive or dead until we opened the box. This brings us to the strange and beautiful phenomenon of quantum entanglement. Suppose that instead of one cat in a box, we have two cats in two different boxes. If we repeat the Schrödinger's cat experiment with this pair of cats, the outcome of the experiment can be one of four possibilities. Either both cats will be alive, or both will be dead, or one will be alive and the other dead, or vice versa. The system of both cats is again in a superposition state, with each outcome having a 25% chance rather than 50%. But here's the cool thing: quantum mechanics tells us it's possible to erase the both cats alive and both cats dead outcomes from the superposition state. In other words, there can be a two cat system, such that the outcome will always be one cat alive and the other cat dead. The technical term for this is that the states of the cats are entangled. But there's something truly mindblowing about quantum entanglement. If you prepare the system of two cats in boxes in this entangled state, then move the boxes to opposite ends of the universe, the outcome of the experiment will still always be the same. One cat will always come out alive, and the other cat will always end up dead, even though which particular cat lives or dies is completely undetermined before we measure the outcome. How is this possible? How is it that the states of cats on opposite sides of the universe can be entangled in this way? They're too far away to communicate with each other in time, so how do the two bombs always conspire such that one blows up and the other doesn't? You might be thinking, "This is just some theoretical mumbo jumbo. This sort of thing can't happen in the real world." But it turns out that quantum entanglement has been confirmed in real world lab experiments. Two subatomic particles entangled in a superposition state, where if one spins one way then the other must spin the other way, will do just that, even when there's no way for information to pass from one particle to the other indicating which way to spin to obey the rules of entanglement. It's not surprising then that entanglement is at the core of quantum information science, a growing field studying how to use the laws of the strange quantum world in our macroscopic world, like in quantum cryptography, so spies can send secure messages to each other, or quantum computing, for cracking secret codes. Everyday physics may start to look a bit more like the strange quantum world. Quantum teleportation may even progress so far, that one day your cat will escape to a safer galaxy, where there are no physicists and no boxes.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=121)

翻译人员: Nical Lee 校对人员: Bighead Ge竖直地向上扔一个球你能预测当球离开你的手以后的运动吗？当然，这很简单。在到达某个最高点之前，这个球将一直上升。之后它将下落，又一次回到你的手上。当然，事情就是这样的。你之所以知道，是因为你已经无数次目击过这样的事情发生。你一直在整个生命的日常现象里观察到物理但是，假设我们去探索一个关于原子物理的问题就像是，一个电子绕氢原子核的运动是什么样就像是，一个电子绕氢原子核的运动是什么样我们能依据日常的物理经验去回答吗？肯定不行。为什么？因为，微观系统运行的物理定律与宏观物理的定律有很大不同那些你见到或是围绕在你身边的物理每天，你所见到和所深爱的被经典力学定律所掌控着。但是，原子规模的系统被量子力学定律所掌控。这种量子世界被证明是个十分奇怪的地方。一个有名的思想实验给出了一个说明量子世界奇怪的例子，薛定谔的猫一个实际上并不特别喜欢猫的物理学家，将一只猫放进盒子中，并一同放了一颗炸弹，在盖子盖上后，有50%的机率爆炸。除非我们我们重新打开盖子，我们没有办法得知炸弹有没有爆炸因此，也无法知道猫是活着还是死了。在量子物理中，我们可以说在观测之前，那只猫处于叠加态。既不是活着也不是死亡，而是两种可能性的混合。每种可能都有50%的可能性。在量子规模中，同样的事情发生在物理系统上，就像一个电子绕氢原子核运行电子不是真正的绕轨道运行。就像是空间中的任何地方，都在一瞬间存在某处比其他地方有更大的可能性，并且只有在我们测量过它的位置之后，我们才可以精确的知道那个时刻它在哪。很多现象，像是我们不知道这只猫是死是活直到打开盒子这些把我们带入奇怪而又美丽的量子缠绕现象。假设，现在我们有两只猫，在两个不同的盒子里如果我们对这一对猫重复“薛定谔的猫”的实验这个实验的结果有四种可能两只猫都活着或是都死了亦或是，一只猫活着一只死了，或者反一下这个两只猫的系统又存在于叠加态，每种结果都有25%的可能性，而不是50％。但是，这里有很有棒的事量子力学告诉我们有可能去清除叠加态中的结果，即两只猫都活着或死去。换言之，可以是两只猫的系统，这个的结果将总是一只猫活着，另一只猫死去。这个科学术语就是猫的纠缠态。但是，关于量子纠缠有些真正吸引人的事情。如果你在这种纠缠态中，准备两只在盒子中猫的系统然后把盒子移到宇宙的另一端实验的结果将总是相同。一只猫总是活着，而另一只总是以死亡结束。尽管在观测结果前，具体哪只猫死亡或活着是完全不确定的，这怎么可能？宇宙两端的猫的状态怎能这样被纠缠？它们相隔太远以至于不能即使沟通。那么，两个炸弹怎么能总是策划好一个爆炸而另一个无恙？你一定在想，这只是一些理论上的胡言乱语这种事情不可能在真正的世界上发生。但是，这证明了，量子纠缠（量子纠缠）已经在真实世界的实验室被证实了。两个亚原子的颗粒在叠加态纠缠，在这种状态下，如果一个颗粒以一个方向旋转，另一个颗粒，必定以反方向旋转事实就是这样，甚至，当没有办法将信息从一个颗粒传给另一个去暗示，怎么服从缠绕的法则旋转。不足为奇的是，纠缠是量子信息科学的核心，这是一个正在发展的领域，研究在我们的宏观世界怎样应用奇怪的量子世界的定律就像量子密码，间谍可以互相发送安全信息，或者量子计算，去破解密码。日常的物理可能开始看上去有点像奇怪的量子世界。量子远距离传送，甚至可能发展的十分迅速某天，你的猫可能逃脱去了另一个星系，那里既没有物理学家，也没有盒子。

**P122 2014-08-08 How optical illusions trick your brain - Nathan S. Jacobs**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=122)

Check this out: Here's a grid, nothing special, just a basic grid, very grid-y. But look closer, into this white spot at the center where the two central vertical and horizontal lines intersect. Look very closely. Notice anything funny about this spot? Yeah, nothing. But keep looking. Get weird and stare at it. Now, keeping your gaze fixed on this white spot, check what's happening in your peripheral vision. The other spots, are they still white? Or do they show weird flashes of grey? Now look at this pan for baking muffins. Oh, sorry, one of the cups is inverted. It pops up instead of dipping down. Wait, no spin the pan. The other five are domed now? Whichever it is, this pan's defective. Here's a photo of Abraham Lincoln, and here's one upside down. Nothing weird going on here. Wait, turn that upside down one right side up. What have they done to Abe? Those are just three optical illusions, images that seem to trick us. How do they work? Are magical things happening in the images themselves? While we could certainly be sneaking flashes of grey into the peripheral white spots of our animated grid, first off, we promise we aren't. You'll see the same effect with a grid printed on a plain old piece of paper. In reality, this grid really is just a grid. But not to your brain's visual system. Here's how it interprets the light information you call this grid. The white intersections are surrounded by relatively more white on all four sides than any white point along a line segment. Your retinal ganglion cells notice that there is more white around the intersections because they are organized to increase contrast with lateral inhibition. Better contrast means it's easier to see the edge of something. And things are what your eyes and brain have evolved to see. Your retinal ganglion cells don't respond as much at the crossings because there is more lateral inhibition for more white spots nearby compared to the lines, which are surrounded by black. This isn't just a defect in your eyes; if you can see, then optical illusions can trick you with your glasses on or with this paper or computer screen right up in your face. What optical illusions show us is the way your photo receptors and brain assemble visual information into the three-dimensional world you see around you, where edges should get extra attention because things with edges can help you or kill you. Look at that muffin pan again. You know what causes confusion here? Your brain's visual cortex operates on assumptions about the lighting of this image. It expects light to come from a single source, shining down from above. And so these shading patterns could only have been caused by light shining down on the sloping sides of a dome, or the bottom of a hole. If we carefully recreate these clues by drawing shading patterns, even on a flat piece of paper, our brain reflexively creates the 3D concave or convex shape. Now for that creepy Lincoln upside down face. Faces trigger activity in areas of the brain that have specifically evolved to help us recognize faces. Like the fusiform face area and others in the occipital and temporal lobes. It makes sense, too, we're very social animals with highly complex ways of interacting with each other. When we see faces, we have to recognize they are faces and figure out what they're expressing very quickly. And what we focus on most are the eyes and mouth. That's how we figure out if someone is mad at us or wants to be our friend. In the upside down Lincoln face, the eyes and mouth were actually right side up, so you didn't notice anything was off. But when we flipped the whole image over, the most important parts of the face, the eyes and mouth, were now upside down, and you realized something fishy was up. You realized your brain had taken a short cut and missed something. But your brain wasn't really being lazy, it's just very busy. So it spends cognitive energy as efficiently as possible, using assumptions about visual information to create a tailored, edited vision of the world. Imagine your brain calling out these edits on the fly: "Okay, those squares could be objects. Let's enhance that black-white contrast on the sides with lateral inhibition. Darken those corners! Dark grey fading into light grey? Assume overhead sunlight falling on a sloping curve. Next! Those eyes look like most eyes I've seen before, nothing weird going on here." See? Our visual tricks have revealed your brain's job as a busy director of 3D animation in a studio inside your skull, allocating cognitive energy and constructing a world on the fly with tried and mostly -- but not always -- true tricks of its own.

**P122 2014-08-08 How optical illusions trick your brain - Nathan S. Jacobs**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=122)

翻译人员: Catherine Gu 校对人员: Jenny Yang看看：一个网格，无特别之处，只是个网格，很网格的。但仔细看看中心的这个白点，两条中心横竖垂直的线交叉在一起。看仔细点。注意到这点有什么奇怪的吗？对，没有。可是再继续盯着看。现在，盯着这个白点，用余光看一下在发生什么。其它的点还是白色的吗？还是它们显出怪异的灰色闪光？现在看这个松饼烤盘。哦，对不起，一个杯子倒过来，它凸了起来而不是凹下去。等一下，现在转一下烤盘。现在其它五个杯凸起来了吗？不管是哪一个，这个烤盘是有缺陷的。这是一张林肯的照片，还有一张是倒放的。没什么怪异的地方。等一下，把倒放的照片放正。亚伯怎么了？那只是三种视觉假象，似乎欺骗我们的图像。它们是如何产生的？魔术般的事情发生在图像本身吗？虽然我们当然可以把灰色闪光放入动画网格的外围白点，首先，我们发誓我们不会那样做。网格如果印在一张普通的纸上，你也会看到同样的效果。其实，这个网格就只是个网格。但对你的大脑的视觉系统它不是。大脑是这么理解从所谓的网格来的光和信息的：白色交点四周有更多的白色包围着，比沿着任何一条线段的白点还多。你的视网膜神经节细胞注意到交点周围有更多的白色。因为侧抑制使他们增加对比 。对比鲜明意味着较易看到东西的边缘。这些东西就是你的眼睛和大脑进化的结果。你的视网膜神经节细胞在交叉点没有过多的反应。因为对附近更多的白点有更多的侧抑制，这是和黑色包围的线条相比。这不仅仅是你眼睛的缺陷；如果你能看到，即使你戴着眼镜，或用这张纸， 或就在你面前的电脑屏幕，错觉会欺骗你，。错觉向我们显示的是你的光受体和大脑把可视信息组装成你周围看到的三维世界的方式，三唯世界里应额外注意边因为带边的东西既能帮你也会杀你。再看那个松饼盘。你知道是什么引起了混乱吗？你大脑的视觉皮层对这个图像的照明在进行假设。假设光是从上方照下来的单一光源。所以这些阴影模式只能是由照下来的光引起的，是照在圆顶斜面上的光，还是照在凹下去的底部的光。如果我们绘制阴影图案来仔细重建这些线索，甚至在一张平纸上，我们的大脑也会本能地创建三维凹或凸的形状。现在就说林肯那张异样的上下颠倒的脸。脸触发大脑区域的活动专门进化帮我们识别人脸。像梭状回面孔区和枕叶和颞叶的其它区域。这也是有道理的，我们是非常社会化的动物具有相互作用的极其复杂的方式。我们看脸的时候不得不认出它们是脸并非常迅速地想出他们在表达什么。我们注意最多的是脸和嘴。我们就是这样判断出人是对我们生气了还是想和我们做朋友。林肯那张上下颠倒的脸，实际上眼睛和嘴是右面在上，所以，你没注意到少了什么。但当我们把整个图像翻转过来，脸最重要的部分，眼睛和嘴，现在上下颠倒了，所以你意识到有点不对劲。你意识到大脑走了捷径而错过了什么。但你的大脑不是真犯懒， 只是很忙而已。所以大脑尽可能高效地使用认知力，利用有关视觉信息的假设来创造一个量身定做的ˎ编辑了的世界景象。想象一下你的大脑匆忙调出这些编辑：“好了，那些方块儿可能是物体。用侧抑制在两侧让我们增强黑白对比。使那些角落变暗！深灰色褪成了浅灰色吗？假设上面的阳光落在一条倾斜的曲线上。接着！那些眼睛看上去像我以前看见的大部分眼睛，没有什么奇怪的。看见了？我们视觉上的幻觉揭示了我们大脑的工作它仿佛是你的脑壳工作室里一个忙碌的三维动画导演，经常但并不总是用自身具有的一些手法分配认知能量并快速构建一个世界

**P123 2014-08-15 Feedback loops - How nature gets its rhythms - Anje-Margriet Neutel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=123)

Testing, testing, one, two, three. When your band is trying to perform, feedback is an annoying obstacle, but in the grand orchestra of nature, feedback is not only beneficial, it's what makes everything work. What exactly is feedback? The key element, whether in sound, the environment or social science, is a phenomenon called mutual causal interaction, where x affects y, y affects x, and so on, creating an ongoing process called a feedback loop. And the natural world is full of these mechanisms formed by the links between living and nonliving things that build resilience by governing the way populations and food webs respond to events. When plants die, the dead material enriches the soil with humus, a stable mass of organic matter, providing moisture and nutrients for other plants to grow. The more plants grow and die, the more humus is produced, allowing even more plants to grow, and so on. This is an example of positive feedback, an essential force in the buildup of ecosystems. But it's not called positive feedback because it's beneficial. Rather, it is positive because it amplifies a particular effect or change from previous conditions. These positive, or amplifying, loops can also be harmful, like when removing a forest makes it vulnerable to erosion, which removes organic matter and nutrients from the earth, leaving less plants to anchor the soil, and leading to more erosion. In contrast, negative feedback diminishes or counteracts changes in an ecosystem to maintain a more stable balance. Consider predators and their prey. When lynx eat snowshoe hares, they reduce their population, but this drop in the lynx's food source will soon cause their own population to decline, reducing the predation rate and allowing the hare population to increase again. The ongoing cycle creates an up and down wavelike pattern, maintaining a long-term equilibrium and allowing a food chain to persist over time. Feedback processes might seem counterintuitive because many of us are used to more predictable linear scenarios of cause and effect. For instance, it seems simple enough that spraying pesticides would help plants grow by killing pest insects, but it may trigger a host of other unexpected reactions. For example, if spraying pushes down the insect population, its predators will have less food. As their population dips, the reduced predation would allow the insect population to rise, counteracting the effects of our pesticides. Note that each feedback is the product of the links in the loop. Add one negative link and it will reverse the feedback force entirely, and one weak link will reduce the effect of the entire feedback considerably. Lose a link, and the whole loop is broken. But this is only a simple example, since natural communities consist not of separate food chains, but networks of interactions. Feedback loops will often be indirect, occurring through longer chains. A food web containing twenty populations can generate thousands of loops of up to twenty links in length. But instead of forming a disordered cacophany, feedback loops in ecological systems play together, creating regular patterns just like multiple instruments, coming together to create a complex but harmonious piece of music. Wide-ranging negative feedbacks keep the positive feedbacks in check, like drums maintaining a rhythm. You can look at the way a particular ecosystem functions within its unique habitat as representing its trademark sound. Ocean environments dominated by predator-prey interactions, and strong negative and positive loops stabilized by self-damping feedback, are powerful and loud, with many oscillations. Desert ecosystems, where the turn over of biomass is slow, and the weak feedbacks loops through dead matter are more like a constant drone. And the tropical rainforest, with its great diversity of species, high nutrient turnover, and strong feedbacks among both living and dead matter, is like a lush panoply of sounds. Despite their stabilizing effects, many of these habitats and their ecosystems develop and change over time, as do the harmonies they create. Deforestation may turn lush tropics into a barren patch, like a successful ensemble breaking up after losing its star performers. But an abandoned patch of farmland may also become a forest over time, like a garage band growing into a magnificent orchestra.

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翻译人员: Wanling Wang 校对人员: Yulin Li测试，测试，1，2，3当你的乐队准备登台演出时， 反馈噪音是一个很烦人的问题。但是在自然界，这个世界上最大规模的交响乐演出中， 反馈不仅仅是有益的，更是让一切事物有序运转的关键。那么到底什么是反馈呢？无论是在声音、环境科学、或者是社会科学中，最关键的要素是一种叫做相互因果关系的现象，也就是x先影响y，y再影响x，等等，产生一种叫做反馈回路的持续过程。在自然界中这样的机制随处可见，通过生物及非生物之间的链接，利用种群数量和食物网的自然规律来打造自然适应力。当植物死亡后，死植给土壤提供腐殖质，腐殖质是一种为其他植物的生长提供所需的水分及营养的稳定的有机物质。植物死亡的越多，土壤中的腐殖质就越多，土壤就会更加肥沃，生长更多的植物，如此往复。这就是一个正反馈的例子，一个生态环境中非常重要的组成部分。但我们并不是因为其有益而称其为正反馈。而是因为这种反馈作用将之前的改变扩大了影响。这种正向的，或者说放大的循环也可能有害，比如当我们砍伐森林，导致水土流失，也就同时去除了土壤中的养分和有机物，这样植物就会死亡，从而导致更多的腐殖质产生。相反，负向反馈通过减弱或阻碍生态系统中的改变来达到一个更加稳定的平衡。想想捕食者和它们的猎物：当山猫捕食野兔时，野兔的数量会减少。但是野兔数量的减少会很快导致山猫食物的缺乏，最终导致山猫数量同样减少。山猫的种群数量下降导致了野兔的天敌变少，从而使得野兔的种群数量又回升。这种往复的循环形成上下波浪状的模式达到了一个长期的均衡，且使得食物链稳定。反馈的过程可能对于大多数人来说是违反直觉的，因为我们大都习惯了可预测性的，线性关系的因果关系。举个例子来说:众所周知，喷洒杀虫剂能杀灭害虫帮助植物生长。但是这个过程可能会导致一系列出乎意料的后果。比如说，如果喷药使得昆虫数量降低，捕食昆虫的动物就会面临食物缺乏。它们的种群数量就会降低，而此就会导致昆虫的数量回升，抵消了我们喷洒杀虫剂的效果。请注意，每一个反馈都是这个循环弧中的一个因素。加入一个负向的因素就会改变整个循环的方向，加入一个弱的因素会大大减弱整个反馈的能力。缺少一个因素，整个循环会崩溃。但这只是一个简单的例子因为自然界中没有独立的食物链而是一个互相影响的巨大网络反馈循环经常是间接的，并且发生在一个较长的食物链中一个包含着20个种群的食物网会产生上千种不同的循环，每个循环都会有20个环节。但是相对于混乱如麻的关系，生态系统中的反馈回路一起创造出了一个共有的篇章，就像许多种乐器一起演奏出一首悦耳的奏鸣曲。大范围的负向反馈使得正向反馈不会太过强大就像鼓声保持着节奏。你可以看到一个生态系统用他自己独特的方式维持着自己的正常运行。海洋环境被捕食与被捕食的关系所主宰，正负向反馈被自减震反馈作用相抵消，但是过程中充斥着震耳欲聋的振动声。在缓慢的沙漠生态系统中，通过死亡物质发生作用的微弱反馈就更像是持续的嗡鸣声。在极具多样性的热带雨林中，极高的营养交换率，生物及死亡物质作用的强反馈就像首复杂而和谐的交响乐。由于他们的稳定作用，许多栖息地和他们的生态系统不断的发展和改变，同时它们也非常和谐的共存着。沙漠化进程可能会将一片富饶的热带雨林变成贫瘠的荒地，就像一个乐队组合在失去了他们的明星后解散。但一片被遗忘的农田也有可能变成一片广袤的森林，就像一个车库乐队最终变成了一个伟大的交响乐团。

**P124 2014-08-15 The past, present and future of the bubonic plague - Sharon N. DeWitt**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=124)

Imagine if half the people in your neighborhood, your city, or even your whole country were wiped out. It might sound like something out of an apocalyptic horror film, but it actually happened in the 14th century during a disease outbreak known as the Black Death. Spreading from China through Asia, the Middle East, Africa and Europe, the devastating epidemic destroyed as much as 1/5 of the world's population, killing nearly 50% of Europeans in just four years. One of the most fascinating and puzzling things abut the Black Death is that the illness itself was not a new phenomenon but one that has affected humans for centuries. DNA analysis of bone and tooth samples from this period, as well as an earlier epidemic known as the Plague of Justinian in 541 CE, has revealed that both were caused by Yersinia pestis, the same bacterium that causes bubonic plague today. What this means is that the same disease caused by the same pathogen can behave and spread very differently throughout history. Even before the use of antibiotics, the deadliest oubreaks in modern times, such as the ones that occurred in early 20th century India, killed no more than 3% of the population. Modern instances of plague also tend to remain localized, or travel slowly, as they are spread by rodent fleas. But the medieval Black Death, which spread like wildfire, was most likely communicated directly from one person to another. And because genetic comparisons of ancient to modern strains of Yersinia pestis have not revealed any significantly functional genetic differences, the key to why the earlier outbreak was so much deadlier must lie not in the parasite but the host. For about 300 years during the High Middle Ages, a warmer climate and agricultural improvements had led to explosive population growth throughout Europe. But with so many new mouths to feed, the end of this warm period spelled disaster. High fertility rates combined with reduced harvest, meant the land could no longer support its population, while the abundant supply of labor kept wages low. As a result, most Europeans in the early 14th century experienced a steady decline in living standards, marked by famine, poverty and poor health, leaving them vulnerable to infection. And indeed, the skeletal remains of Black Death victims found in London show telltale signs of malnutrition and prior illness. The destruction caused by the Black Death changed humanity in two important ways. On a societal level, the rapid loss of population led to important changes in Europe's economic conditions. With more food to go around, as well as more land and better pay for the surviving farmers and workers, people began to eat better and live longer as studies of London cemeteries have shown. Higher living standards also brought an increase in social mobility, weakening feudalism, and eventually leading to political reforms. But the plague also had an important biological impact. The sudden death of so many of the most frail and vulnerable people left behind a population with a significantly different gene pool, including genes that may have helped survivors resist the disease. And because such mutations often confer immunities to multiple pathogens that work in similar ways, research to discover the genetic consequences of the Black Death has the potential to be hugely beneficial. Today, the threat of an epidemic on the scale of the Black Death has been largely eliminated thanks to antibiotics. But the bubonic plague continues to kill a few thousand people worldwide every year, and the recent emergence of a drug-resistant strain threatens the return of darker times. Learning more about the causes and effects of the Black Death is important, not just for understanding how our world has been shaped by the past. It may also help save us from a similar nightmare in the future.

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翻译人员: Kai Cui 校对人员: Zhiting Chen想象一下， 如果你居住的街区、城市，甚至你的国家， 一半人口突然死亡。这听起来像是 末日启示录类型的恐怖电影，但这是在14世纪真实发生的事情当时爆发了一种 叫做黑死病的疾病。从中国蔓延到亚洲、 中东、非洲和欧洲，这场毁灭性的传染病 夺走了全世界1/5人口的生命四年时间里，50％欧洲人丧生。有关黑死病，最神奇、 最令人费解的问题在于它并不是一个新病种而是已经困扰了人类几个世纪的疾病。对这个时代人类遗留的骸骨 和牙齿样本的DNA分析以及更早期于公元541年 爆发的查士丁尼大瘟疫分析结果显示两种疾病 都是由鼠疫耶尔辛杆菌引起的，同样的细菌导致了今天的黑死病。这意味着，同样的病原体 引发的同样疾病在历史上会展示出非常不同的 症状，并以不同的方式传播即使在抗生素出现之前， 现代社会最致命的疾病爆发，比如二十世纪初在印度爆发的疾病导致的死亡人数， 亦不到人口总数的3％而且现代社会中的传染病 传播范围比较有限速度也比较慢， 就像多毛蚤传播的那些疾病但是中世纪的黑死病 像野火一样蔓延，似乎是直接由一个人 传染给另外一个人。将古代和现代的 耶尔辛杆菌的基因做比对并没有发现明显的基因差别，那么早期传染病死亡率更高的 主要原因必然不是寄生病菌，而是宿主。在中世纪的300年里，温暖的气候和农业的进步让欧洲人口大幅度增长。但是随着人口增加，温暖气候的结束带来了灾难。高人口出生率，加上农业减产意味着土地无法养活这些人口，而且劳动力供给过剩 导致收入偏低。所以14世纪初的大部分欧洲人都经历了一个生活品质 逐渐下降的过程，其中包括饥荒、贫困、健康状况 下降，导致他们易受传染病伤害。实际上，伦敦黑死病死亡者遗留的骸骨中都有营养不良和先天疾病的迹象。黑死病所造成的危害从两个 重要方面改变了人类历史进程。从社会层面来说， 人口的迅速减少导致欧洲经济结构的重大变化。食物更多了，有更多的土地，幸存下来的 农民和工人拿到了更好的报酬。对伦敦墓地的调查显示， 人们吃得更好，寿命更长了更好的生活条件 还推高了社会流动性，削弱了封建势力， 最终带来了政治改革。瘟疫还造成了重大的生物学影响。大部分体弱的人口突然死亡留下了一个具有 完全不同基因库的人群，其中就包括了 能够帮助幸存者对抗疾病的基因。因为这种突变经常代表对多种类似病原体的免疫力，所以研究黑死病所带来的基因变化具有重要的意义。今天，黑死病蔓延的威胁已经被基本消除了， 这要感谢抗生素。但是淋巴腺鼠疫 每年依然在导致数千人丧生，而且近期出现的耐药菌株似乎有让我们回到黑暗时代的迹象。了解黑死病的病因和影响非常重要，不仅仅要了解我们的世界 在过去发生了怎样的变化，还可能帮助我们避免 梦魇在未来重现，

**P125 2014-08-15 Why we love repetition in music - Elizabeth Hellmuth Margulis**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=125)

How many times does the chorus repeat in your favorite song? And, take a moment to think, how many times have you listened to it? Chances are you've heard that chorus repeated dozens, if not hundreds, of times, and it's not just popular songs in the West that repeat a lot. Repetition is a feature that music from cultures around the world tends to share. So, why does music rely so heavily on repetition? One part of the answer come from what psychologists call the mere-exposure effect. In short, people tend to prefer things they've been exposed to before. For example, a song comes on the radio that we don't particularly like, but then we hear the song at the grocery store, at the movie theater and again on the street corner. Soon, we are tapping to the beat, singing the words, even downloading the track. This mere-exposure effect doesn't just work for songs. It also works for everything from shapes to Super Bowl ads. So, what makes repetition so uniquely prevalent in music? To investigate, psychologists asked people to listen to musical compositions that avoided exact repetition. They heard excerpts from these pieces in either their original form, or in a version that had been digitally altered to include repetition. Although the original versions had been composed by some of the most respected 20th century composers, and the repetitive versions had been assembled by brute force audio editing, people rated the repetitive versions as more enjoyable, more interesting and more likely to have been composed by a human artist. Musical repetition is deeply compelling. Think about the Muppets classic, "Mahna Mahna." If you've heard it before, it's almost impossible after I sing, "Mahna mahna," not to respond, "Do doo do do do." Repetition connects each bit of music irresistibly to the next bit of music that follows it. So when you hear a few notes, you're already imagining what's coming next. Your mind is unconsciously singing along, and without noticing, you might start humming out loud. Recent studies have shown that when people hear a segment of music repeated, they are more likely to move or tap along to it. Repetition invites us into music as imagined participants, rather than as passive listeners. Research has also shown that listeners shift their attention across musical repetitions, focusing on different aspects of the sound on each new listen. You might notice the melody of a phrase the first time, but when it's repeated, your attention shifts to how the guitarist bends a pitch. This also occurs in language, with something called semantic satiation. Repeating a word like atlas ad nauseam can make you stop thinking about what the word means, and instead focus on the sounds: the odd way the "L" follows the "T." In this way, repetition can open up new worlds of sound not accessible on first hearing. The "L" following the "T" might not be aesthetically relevant to "atlas," but the guitarist pitch bending might be of critical expressive importance. The speech to song illusion captures how simply repeating a sentence a number of times shifts listeners attention to the pitch and temporal aspects of the sound, so that the repeated spoken language actually begins to sound like it is being sung. A similar effect happens with random sequences of sound. People will rate random sequences they've heard on repeated loop as more musical than a random sequence they've only heard once. Repetition gives rise to a kind of orientation to sound that we think of as distinctively musical, where we're listening along with the sound, engaging imaginatively with the note about to happen. This mode of listening ties in with our susceptibility to musical ear worms, where segments of music burrow into our head, and play again and again, as if stuck on repeat. Critics are often embarrassed by music's repetitiveness, finding it childish or regressive, but repetition, far from an embarrassment, is actually a key feature that gives rise to the kind of experience we think about as musical.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=125)

翻译人员: nancy liu 校对人员: iris xiao在你最喜欢的歌曲中，高潮部分重复了几遍？花些时间想一想，你一共听了它几遍？事实上，即使你听了它没有几百次，也有几十次了并且并不是只有西方的流行歌曲才会经常重复播放世界各地的音乐都会重复的播放那么，为什么音乐都会被重复的播放呢？原因之一就是心理学家的所提出的曝光效应简而言之，人们更喜欢他们之前曾经遇到过的东西举个例子，电台播放了一首我们并不是很感冒的歌但是我们又在杂货店，在电影院和在街角听到了这首歌不久，我们就会打着节拍，开始唱这首歌甚至下载这首歌这种曝光效应不仅仅体现在歌曲上它也会体现在各种事情上，从图形到超级碗的广告都有它的身影但是，有没有特别的因素使音乐的重复如此普遍？在调查中，心理学家让人们去听一些乐曲一些没有明显重复的乐曲他们听了一些音乐片段，这些片段有些是未经改动的有些则是人工添加重复片段的即使在那些未经改动的乐曲中有些是被20世纪最杰出的作曲家谱写的而那些包含重复片段的乐曲则是用音频编辑器硬生生的修改的人们依旧认为包含重复片段的乐曲更令人愉悦，使人更感兴趣甚至更像是由人类作曲家谱写的重复的音乐如此使人无法抗拒还记得经典木偶剧场里面的“Maha Maha”吗？如果你之前听过这个那在我唱出“maha maha”之后你一定会情不自禁的唱出“do doo do do do”重复使音乐的节拍相连下一节拍自然而然的连了进来因此当你听到一些音符的时候，你已经在脑海里想到了下一个音符你会情不自禁的唱下去甚至你可能都不会注意到自己哼歌的声音越来越大最近的调查表明当人们听到音乐中的一节被重复人们就很可能随着音乐摇摆或者打节拍重复的音乐更有代入感，使我们身临其境而不是被动的听下去研究还表明了在音乐重复过程中，人们会转移自己的关注点每新听一次就会注意到一些不同之处在听第一遍时，你可能会注意到一个短语伴随的旋律但是当音乐重复时，你的注意力就可能会转移到吉他演奏者弹出的一个高音这种情况也发生在语言中，被称为语义饱和重复一个单词，比如不断重复“atlas”直到厌烦这样做可以使你不再想这个词是什么意思而是注意到“L”跟在“T”后面会发出很奇怪的音在这种情况下，重复会为你打开发音这个新世界的大门这在第一次听时是无法做到的“L”跟随“T”在字面上看起来好像和“atlas”没太大的关系但是吉他演奏手演奏的高音就可能在表现力方面很有意义音调带来的想像可以阐明重复一个句子很多次可以很简单的转移听音乐的人的注意力把注意力转移到乐曲的音高或者其他方面因此那些不断被重复说出的话语有时听起来好像是被唱出来的相同的情况也会发生在当人们听到随机排列的音符的时候相比起那些没有重复播放的随机排列的音符人们会觉得重复播放的随机排列的音符更加有音乐性重复使音符们变得更加有秩序所以当我们听到它时，会认为有很显著的音乐性沉浸在脑海的想象中，思考着下一个音符会是什么这种效应会给我们带来音乐挥之不去的效果因此音乐的片段会在我们脑中不断回旋一边又一边的回响评论家经常会不喜欢音乐的重复性认为它很幼稚，没有创造力但是对于音乐的重复，其实并不会令人憎恶，反而是一种音乐的主要特性这种特性可以给我们带来富有音乐感的体验

**P126 2014-08-25 Why do we pass gas - Purna Kashyap**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=126)

Flatulence, or passing gas, is a normal daily phenomenon. Most individuals, yes, that includes you, will make anywhere from 500-1500 milliliters of gas and can pass gas ten to twenty times a day. But where does this bodily gas come from? A small proportion may come from ingesting air during sleep, or at other times, but the majority of gas is produced by bacteria in our intestines as they digest parts of food which we cannot. Our intestine is home to trillions of bacteria living in a symbiotic relationship with us. We provide them with a safe place to stay and food to eat. In exchange, they help us extract energy from our food, make vitamins for us, like vitamin B and K, boost our immune system, and play an important role in gastrointestinal barrier function, motility and the development of various organ systems. Clearly, it's in our best interest to keep these bacteria happy. Gut bacteria get their nutrition primarily from undigested food, such as carbohydrates and proteins, which come to the large intestine. They ferment this undigested food to produce a wide range of compounds, such as short-chain fatty acids and, of course, gases. Hydrogen and carbon dioxide are the most common gaseous products of bacterial fermentation, and are odorless. Some people also produce methane due to specific microbes present in their gut. But methane is actually odorless, too. Well then, what stinks? The foul smell is usually due to volatile sulfur compounds, such as hydrogen sulfide and methanethiol, or methyl mercaptan. These gases, however, constitute less than 1% of volume, and are often seen with ingestion of amino acids containing sulfur, which may explain the foul smell of gas from certain high protein diets. Increased passage of gas is commonly noticed after eating foods with high amounts of indigestible carbohydrates, like beans, lentils, dairy products, onions, garlic, leeks, radishes, potatoes, oats, wheat, cauliflower, broccoli, cabbage, and brussel sprouts. Humans lack the enzymes, so the bacteria able to ferment complex carbohydrates take over, and this naturally leads to more gas than usual. But if you feel uncomfortable, bloated or visibly distended, this may indicate impaired movement of gas along the gastrointestinal track. It's important not to just blame certain foods for gas and bloating and then avoid them. You don't want to starve the bacteria that digest these complex carbohydrates, or they'll have to start eating the sugars in the mucus lining of your intestines. Your personal gas will vary based on what you eat, and what bacteria are in your gut. For example, from the same starting sugar, the bacteria clostridium produces carbon dioxide, butyrate and hydrogen, while propionibacterium can produce carbon dioxide, propionate and acetate. At the same time, methanogens can use hydrogen and carbon dioxide produced by other bacteria to generate methane, which can reduce the total volume of gas by using up hydrogen and carbon dioxide. So there's a complex web among intestinal bacteria allowing them to flourish by either directly consuming undigested food, or using what other bacteria produce. This interaction largely determines the amount and type of gas produced, so gas production is a sign that your gut bacteria are at work. But in some instances, people may develop abnormal increased flatulence. A common example is lactose intolerance. Most individuals have the enzyme for breaking down lactose, a sugar present in milk and milk-derived products. But some people either lack it entirely, or have a reduced amount, such as after a gastrointestinal infection, so they're unable to digest lactose products and may experience cramping, along with increased flatulence due to bacterial fermentation. But remember, most gas is produced as a natural result of bacterial fermentation in the intestine, and indicates healthy functioning of the gut. The amount and type can vary based on your diet and the bacteria in your intestine. Exercise social courtesy while passing gas, and do try to forgive your bacteria. They're only trying to be helpful.

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翻译人员: Olivia Shen 校对人员: Chenlu Wang胀气，或者放屁，是正常的日常现象大多数人，是的，这包括你每天将会产生500-1500毫升的气体并且每天会放十次到二十次的屁。但是身体里的气体从哪里产生的呢？小部分的气体可能来自于 在睡眠或其他时间吞入的空气，但是大部分的气体， 是由我们肠道里的细菌产生的，因为他们可以消化部分我们无法消化的食物。我们的肠道里住着上亿万的细菌他们和我们是共生的关系。我们为他们提供了 安全的居住环境和吃的东西。作为交换，他们帮助我们从食物中提取能量，为我们制造维他命，例如维生素B和维生素K， 增强我们的免疫系统，并在肠屏障功能，胃肠运动 及各器官系统的发展中发挥重要作用。如此可见，我们最好让这些细菌快乐的生活下去。肠道细菌主要从未消化的食物里取得营养，像到大肠里的碳水化合物和蛋白质，他们将未消化的食物发酵 从而产生一系列的化合物，例如：短链脂肪酸，当然，还有气体。氢和二氧化碳是最常见的细菌发酵的气体产物并且他们是无味的。由于有些人肠胃里有某种特定的微生物， 他们还会产生甲烷。但是甲烷也是无味的。那么，什么东西这么臭？臭味一般是因为有挥发性的硫化物，如硫化氢和甲硫醇，或巯基甲烷。但是，这些气体只占总量的1%，并且经常因为我们摄入含硫氨基酸，这可能解释了臭气是从某种高蛋白饮食中来的。常常在吃了含有大量不易消化的碳水化合物的食物后，会产生更多的气体，如豆类，扁豆，乳制品， 洋葱，大蒜，韭葱，萝卜，马铃薯，燕麦，小麦，菜花， 西兰花，白菜及甘蓝。人体缺乏酶，因此那些能发酵复合碳水化合物的细菌 就派上用场了，这就会产生比平常更多的气体。但是，如果你觉得不舒服， 浮肿或明显肿胀，这可能表明沿着胃肠道运动的气体遇到了障碍。我们不能因为涨肚就归咎于某些食物然后就不吃它们。你不会想饿着这些消化复杂碳水化合物的细菌，否则它们就会开始消化肠道粘膜里的糖。你身体里产生的气体取决于你吃了什么以及你肠胃里的细菌种类。例如，同样是糖，梭状芽孢杆菌会产生二氧化碳，丁酸盐和氢气，然而丙酸杆菌可以产生二氧化碳，丙酸和乙酸。同时，产甲烷菌可以使用其他细菌产出的氢和二氧化碳以生成甲烷，通过耗掉氢气和二氧化碳 来减少气体的总量。因此，肠道细菌形成了一个复杂的网络，它们可以直接消耗未消化的食物或者消耗其他细菌生产出来的东西。这种相互作用在很大程度上决定了气体所产生的量和类型，因此，产气表明你的肠道细菌在起作用。但是在某些情况下， 人们可能会产生异常的胃肠胀气。一个常见的例子是乳糖不耐症。大多数人都有分解乳糖的酶，乳糖是一种在牛奶或奶制品里存在的糖。但是有些人可能就没有这种酶， 或者有但是数量不够，如胃肠感染后，所以他们无法消化乳糖的产品 并可能腹部绞痛，同时伴随着由于细菌发酵而导致的胀气。但是记住，大部分气体都是由肠胃里的细菌自然发酵的，这表明肠胃正常工作。气体的数量和类型会因为你的饮食和 肠道内的细菌种类而有所不同。放屁时也要娴习礼仪 并试着原谅你的细菌。他们也只是想帮帮忙。

**P127 2014-08-27 What did dogs teach humans about diabetes - Duncan C. Ferguson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=127)

Diabetes mellitus has been a scourge of the developed world with an estimated 400,000,000 people worldwide suffering from this disease, and 50% more predicted within twenty years. Its early symptoms, which include increased thirst and large volumes of urine, were recognized as far back as 1500 BCE in Egypt. While the term diabetes, meaning "to pass through," was first used in 250 BCE by the Greek physician Apollonius of Memphis, Type 1 and Type 2 diabetes, associated respectively with youth and obesity, were identified as separate conditions by Indian physicians somewhere in the 5th century CE. But despite the disease being known, a diagnosis of diabetes in a human patient would remain tantamount to a death sentence until the early 20th century, its causes unknown. What changed this dire situation was the help of humanity's longtime animal partner: Canis lupus familiaris, domesticated from Grey wolves thousands of years ago. In 1890, the German scientists Von Mering and Minkowski demonstrated that removing a dog's pancreas caused it to develop all the signs of diabetes, thus establishing the organ's central role in the disease. But the exact mechanism by which this occurred remained a mystery until 1920, when a young Canadian surgeon named Frederick Banting and his student, Charles Best, advanced the findings of their German colleagues. Working under Professor Macleod at the University of Toronto, they confirmed that the pancreas was responsible for regulating blood glucose, successfully treating diabetic dogs by injecting them with an extract they had prepared from pancreas tissue. By 1922, the researchers working with biochemist James Collip were able to develop a similar extract from beef pancreas to first treat a 14-year-old diabetic boy, followed by six additional patients. The manufacturing process for this extract, now known as insulin, was eventually turned over to a pharmaceutical company that makes different types of injectable insulin to this day. Banting and Macleod received the Nobel Prize for Medicine in 1923 for their discovery. But Banting chose to share his portion with Charles Best, for his help in the initial studies involving dogs. But while medical experimentation on animals remains controversial, in this case at least, it was not just a matter of exploiting dogs for human needs. Dogs develop diabetes at the rate of two cases per 1,000 dogs, almost the same as that of humans under 20. Most canine cases are of Type 1 diabetes, similar to the type that young children develop following immune system destruction of the pancreas, and genetic studies have shown that the dog disease has many similar hallmarks of the human disease. This has allowed veterinarians to turn the tables, successfully using insulin to treat diabetes in man's best friend for over 60 years. Many dog owners commit to managing their dogs' diabetes with insulin injected twice daily, regimented feedings, and periodic blood measurements using the same home-testing glucose monitors used by human patients. And if the purified pig insulin commonly used for dogs fails to work for a particular dog, the vet may even turn to a formulation of human insulin, bringing the process full circle. After all that dogs have done for us throughout the ages, including their role in a medical discovery that has saved countless human lives, using that same knowledge to help them is the least we could do.

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翻译人员: Wen Chen 校对人员: Feifei Yan糖尿病已经成为发达国家的一大杀手全世界据估计已有4亿人患上糖尿病而在未来二十年内，这个数字预计会增加50%它的早期症状，包括口渴、多尿早在公元前 1500 年前的埃及就已被发现而“糖尿病”这个词，其本意是“通过”最早是在公元前250年 由希腊医生孟菲斯提出的1型糖尿病和2型糖尿病的发病机理不同分别与年龄和肥胖有关这两种类型的区分是在5世纪时由某地的印度医生提出尽管糖尿病早就被人们所认识可一直到20世纪初，被诊断出 患了糖尿病还是跟被判了死刑差不多因为它的诱因不明帮助我们脱离这个困境的 是人类一直以来的动物伙伴：数千年前从灰狼驯化而成的——犬类1890年，德国科学家冯·梅林（von Mering）和明科夫斯基（Minkowski）发现摘除狗的胰腺会导致糖尿病的所有症状由此确立了胰脏对于糖尿病的核心作用然而这其中的确切机理一直是个谜直到1920年，一个名叫弗雷德里克·班廷（Frederick Banting）的年轻的加拿大医生和他的学生查尔斯·贝斯特（Charles Best）才进一步证实了他们的德国同事们的发现在多伦多大学教授麦克劳德 （Macleod）的带领下他们证实，胰腺是负责调节血糖的通过注射胰腺组织的提取物他们成功治愈了患糖尿病的狗到1922年，这些研究者又与生物学家 詹姆斯·科利普（James Collip）一起从牛的胰腺中得到一种相似的提取物并首次治疗了一个十四岁的糖尿病男孩接着又治疗了另外六位病人这种提取物 （也就是现在为人熟知的胰岛素）的生产最终被交付给一家制药公司如今他们已经生产了 各种各样的注射用胰岛素班廷和麦克劳德因此获得了1923年的诺贝尔医学奖但班廷选择与查尔斯·贝斯特分享他的奖金以感谢他在最初的研究中引入了狗虽然将动物用于医学试验仍然颇具争议但至少在这个例子中 并不只是利用狗来满足人类需求而已一千条狗中就有两例患有糖尿病这几率几乎跟20岁以下的人类一样大多数的犬病例是1型糖尿病跟儿童或青少年中胰腺免疫系统损坏造成的糖尿病类似遗传学研究表明犬类疾病与人类疾病还有很多相似之处这也令兽医们改变了局面他们已经成功地利用胰岛素为人类最好的朋友治疗糖尿病超过60年许多狗主人致力于治疗他们的糖尿病犬这包括每天两次的胰岛素注射，定量喂食他们还用人类患者使用的家用血糖监测仪来定期地测量血糖如果犬类常用的纯化猪胰岛素对某条狗不见效兽医甚至会转用人类用胰岛素的制剂可以说是“以其犬之道，还治其犬之身”一直以来狗为我们做了太多它们在医学发现中扮演的重要角色 拯救了无数人命我们最基本的回报的就是 运用这些知识反过来帮助他们

**P128 2014-08-28 The chemistry of cold packs - John Pollard**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=128)

So you just strained a muscle and the inflammation is unbearable. You wish you had something ice-cold to dull the pain, but to use an ice pack, you would have had to put it in the freezer hours ago. Fortunately, there's another option. A cold pack can be left at room temperature until the moment you need it, then just snap it as instructed and within seconds you'll feel the chill. But how can something go from room temperature to near freezing in such a short time? The answer lies in chemistry. Your cold pack contains water and a solid compound, usually ammonium nitrate, in different compartments separated by a barrier. When the barrier is broken, the solid dissolves causing what's known as an endothermic reaction, one that absorbs heat from its surroundings. To understand how this works, we need to look at the two driving forces behind chemical processes: energetics and entropy. These determine whether a change occurs in a system and how energy flows if it does. In chemistry, energetics deals with the attractive and repulsive forces between particles at the molecular level. This scale is so small that there are more water molecules in a single glass than there are known stars in the universe. And all of these trillions of molecules are constantly moving, vibrating and rotating at different rates. We can think of temperature as a measurement of the average motion, or kinetic energy, of all these particles, with an increase in movement meaning an increase in temperature, and vice versa. The flow of heat in any chemical transformation depends on the relative strength of particle interactions in each of a substance's chemical states. When particles have a strong mutual attractive force, they move rapidly towards one another, until they get so close, that repulsive forces push them away. If the initial attraction was strong enough, the particles will keep vibrating back and forth in this way. The stronger the attraction, the faster their movement, and since heat is essentially motion, when a substance changes to a state in which these interactions are stronger, the system heats up. But our cold packs do the opposite, which means that when the solid dissolves in the water, the new interactions of solid particles and water molecules with each other are weaker than the separate interactions that existed before. This makes both types of particles slow down on average, cooling the whole solution. But why would a substance change to a state where the interactions were weaker? Wouldn't the stronger preexisting interactions keep the solid from dissolving? This is where entropy comes in. Entropy basically describes how objects and energy are distributed based on random motion. If you think of the air in a room, there are many different possible arrangements for the trillions of particles that compose it. Some of these will have all the oxygen molecules in one area, and all the nitrogen molecules in another. But far more will have them mixed together, which is why air is always found in this state. Now, if there are strong attractive forces between particles, the probability of some configurations can change even to the point where the odds don't favor certain substances mixing. Oil and water not mixing is an example. But in the case of the ammonium nitrate, or other substance in your cold pack, the attractive forces are not strong enough to change the odds, and random motion makes the particles composing the solid separate by dissolving into the water and never returning to their solid state. To put it simply, your cold pack gets cold because random motion creates more configurations where the solid and water mix together and all of these have even weaker particle interaction, less overall particle movement, and less heat than there was inside the unused pack. So while the disorder that can result from entropy may have caused your injury in the first place, its also responsible for that comforting cold that soothes your pain.

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翻译人员: Luo Wang 校对人员: Yolanda Zhang你的肌肉刚刚拉伤了， 疼痛和灼烧感让你坐卧难安。你希望能有些冰的东西来镇痛，但要是用冰袋，你需要 提早几小时把它放到冷冻室里。幸运的是，还有另一个选择。一个速冻袋可以一直放置在室温下， 在你需要它的时候，只需按照指示摁下它， 然后不出几秒你就会感到寒意。但是某样东西是如何在这么短的时间内从室温降到接近冰点的呢？答案就藏在化学反应中。你的速冻袋含有水和一种固体化合物，通常是硝酸铵， 被间隔物阻挡在另一个区域.当间隔物被打破，固体就溶化了，并导致了众所周知的吸热反应，从周围的环境中吸收热量。为了理解其中的工作原理，我们需要通过化学过程了解 其背后的两种动力：热力学和熵。这些决定了系统中是否会发生变化， 以及如果发生了变化能量如何流动。在化学中，热力学影响了分子层面粒子间的引力和斥力。分子是如此的小，以至于一杯水中的水分子比宇宙中已知的星星数量还要多。所有这些数万亿的分子一直以不同的速度保持运动，振颤和旋转。我们可以将温度看作平均运动下的标尺,或者这些所有粒子的动能，速度的提升意味着温度的提升，反之亦然。在任何化学变化中热量的流动都取决于一个物质各个化学状态下其粒子间互相作用的相对强弱。当粒子间有很强的相互引力，它们会急速地向另一个运动，直到近到会被斥力推开。如果初始吸引力足够强大，粒子会像这样保持前后震动。引力越大，运动越快，因为热量本质上是一种运动，当一种物质进入相互作用更强的状态时，系统就会升温。但是速冻袋与之相反，这意味着，当固体溶解在水中，固体粒子和水分子之间的新的引力会比之前分别存在的单独相互作用弱。这会使两种类型的粒子平均上减速，使溶液降温。但是物质是怎么达到 相互作用更弱的状态的呢？难道之前更强的相互作用 不会阻止固体溶解吗？这就是熵参与的地方。熵基本上描述了物质和能量是基于随机运动分布的。考虑一下房间里的空气，组成它的万亿粒子有很多种不同的排列。某个区域会聚集所有的氧分子，在另一区域则聚集了所有氮分子。它们当中绝大多数会混合起来，这就是为什么空气总在这种状态下被发现。现在，如果粒子间有更强的引力，一些构造产生的可能性就会发生改变，甚至会达到使某些物质不相容的状态。油和水不能混合就是个例子。但是对于硝酸铵或者 速冻袋中其他的物质，引力还不足以强到改变相溶性，随机运动会让构成固体的粒子 通过溶解到水中而分解，并且不能恢复到固体状态。简单来讲，你的速冻袋变冷是因为随机运动创造出了固体和水混合的状态，这些粒子间的引力甚至会更弱，整个的粒子运动越少，热量就会比未使用过的速冻袋要少。所以熵造成的紊乱也许不但导致了你的伤势，也造成了能舒缓你疼痛的冰爽感。

**P129 2014-08-29 Corruption, wealth and beauty - The history of the Venetian gondola -**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=129)

If I say, "Venice," do you imagine yourself gliding down the Grand Canal, serenaded by a gondolier? There's no doubt that the gondola is a symbol of Venice, Italy, but how did this curious banana-shaped black boat get its distinctive look? The origins of the Venetian gondola are lost to history, but by the 1500s, some 10,000 gondolas transported dignitaries, merchants and goods through the city's canals. In fact, Venice teemed with many types of handmade boats, from utilitarian rafts to the Doge's own ostentatious gilded barge. Like a modern day taxi system, gondolas were leased to boatmen who made the rounds of the city's ferry stations. Passengers paid a fare to be carried from one side of the Grand Canal to the other, as well as to other points around the city. But gondoliers soon developed a bad rap. Historical documents describe numerous infractions involving boatmen, including cursing, gambling, extorting passengers -- even occasional acts of violence. To minimize the unpredictability of canal travel, Venetian citizens who could afford it purchased their own gondolas, just as a celebirty might use a private car and driver today. These wealthy Venetians hired two private gondoliers to ferry them around the city and maintain their boats. The gondolas soon became a status symbol, much like an expensive car, with custom fittings, carved and gilded ornamentation, and seasonal fabrics, like silk and velvet. However, the majority of gondolas seen today are black because in 1562, Venetian authorities decreed that all but ceremonial gondolas be painted black in order to avoid sinfully extravagant displays. Apparently, Venetian authorities did not believe in "pimping their rides." Still, some wealthy Venetians chose to pay the fines in order to maintain their ornamental gondolas, a small price to keep up appearances. The distinctive look of the gondola developed over many centuries. Each gondola was constructed in a family boatyard called a squero. From their fathers and grandfathers, sons learned how to select and season pieces of beech, cherry, elm, fir, larch, lime, mahogany, oak and walnut. The gondola makers began with a wooden template that may have been hammered into the workshop floor generations earlier. From this basic form, they attached fore and aft sterns, then formed the longitudinal planks and ribs that made up the frame of a boat designed to glide through shallow, narrow canals. A gondola has no straight lines or edges. Its familiar profile was achieved through an impressive fire and water process that involved warping the boards with torches made of marsh reeds set ablaze. However, the majority of the 500 hours that went into building a gondola involved the final stages: preparing surfaces and applying successive coats of waterproof varnish. The varnish was a family recipe, as closely guarded as one for risotto or a homemade sauce. Yet even with the woodwork finished, the gondola was still not complete. Specialized artisans supplied their gondola-making colleagues with elaborate covered passenger compartments, upholstery and ornaments of steel and brass. Oar makers became integral partners to the gondola makers. The Venetian oarlock, or fórcola, began as a simple wooden fork, but evolved into a high-precision tool that allowed a gondolier to guide the oar into many positions. By the late 1800s, gondola makers began to make the left side of the gondola wider than the right as a counter balance to the force created by a single gondolier. This modification allowed rowers to steer from the right side only, and without lifting the oar from the water. While these modifications improved gondola travel, they were not enough to keep pace with motorized boats. Today, only about 400 gondolas glide through the waterways of Venice, and each year, fewer authentic gondolas are turned out by hand. But along the alleys, street signs contain words in Venetian dialect for the locations of old boatyards, oar makers and ferry stations, imprinting the memory of the boat-building trades that once kept life in the most serene republic gliding along at a steady clip.

**P129 2014-08-29 Corruption, wealth and beauty - The history of the Venetian gondola -**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=129)

翻译人员: Jingwei Gu 校对人员: Karen Kuang如果我说，“威尼斯，” 你会想像自己乘着小船 在大运河上顺流逶迤而下，聆听船夫哼唱小夜曲的情景吗？小船贡多拉（Gondola）无疑是 意大利威尼斯的一大标志，但这种古怪的黑色香蕉船极富特点的外形 是怎么产生的呢？威尼斯贡多拉的起源历史已经无从考证，但在16世纪时，有大约一万艘贡多拉 在城市的运河穿梭接送贵宾，抑或是运送商品货物。其实，威尼斯有着大量 各式各样的手工制小船，从实用的筏子到总督私有的铺张船只，就好像现代的出租车体系一样， 贡多拉被租给那些在城里的轮渡站之间 来来回回的船夫们。乘客们支付费用 从大运河的此岸渡到彼岸，也会去往城市的其他地方。但是船夫们很快就有了个坏名声。历史文献描述了大量牵涉到船夫的违法案件，包括诅咒、参与赌博、勒索乘客——甚至是偶有发生的暴力事件。为了最大限度减少运河航行中 不可预测的危险，有经济能力的威尼斯老百姓们 购买了自己的贡多拉，就像今天的名人会购买私家车、 起用私人司机一样。这些富有的威尼斯人雇佣两个私人船夫 这样就能渡到城市的各处并让船夫们保养自己的船只。贡多拉很快就成为了一种身份象征， 简直就像名贵的汽车一样，有定制的配件、镀金的雕刻装饰，还有随季节变化的织物，比如丝绸与天鹅绒。然而，现在大多数贡多拉看起来都是黑色的因为在1562年，威尼斯地方当局颁布法令，规定除庆典用船之外， 其他贡多拉都应被漆成黑色，从而避免不道德的过分奢侈。显然，威尼斯当局不信任 "改靓你的小船"这东西。不过，仍有一些富有的威尼斯人 选择支付罚款从而保留他们装饰华丽的贡多拉，装点门面的小钱而已。贡多拉与众不同的外观 经过了几个世纪的演变。每艘家庭船坞制造的贡多拉 被称为“斯奎罗”（Squero）。子孙们从祖辈那里 学习如何挑选、风干山毛榉、樱桃、榆木、冷杉、落叶松、 酸橙、红木、橡木和核桃木的木料。贡多拉制造者们会从一块 木头模板开始，那模板可能几代以前就已经制作完成、 被放到车间的地板上了。从这个基础型开始，他们再 加上船头和船尾，然后组装纵式与肋状的支撑物 从而形成船身，这样的设计是为了使船驶过 又浅又窄的运河水道。贡多拉没有任何棱角。它那为人所熟知的的轮廓是经由一个 令人印象深刻的水火处理过程达到的。这个过程包括用燃烧的芦苇火把烤弯木板。然而，制造一艘贡多拉所需的500小时主要耗费在了最后的工序上：处理表面，上几道防水漆。防水漆是家庭的秘方，就像意大利调味饭 的配方，或者自家制的调味汁一样，被严密地保护着。但就算木工已经完成， 贡多拉也还是半成品。专业的工匠们提供制造贡多拉的同工们精心打造的船舱，钢铁与黄铜的饰品，以及座套。桨的制造者成为了贡多拉工匠们 不可或缺的搭档。威尼斯的船桨托， 或者说“福克拉”（fórcola）， 开始的时候只是简单的木叉，后来却逐渐演变成一种高精度工具，让船夫能够把船桨调整到许多位置上。十九世纪末，贡多拉工匠们开始把贡多拉的左侧 制造得比右边更宽从而平衡单一的船夫产生的力量。这样的改良使得桨手们 只从右侧操纵就足够，不必再把桨从水里提起来。尽管这些改良提高了贡多拉的行驶能力，它们的速度还是跟不上机动船只。今天，只有约四百艘贡多拉 还在威尼斯的水道上行驶，正宗的手工制贡多拉也在逐年减少。然而，街巷之中，以威尼斯方言写成的路牌仍然指示着古老的船坞、船桨工匠 与轮渡站的方向，铭记着造船业曾几何时无限的繁盛在静谧的共和国里熙来攘往的回忆。

**P130 2014-09-05 If matter falls down, does antimatter fall up - Chloé Malbrunot**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=130)

"Hey, another atom. I'm hydrogen, nice to meet you. How are you feeling about the jump?" "Hi there, I'm antihydrogen, your antiatom, and to be honest, I'm feeling kind of neutral. My positron and antiproton balance out, just like your electron and proton, right?" "Hey, yeah! You look just like me, but different somehow." "Whoa, be careful! If we get too close, we'll disappear in a spark of energy. I'd like to stay in one piece." "Oh wow, sorry." "It's okay. I was just thinking, it's kind of weird for us to be chatting like this before our jump above CERN." "Why's that?" "Well, for starters, how do we know we'll both fall?" "Of course we'll fall. It's gravity, you know, the force of attraction between masses. I even know how fast we should fall. Galileo showed in that tower experiment that all falling objects accelerate at the same rate, regardless of mass." "That's for bigger objects. It's a different story for small particles like us. Our mass is so tiny that the gravitational force we experience is miniscule, and if the particles are charged, like my antiproton or your proton, then it becomes impossible to detect compared to the much greater electromagnetic force acting on them." "But that's only for charged particles. You and I are both neutral. Our charges balance out, so the electromagnetic force is small and the gravitational force should be detectable. I know mine's been measured." "Because you're everywhere, but I'm kind of hard to find." "Why is that, anyway? Shouldn't there have been an equal amount of matter and antimatter created in the Big Bang?" "You'd think so, but then all of those particles would have annihilated each other into energy, remember? And the Universe is obviously full of matter. No one knows why there is more matter than antimatter, which is why scientists are so interested in studying me." "So where do they find you anyway?" "Actually, I was made in that lab down there. They needed an accelerator to make my antiproton because it's so heavy, just as heavy as your proton. Getting my positron was easier. It's much lighter, like your electron, and there are materials that naturally decay by emitting one. Then they just had to put the two together and they got me. But it's only recently that they've been able to keep me around long enough to study my properties." "And now they've sent you on this jump with me. Hey, wait a minute." "That's right. We're reenacting Galileo's experiment, but with matter and antimatter instead of two objects made of matter." "So what's going to happen? Are you going to fall upwards or something?" "Only one way to find out!"

**P130 2014-09-05 If matter falls down, does antimatter fall up - Chloé Malbrunot**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=130)

翻译人员: Yixiong Zhu 校对人员: Cissy Yun“嗨，那个原子！我是氢原子，很高兴认识你。你对一会儿跳伞感觉如何？“”你好啊，我是反氢原子，你的反原子，说实话，我感觉不来电我的正电子和反质子的电荷相等，就像你的电子和质子相等一样，是吧？”“是啊！你看起来跟我一样，但又有点不一样。”“喂，小心啊！如果我们靠得太近，我们会消失成一股能量的。”我还是想多活一会儿。”“哦，对不起。”“没关系。我只是想，我们在CERN（欧洲核子研究组织）上空跳伞前，这么聊天有点奇怪。“”为什么呢？“”嗯，比如说，我们怎么知道我们会坠落？“”我们当然会坠落，重力导致的啊，质量之间相互吸引的力量。我还知道我们坠落得会有多块呢，伽利略在那个塔上的实验中证明，所有坠落的物体都有同样的加速度，与质量大小无关。”“那是大的物体。对于我们小的粒子而言，情况是不同的。我们的质量太小了，我们感受的引力也特别小，如果粒子是带电的，像你的反质子和我的质子，那重力就无法检测，因为电荷上的电磁力太强了。”“但只有带电粒子会那样。我们都是不带电的。我们的正负电荷相等，所以电磁力很小，重力应该可以被检测到。我知道我的重力被测量到过。”“但你到处都是啊，我比较难找。”“为什么会这样呢？大爆炸以来，物质和反物质的数量难道不应该相等么？”“大家都这么想，但这些粒子相互之间都湮灭成了能量，还记得么？现在的宇宙显然满是物质。没人知道为什么物质比反物质多，这也是为什么科学家特别喜欢研究我。”“那他们是从哪儿找到你的？”“事实上，我是在下面的实验室里造出来的。他们得用加速器来制造我的反质子，因为反质子质量非常大，跟你的质子一边大。正电子比较容易，质量小，跟你的电子一样，有的原子在自然衰变中就会放出来些。他们把两个放到一起，就成了我。但直到最近科学家才能让我活得足够长，来研究我的特性。”“那现在他们让你来跟我进行这个跳伞实验。等等...”“对的，我们在重演伽利略的实验，只不过是用物质和反物质，而不是两个物质。”“那会发生什么呢？你是会上落还是什么？“”只有试过才能知道！“

**P131 2014-09-06 How cosmic rays help us understand the universe - Veronica Bindi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=131)

How much can we really know about the universe beyond our galaxy? The Hubble Telescope has enabled us to see objects in space as far 13,000,000,000 light years away. But this still doesn't give us the answers to all our questions, questions like, "What is the universe made of?" "Which elements are the most abundant?" "Does space contain undiscovered forms of matter?" "Could there be antimatter stars or galaxies?" Some of these questions cannot be answered solely from visual images, but what if we had messengers bringing us physical data from distant parts of the cosmos, beyond the reach of explorers or satellites? In a way, we do, and these "space messengers" are called cosmic rays. Cosmic rays were first discovered in 1912 by Victor Hess when he set out to explore variations in the atmosphere's level of radiation, which had been thought to emanate from the Earth's crust. By taking measurements on board a flying balloon during an eclipse, Hess demonstrated both that the radiation actually increased at greater altitudes and that the sun could not be its source. The startling conclusion was that it wasn't coming from anywhere within the Earth's atmosphere but from outer space. Our universe is composed of many astronomical objects. BIllions of stars of all sizes, black holes, active galactic nuclei, astroids, planets and more. During violent disturbances, such as a large star exploding into a supernova, billions of particles are emitted into space. Although they are called rays, cosmic rays consist of these high energy particles rather than the photons that make up light rays. While the light from an explosion travels in a straight line at its famous constant speed, the particles are trapped in extraordinary loops by magnetic shockwaves generated by the explosion. Crossing back and forth through these magnetic field lines accelerates them to almost the speed of light before they escape. There are lots of cosmic rays in space, and some of these particles have traveled for billions of years before reaching Earth. When they enter our atmosphere, they collide with the molecules there, generating secondary cosmic rays, lighter particles with less energy than the original. Most of these are absorbed into the atmosphere, but some are able to reach the ground, even passing through our bodies. At sea level, this radiation is fairly low. But people who spend a lot of time at higher altitudes, such as airline crews, are exposed to much more. What makes cosmic rays useful as messengers is that they carry the traces of their origins. By studying the frequency with which different particles occur, scientists are able to determine the relative abundance of elements, such as hydrogen and helium, within the universe. But cosmic rays may provide even more fascinating information about the fabric of the universe itself. An experiment called the Alpha Magnetic Spectrometer, A.M.S., has recently been installed on board the International Space Station, containing several detectors that can separately measure a cosmic ray particle's velocity, trajectory, radiation, mass and energy, as well as whether the particle is matter or antimatter. While the two are normally indistinguishable, their opposite charges enable them to be detected with the help of a magnet. The Alpha Magnetic Spectrometer is currently measuring 50 million particles per day with information about each particle being sent in real time from the space station to the A.M.S. control room at CERN. Over the upcoming months and years, it's expected to yield both amazing and useful information about antimatter, the possible existence of dark matter, and even possible ways to mitigate the effects of cosmic radiation on space travel. As we stay tuned for new discoveries, look to the sky on a clear night, and you may see the International Space Station, where the Alpha Magnetic Spectrometer receives the tiny messengers that carry cosmic secrets.

**P131 2014-09-06 How cosmic rays help us understand the universe - Veronica Bindi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=131)

翻译人员: Xinyi Zhang 校对人员: Tianyu Wang我们对银河之外的宇宙了解多少？哈勃望远镜使我们能够看到远至宇宙空间中13000000000光年的东西。但这仍然不足以给出我们的问题的全部答案，像这样的问题，“宇宙是由什么组成的？”"宇宙中含量最丰富的元素是什么？"“空间是否包含着尚未被发现的物质形态？”“是否有反物质星或星系存在？”仅仅通过视觉图像（指哈勃望远镜）来回答其中一些问题是不够的，但是如果我们有一些信使能带给我们遥远宇宙空间的信息，甚至超越了探月器和卫星可以到达的尺度？在某种程度上，我们有这种“空间信使”，即宇宙线。宇宙线在1912年由维克特 赫斯 首先发现，当时他着手研究大气中辐射的变化这种辐射被认为是源自地壳。通过在日食期间在热气球上的进行的测量，赫斯展示了辐射随着海拔的增高而增高，从而排除了太阳作为辐射源的情形。令人吃惊的结论是辐射并不来自地球大气层以内的任何地方而是来自太空。我们的宇宙由很多天体组成，数以亿计、各种大小的恒星、黑洞、活动星系核、卫星、行星，等等。在剧烈的扰动，比如一个大恒星演化至爆炸成一个超新星时，数以亿计的粒子辐射到宇宙空间。尽管也被叫做“线”（rays），宇宙线是由一些高能粒子组成，而不是像光线由光子组成。当爆炸产生的光子沿直线以它著名的速度（光速）传播，宇宙线中的高能粒子却被束缚在一些由爆炸产生的冲击波形成的圈中。反反复复在这些磁力线之间穿梭，这些粒子被加速，到逃离这些圈时速度已经接近光速。大气中有很多的宇宙线，其中的一些粒子在到达地球前已经传播了几十亿年。当它们进入地球大气层，就会和大气中的分子碰撞，产生次级宇宙线，由更轻的、具有更少能量的粒子组成。大部分粒子被大气吸收，但也有部分粒子能够到达地表，甚至穿过我们的身体。在海平面上，辐射粒子已经非常慢了。但是对于在更高海拔停留更久的人们，比如航线的机组人员，会受到更多的辐射。使宇宙线能够作为“信使”的特质，是它们带着产生它们的源的信息。通过研究不同粒子出现的频率，科学家能够区别不同元素在宇宙中的相对丰度，比如氢元素和氦元素。其实宇宙线还可以提供更有趣的信息关于宇宙本身的组成。有一个叫做阿尔法磁谱仪（A.M.S.）的实验装置，最近被安装在国际空间站，它包含多个探测器可以分别测量宇宙线粒子的速度、径迹、辐射、质量和能量，以及分辨这个粒子是物质粒子还是反物质粒子。尽管二者通常是不可区分的，它们相反的荷使我们可以通过磁铁区别它们的行为。阿尔法磁谱仪现在每天测量五千万个粒子，并实时地将每个粒子的测量信息从空间站发送到位于欧洲核子中心（CERN）的阿尔法磁谱仪实验控制室。在未来的几个月到几年的时间，我们期待它能给我们更多更惊奇而有用的关于反物质的信息，关于可能存在的暗物质的信息，甚至找到减轻在太空旅行时受到宇宙线辐射的可能方式。我们对新发现怀抱希望，在晴朗的夜晚仰望星空，你或许会看到国际空间站，阿尔法磁谱仪就在那里接收微小的宇宙信使，而这些信使携带着宇宙的秘密。

**P132 2014-09-08 Making a TED-Ed Lesson - Bringing a pop-up book to life**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=132)

In this short video, we're going to show you how we constructed and animated a pop-up book to explain Earth's tectonic plates. The supercontinent Pangaea broke apart 200,000,000 years ago, but the pieces haven't stopped shifting. Although with animation we can show this movement easily with drawings, we thought it'd be more interesting to depict gigantic sliding slabs of rock using a tangible object that also moves and shifts. and the pop-up book idea was born. (music) To make your own pop-up book, you'll need some basic paper tools, such as scissors, an X-Acto knife, glue, double-sided Scotch tape, a ruler, a bone folder or other creasing tool, and, of course, some paper. For this lesson, we first determined the visual style by making illustrations and deciding on the overall design, colors, shapes and elements we wanted on each page, or spread. You can have more detailed illustrations, but we wanted to illustrate this lesson simply by playing with shapes and colors. When you visualize your pop-up and choose a visual style, you will want to make a bunch of good old pencil sketches on paper and plan each movement for each spread. Plan as much as you can: all the basic shapes and how they connect and how you want them to move, which parts you want to pop-up first. Challenge yourself, and explore multiple possibilities of how your main element on the spread can pop up. For the next step, make a mock-up spread and see if your masterful paper engineering ideas translate from a sketch to the actual prototype. Instead of using fancy paper, start with the cheap stuff and allow yourself to make mistakes and adjustments. This prototype lets you see how your preliminary sketches will come to life. You will want to first draw all individual parts on a single sheet, including all your main pieces, all the supporting pieces and the folds. You may be surprised that there are only two types of folds that can make your elements pop up the way you want: a step fold and a V-fold. Here, you can see how we used a step fold to make each layer of the Earth step out. Then, cut all your individual elements and assemble using glue or double-sided Scotch tape. (Music) Through trial and error, make sure that all the elements, shapes and placements are moving the way you imagined, and that they fold properly when closed and opened. (Music) Once your prototype is tested and complete, you can proceed to making the final product in color. Draw or paint on your main pop-up elements as you see fit. For this lesson, we decided to just play with simple shapes in different colors to create the world of shifting continents we imagined. (Music) When we were planning each spread, we knew we wanted some elements to move independently of the typical pop-up book using slight manipulations and animations. We had to plan well, but also use a few tricks. As always, when you're making stop-motion, you may have to be creative and use all sorts of unusual tools and props to achieve the effect that you want. In this shot, the birds had to fly across and off the edge of the book, so we used Fun-Tak to move the clouds across the page. Once they left the page, they had to be trimmed to get the illusion they flew off. When the pages of the book close at the end, we had to flip each page, supporting it in each position long enough to be photographed as an individual frame. We used binder clips, wedges, Fun-Tak, and almost every handy little thing you can think of. Once all the individual frames were photographed, we put them all together and composited to make our pop-up book look like it's moving on its own. So now, think of a special occasion where you can surprise someone with your own unique pop-up card, or an entire story that you want to tell, and start plotting the ins and outs of your pop-up book.

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翻译人员: Francis Ma 校对人员: Sherry Chen构造板块是什么？ 为什么要用立体书来解释它？在这个短片里，我们将向你展示 我们是如何做出立体书并且使立体书生动地 来解释地质板块的超级盘古大陆在两亿年前 分成了多个部分然而每个部分都没有停止漂移虽然用动画我们很容易用绘画的方式 来解释这一现象但是我们认为如果能 将这些滑动的板状巨石通过同样可以移动和漂移的实体呈现 会是更加有趣的于是，立体书的想法就诞生了（音乐） 我们如何做一本立体书？做一本自己的立体书时 你需要一些简单的工具比如说剪刀，X-Acto刻刀 胶水，双面胶，一把尺子摺纸棒或者别的什么给纸折缝的工具 当然了，还需要一些纸这门课首先我们需要 确定整体的可视风格通过提前绘制好平面图示， 然后决定整体上的风格包括每一页或者每一个横页的设计，颜色，形状和各种小的组成部分你当然可以将图示做的非常细致 但是在这个教程当中我们只简单地用基本的形状 和颜色来做图示当你选择了一种视觉效果 并且开始设计立体图片时你会想要在纸上 用铅笔绘出你初步的草稿然后为每一个横页 准备一种立体的展现方式计划得越详细越好最好提前规划好所有的基本图形 和它们的衔接以及以立体呈现的方式想好哪一部分 你最先想以立体呈现出来进一步挑战自己并且要想出多套立体书中的 元素呈现的方案下一步，做一个 1:1 的横页的模型然后来测验你的精妙设计 是不是能从理论进化到可实施阶段先不要用高档的卡纸 用便宜的就可以了这样可以允许自己犯错 并且能很容易做出调整这个原型就是让你对于自己的设计 将如何呈现有更直观的感受然后在一张上面画上所有单独的部分包括所有的主要组成部分， 所有的支撑部分和可折叠的部分你也许会惊讶 因为仅有两种折叠方式可以让你的元素 以你所想的立体形式呈现一种是阶状折叠，一种是V形折叠现在，你可以看到 我们是如何使用阶状褶皱使得地球的每一层可以立体地弹出然后，剪下所有元素并且组装利用胶水或者双面胶都行（音乐）从一次次尝试的失败和错误中积累经验保证所有元素 都以你想象的方式呈现并且所有元素在打开和关闭时 都能和容易得折叠（音乐）当你的原型已经测试没有问题了你可以进一步制作 上了颜色的最终产品了在你的所有元素上绘上 你觉得合适的样式这门课呢我们决定仅仅用简单的 不同颜色的纯色图案来创造一个我们所想的 大陆板块漂移的世界（音乐）我们如何让一本立体书动起来当我们规划每一横页的时候应该清楚我们需要哪些元素 从立体书中单独呈现出来可以用一些微小的结构和动画效果我们需要规划好 也需要一些小技巧一般来说，当你制作定格动画时你应该会创作并且应用 很多古怪的工具和支撑物来完成你想要的定格动画的效果在这个场景中 鸟儿将穿越整本书飞过书的边缘所以我们用到了Fun-Tak粘 来让云朵沿着书页移动当他们离开了页面的时候 就将它们去掉来营造一种云朵飞走了的错觉当书页做种合上时我们将一页一页的翻书保持那个位置长时间不变 然后拍成单独的一帧我们用到了长尾夹， 楔子和 Fun-Tak还有很多你能想到的日常用品一旦这些单独的帧拍好了我们将每一帧都放到一起 并且合成到一起通过这样的方法 我们的立体书好像自己在动所以现在，构想一种特殊的情景让你可以向一些人展示 你独特的立体卡片甚至是你想讲的一整个故事那么，现在开始构想 你自己的立体书的细枝末节吧！

**P133 2014-09-09 Could comets be the source of life on Earth - Justin Dowd**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=133)

Humans have observed comets for thousands of years as their orbits have brought them within visible distance of Earth. Appearing throughout historical records, these mysterious lights that came out of nowhere and disappeared after a short while were thought to be ill omens of war and famine, or the wrath of gods. But recent research has revealed that comets may be even more deeply connected to humanity and our presence on Earth than any of these mythical explanations suggested. When you think of our Solar System, you probably imagine the nine, sorry eight, planets orbiting the Sun. But beyond Neptune, far from the heat of the Sun, there is a sparse ring found formed by icy chunks ranging from the size of marbles to that of small planets. And thousands of times farther at the outer reaches of the Solar System lies a spherical cloud of small fragments and gases. Many of these ancient clumps of stardust are leftovers from the formation of the Solar System 4.6 billion years ago, while some of the most distant may even come from a neighboring system. But sometimes the gravity from passing planets or stars pulls them toward our sun, beginning a journey that can take up to millions of years. As the frozen object travels further into the Solar System, the sun grows from a distant spark to an inferno, melting the ice for the first time in billions of years. Gas and steam eject dust into space, forming a bright surrounding cloud, called a coma, that can grow even larger than the sun itself. Meanwhile, the intense stream of high-energy particles constantly emitted by the Sun, known as the solar wind, blows particles away from the comet's core, forming a trail of debris up to millions of miles long. The ice, gas and dust reflect light glowing brightly. A comet is born, now orbiting the sun along with the rest of the objects in our Solar System. But as the comet travels through the Solar System, the solar wind tears apart and recombines molecules into various compounds. In some of the compounds that scientists found, first in the rubble left by a meteorite that disintegrated above northern Canada, and then in samples collected by a space craft from a passing comet's tail, were nothing less important than amino acids. Coming together to form proteins according to the instructs encoded in DNA, these are the main active components in all living cells, from bacteria to blue whales. If comets are where these building blocks of life were first formed, then they are the ultimate source of life on Earth, and, perhaps, some of the other places they visited as well. We know that planets orbit nearly every star in the night sky, with one in five having a planet similar to Earth in size and temperature. If Earth-like planets and the molecules found in DNA are not anomalies, we may be only one example of what's possible when a planet under the right conditions is seeded with organic molecules by a passing comet. So, rather than an omen of death, the comet that first brought amino acids to Earth could have been a portent of life, a prediction of a distant future, where creatures of stardust would return to space to find the mysteries of where they came from.

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翻译人员: Yi Zong 校对人员: Yuting Liu人类观察彗星已经有上千年的历史了，由于它们的轨道让他们出现在地球的可视距离以内。在所有的历史记录中，这些神秘的光不知道从何处来，而且一瞬即逝它们曾被认为是战争和饥荒的征兆，或者是神的愤怒。但是最新的研究揭示了彗星更可能和地球上人类的出现有着深远的联系，这远超出于那些神秘的解释。当你想到太阳系，大概会想到9个哦不，是8个行星围绕着太阳。但是在距离太阳的光热最远的海王星之外，还有一 个由稀疏的冰块组成的环形带，它们的尺寸从大理石块到小型的行星不等。在与之距离几千倍远的太阳系外围有着碎片和气体形成的天体云。许多这些古老而成簇的星团都是源于46亿年前太阳系的形成，同时还有最遥远的的，可能甚至来自于相邻的星系。但是有时经过的行星或恒星的引力会把他们拉向我们的太阳，这个过程可以需要有几百万年。当冻结的物体行至太阳系，太阳向远处发出的火焰，会第一次融化这些冷冻了几十亿年的冰。气体和蒸汽带着尘埃排向太空，形成了明亮的云，这样的云就是“彗形像差”，它的大小甚至可以超过太阳本身。同时，一股高能量粒子不断地从太阳释放出来 - 太阳风，把粒子不断的吹离彗星核，由碎片组成了一条上百万英里长的踪迹。冰，气体和尘埃反射了明亮的光。一颗彗星这样诞生了，围绕着太阳和其他的物体在我们的太阳系中。但是，就在彗星穿越太阳系的时候，太阳风会把分子分解并重新组合为不同的化合物。在一些科学家已经发现的化合物中，第一次在加拿大北部上空分解的陨石碎片中发现了这样的物质，之后在从经过彗星尾的航天器上也发现的东西，只不过是一些氨基酸。它根据DNA代码组成了蛋白质，这些都是主要的活性细胞的组成部分，从细菌到蓝鲸。如果彗星是这些生命迹象产生的地方，那它们就是地球生命的根本源头，并且也许是他们经过别的地方的生命源头。我们知道夜空中的行星会绕着每一个恒星的轨道运行，五分之一的行星有着和地球相似的大小和温度。如果类似地球的行星和DNA分子并不是特例的话，我们的存在则给出了唯一的例证：当彗星经过一个处在能够孕育有机分子的适当条件的行星时可能会发生的结果。所以，如果说是死亡的预兆，不如说彗星带来了地球上第一个氨基酸也带来了生命的迹象，带来了遥远未来的预兆，这些从星尘上来的生物会回到太空寻找它们的起源。

**P134 2014-09-11 The history of tattoos - Addison Anderson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=134)

Thinking of getting a tattoo? Decorating your birthday suit would add another personal story to a history of tattoos stretching back at least 8000 years. Tattooed mummies from around the world attest to the universality of body modification across the millennia, and to the fact that you really were stuck with it forever if your civilization never got around to inventing laser removal. A mummy from the Chinchorro culture in pre-Incan Peru has a mustache tattooed on his upper lip. Ötzi, mummified iceman of the Alps, has patterned charcoal tats along his spine, behind his knee and around his ankles, which might be from an early sort of acupuncture. The mummy of Amunet, a priestess in Middle Kingdom Egypt, features tattoos thought to symbolize sexuality and fertility. Even older than the mummies, figurines of seemingly tattooed people, and tools possibly used for tattooing date back tens of thousands of years. Tattoos don't have one historical origin point that we know of, but why do we English speakers call them all tattoos? The word is an anglophonic modification of "tatao," a Polynesian word used in Tahiti, where English captain James Cook landed in 1769 and encountered heavily tattooed men and women. Stories of Cook's findings and the tattoos his crew acquired cemented our usage of "tattoo" over previous words like "scarring," "painting," and "staining," and sparked a craze in Victorian English high society. We might think of Victorians having Victorian attitudes about such a risque thing, and you can find such sentiments, and even bans, on tattooing throughout history. But while publicly some Brits looked down their noses at tattoos, behind closed doors and away from their noses, lots of people had them. Reputedly, Queen Victoria had a tiger fighting a python, and tattoos became very popular among Cook's fellow soldiers, who used them to note their travels. You crossed the Atlantic? Get an anchor. Been south of the Equator? Time for your turtle tat. But Westerners sported tattoos long before meeting the Samoans and Maori of the South Pacific. Crusaders got the Jerusalem Cross so if they died in battle, they'd get a Christian burial. Roman soldiers on Hadrian's Wall had military tattoos and called the Picts beyond it "Picts," for the pictures painted on them. There's also a long tradition of people being tattooed unwillingly. Greeks and Romans tattooed slaves and mercenaries to discourage escape and desertion. Criminals in Japan were tattooed as such as far back as the 7th century. Most infamously, the Nazis tattooed numbers on the chest or arms of Jews and other prisoners at the Auschwitz concentration camp in order to identify stripped corpses. But tattoos forced on prisoners and outcasts can be redefined as people take ownership of that status or history. Primo Levi survived Auschwitz and wore short sleeves to Germany after the war to remind people of the crime his number represented. Today, some Holocaust survivors' descendants have their relatives numbers' tattooed on their arms. The Torah has rules against tattoos, but what if you want to make indelible what you feel should never be forgotten? And those criminals and outcasts of Japan, where tattooing was eventually outlawed from the mid-19th century to just after World War II, added decoration to their penal tattoos, with designs borrowed from woodblock prints, popular literature and mythical spirtual iconography. Yakuza gangs viewed their outsider tattoos as signs of lifelong loyalty and courage. After all, they lasted forever and it really hurt to get them. For the Maori, those tattoos were an accepted mainstream tradition. If you shied away from the excruciating chiseling in of your moko design, your unfinished tattoo marked your cowardice. Today, unless you go the traditional route, your tattoo artist will probably use a tattoo machine based on the one patented by Samuel O'Reilly in 1891, itself based on Thomas Edison's stencil machine from 1876. But with the incredibly broad history of tattoos giving you so many options, what are you going to get? This is a bold-lined expression of who you are, or you want to appear to be. As the naturalist aboard Cook's ship said of the tataoed Tahitians, "Everyone is marked, thus in different parts of his body, according maybe to his humor or different circumstances of his life." Maybe your particular humor and circumstances suggest getting a symbol of cultural heritage, a sign of spirituality, sexual energy, or good old-fashioned avant-garde defiance. A reminder of a great accomplishment, or of how you think it would look cool if Hulk Hogan rode a Rhino. It's your expression, your body, so it's your call. Just two rules: you have to find a tattooist who won't be ashamed to draw your idea, and when in doubt, you can never go wrong with "Mom."

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=134)

翻译人员: Lila Yuan 校对人员: Eric Chiang想过刺个纹身吗？给全裸的身体上来点装饰，能在至少有8000年刺青历史上增添一点个人的故事世界各地发现的有纹身的木乃伊证明了数千年来纹身现象的普遍性这也使人们认识到，如果你所处的文明尚未发明激光移除术纹身会一直留在你身上来自前印加时期秘鲁克罗文化的一具木乃伊有两撇纹上去的八字胡须阿尔卑斯山发现的木乃伊，冰人奥茨，在脊柱周围膝盖后面，以及脚踝附近都有深灰色的纹身这可能是早期某种针灸疗法遗留下的印记木乃伊阿蒙内特，古埃及中王朝时期的一名女祭司身上也有象征着性欲和生育能力的纹身甚至比木乃伊的时代还要久远貌似带有纹身的人的雕像以及可能用来纹身的工具，几万年前就曾出现我们并不知道纹身的确切起源时间但是纹身为什么英文里叫“tattoo”呢？这个单词其实是“tatao”的英文变形，“tatao”是塔希提岛上使用的波利尼西亚语的词汇英国人詹姆斯·库克船长在1769年到达该地看到了布满纹身的男男女女库克的发现和他船员们身上所刺的纹身使我们开始使用“tattoo”，取代之前的词语，如“结疤”，“描绘”，及“染色”并使纹身在维多利亚女王时代的英国上流社会受到狂热追捧我们可以推想出当时的人们，对这样一件有伤风化的事情持有维多利亚式的价值观和看法（严谨的行为规范和性约束）类似的看法和纹身禁令，在历史上屡见不鲜尽管一些英国人在公共场合对纹身嗤之以鼻但是私底下很多人都有纹身一般认为，维多利亚女王有一个老虎斗蟒的纹身纹身在库克的将士们中变得非常流行他们用纹身来记录旅程你穿越过大西洋？纹个锚到过南半球？可以纹个海龟了但是西方人纹身的历史，远在他们遇见南太平洋的萨莫安人和毛利人之前就开始了十字军战士会纹上十字架，如果他们在战斗中牺牲了就会得到基督教式的葬礼在哈德良长城的罗马士兵有军事纹身并且管皮克特人纹到身上的图案叫“皮克特”同样，人们被迫纹身也是一个源远流长的传统希腊和罗马给奴隶和外国雇佣兵纹身以防止逃跑和擅离职守早在公元七世纪，日本的罪犯就被刺上纹身最臭名昭著的，纳粹在奥斯维辛集中营，把数字刻在犹太人和其他被关押人员的胸前和手臂上目的是为了辨认全裸的尸体但是随着身份和历史的改变，强留在犯人和被遗弃者身上的纹身，可以有新的含义普里莫·莱维熬过了奥斯维辛集中营的日子，并在战后穿着短袖来到德国提醒世人不要忘记，他的手臂上的数字所代表的那场罪行如今，一些大屠杀幸存者的后代把亲人的数字纹在自己的手臂上以示纪念摩西五经中，有条文禁止纹身但是万一有某件事情，你觉得永远也不该忘记，需要做些标记呢？在19世纪中期至二战刚刚结束时期的日本，纹身是非法的那时的罪犯和被遗弃者在他们受刑的纹身上，用那些来自版画，畅销文学，以及一些神话中的形象进行设计和装点日本的黑帮组织把他们异于常人的纹身视为终身的忠诚和勇气毕竟，纹身是终身的，而且得到纹身的过程也很痛苦对毛利人来说，纹身是被主流传统所认可的如果你无法忍受纹身过程中，刺针进身体的巨大痛苦那你未完成的纹身则象征着你的怯懦今天，除非你采用传统纹身方法你的纹身师极可能是通过纹身机器来完成纹身这种机器是在1891年塞缪尔·奥赖利的一项专利的基础上设计的而奥赖利的设计则是根据托马斯·爱迪生1876年发明的制版机而来纹身的历史包罗万象，给你提供众多选择你会去纹个什么呢？这是彰显你是谁或是你希望成为什么样子的大胆表达正如随库克登船的博物学家讲到带有纹身的塔希提人时说，“每个人在身体的不同位置都有纹身这些纹身可能按照他的气质绘制，也可能是生命中的不同际遇所致“也许你独特的气质和际遇使你想有一个符号，或象征文化遗产或象征某种精神，或象征性能力或是象征对过时传统先锋性的大胆藐视它可以是对伟大成就的纪念也可以是对你觉得胡克·霍根骑着一头犀牛会有多酷的纪念这是你的自我展示，你的身体，所以这是你的决定。只有两条规则：你需要找到个敢于去画出你想法的纹身师如果有怀疑，纹个”妈妈“总不会错

**P135 2014-09-11 What is the Heisenberg Uncertainty Principle - Chad Orzel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=135)

The Heisenberg Uncertainty Principle is one of a handful of ideas from quantum physics to expand into general pop culture. It says that you can never simultaneously know the exact position and the exact speed of an object and shows up as a metaphor in everything from literary criticism to sports commentary. Uncertainty is often explained as a result of measurement, that the act of measuring an object's position changes its speed, or vice versa. The real origin is much deeper and more amazing. The Uncertainty Principle exists because everything in the universe behaves like both a particle and a wave at the same time. In quantum mechanics, the exact position and exact speed of an object have no meaning. To understand this, we need to think about what it means to behave like a particle or a wave. Particles, by definition, exist in a single place at any instant in time. We can represent this by a graph showing the probability of finding the object at a particular place, which looks like a spike, 100% at one specific position, and zero everywhere else. Waves, on the other hand, are disturbances spread out in space, like ripples covering the surface of a pond. We can clearly identify features of the wave pattern as a whole, most importantly, its wavelength, which is the distance between two neighboring peaks, or two neighboring valleys. But we can't assign it a single position. It has a good probability of being in lots of different places. Wavelength is essential for quantum physics because an object's wavelength is related to its momentum, mass times velocity. A fast-moving object has lots of momentum, which corresponds to a very short wavelength. A heavy object has lots of momentum even if it's not moving very fast, which again means a very short wavelength. This is why we don't notice the wave nature of everyday objects. If you toss a baseball up in the air, its wavelength is a billionth of a trillionth of a trillionth of a meter, far too tiny to ever detect. Small things, like atoms or electrons though, can have wavelengths big enough to measure in physics experiments. So, if we have a pure wave, we can measure its wavelength, and thus its momentum, but it has no position. We can know a particles position very well, but it doesn't have a wavelength, so we don't know its momentum. To get a particle with both position and momentum, we need to mix the two pictures to make a graph that has waves, but only in a small area. How can we do this? By combining waves with different wavelengths, which means giving our quantum object some possibility of having different momenta. When we add two waves, we find that there are places where the peaks line up, making a bigger wave, and other places where the peaks of one fill in the valleys of the other. The result has regions where we see waves separated by regions of nothing at all. If we add a third wave, the regions where the waves cancel out get bigger, a fourth and they get bigger still, with the wavier regions becoming narrower. If we keep adding waves, we can make a wave packet with a clear wavelength in one small region. That's a quantum object with both wave and particle nature, but to accomplish this, we had to lose certainty about both position and momentum. The positions isn't restricted to a single point. There's a good probability of finding it within some range of the center of the wave packet, and we made the wave packet by adding lots of waves, which means there's some probability of finding it with the momentum corresponding to any one of those. Both position and momentum are now uncertain, and the uncertainties are connected. If you want to reduce the position uncertainty by making a smaller wave packet, you need to add more waves, which means a bigger momentum uncertainty. If you want to know the momentum better, you need a bigger wave packet, which means a bigger position uncertainty. That's the Heisenberg Uncertainty Principle, first stated by German physicist Werner Heisenberg back in 1927. This uncertainty isn't a matter of measuring well or badly, but an inevitable result of combining particle and wave nature. The Uncertainty Principle isn't just a practical limit on measurment. It's a limit on what properties an object can have, built into the fundamental structure of the universe itself.

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翻译人员: Francis Ma 校对人员: Cindy Ma海森堡不确定性原理 是少数可以从量子物理领域拓展到普罗大众文化的物理原理之一。它指出人不能既知道一个物体的具体位置，又同时知道这个物体的运动速率。 它在各个领域被作为隐喻使用，无论是从文艺评论，还是到体育评论中都有它的身影。不确定性常常被认为是测量时产生的，因为对于一个物体位置的测定会改变该物体的速度， 反过来也是一样。但是真正的原理要更加深奥，并且更加奇妙有趣不确定性原理之所以存在 是因为宇宙中的任何东西都同时表现出「粒子」和「波」的两种性质。在量子力学中， 一个物体的确切位置和速度没有任何意义。要理解这一点，我们需要知道表现的像「粒子」 或是像「波」究竟是什么意思。粒子按照其解释，存在于任意瞬间的一个单独的空间里。我们可以用像一张鞋钉一样的图案表现它，从中我们可以发现要在特定的空间里找到一个物体的概率。在某一个特定地点，概率是 100%， 在别处则都是 0%。而波则是「扰动」在空间中的传播，就像是湖面上荡起的涟漪。我们可以很容易的将「波」作为一个整体， 然后确立它的一些特性。其中最重要的，就是波长。波长是相邻两个波峰之间，或者两个相邻波谷之间的距离。但是我们并不能给他分配一个特定的位置。波有很大概率处于各种不同的位置。波长是量子物理的基础。因为一 个物体的波长 和它的动量是息息相关的：动量 = 质量乘以速度。一个快速运动的物体有很大的动量，所以波长也就很短。一个很重的物体本身具有很大的动量， 即使它并没有快速运动。同样的，也代表了它的波长很短，这也是为什么我们观察不到 日常用品的波的性质的原因。如果你将一个棒球投掷于空中，它的波长是一米的亿分之万亿分之万亿分之一。实在是太小了，基本不可能检测到。然而，更小的物质 比如说原子或者电子，则有一个足够大的 能在物理实验中测量出的波长。所以如果我们有一个纯粹的波， 我们就能测量它的波长，从而得到它的动量。 但是却得不到它的位置。我们可以很容易知道一个粒子的位置，但它却并没有波长， 所以我们也不知道它的动量。为了同时得到一个粒子的位置和动量，我们需要融合两个图像。来创造一个有波的图， 然而尽在很小的区域里。我们如何来做呢？通过将不同波长的波进行融合。这就意味着我们的量子物体 具有不同动量的可能性。当我们让两个波相加时， 我们发现有些地方两个波的波峰对齐 并且组成了一个更大的波。然而在另外一些地方，一个波的波峰 却叠到了另一个的波谷里。结果就是有些地方我们看得到波，另一些地方，则什么都没有。如果我们再加上第三个波，那些波被消减的区域就变大了。加上第四个，依旧变大， 但波的区域逐渐变窄。如果我们持续添加更多的波， 我们能得到一个波包：在一个很小的区域里 有一个确定的波长。这就得到了一个同时拥有波的属性 和粒子的属性的量子物体。但是为了完成这一点， 我们得到的位置和动量就都不具备确定性了。而且它们位置并非规定在一个单独的点上。我们有很高的概率 在波包内的范围里的任何地方找到它。我们通过多个波相加的办法 得到了这个波包，于是我们就有可能找到 其中一个位置的量子物体，拥有与之相应的动量。所以位置和动量现在就都是不确定的了。并且这种不确定性是相关联的。如果你想降低位置的不确定性，就得用更多的波相加， 构造一个更小的波包，从而导致了一个更大的动量不确定性。如果你想更明确的得到动量值， 就需要一个更大的波包，这样就导致了更大的位置的不确定性。这就是海森堡不确定性原理。最初被德国物理学家 Werner Heisenberg 早在 1927 年提出。这种不确定性和测量的好与坏无关，是一种结合波和粒子 两种性质之后的不可避免的结果。不确定性并不仅仅是 测量上的实际限制，它是一种对于物体只能有一种性质的限制，并建立在宇宙本身的基本构成之上。

**P136 2014-09-11 Where do genes come from - Carl Zimmer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=136)

You have about 20,000 genes in your DNA. They encode the molecules that make up your body, from the keratin in your toenails, to the collagen at the tip of your nose, to the dopamine surging around inside your brain. Other species have genes of their own. A spider has genes for spider silk. An oak tree has genes for chlorophyll, which turns sunlight into wood. So where did all those genes come from? It depends on the gene. Scientists suspect that life started on Earth about 4 billion years ago. The early life forms were primitive microbes with a basic set of genes for the basic tasks required to stay alive. They passed down those basic genes to their offspring through billions of generations. Some of them still do the same jobs in our cells today, like copying DNA. But none of those microbes had genes for spider silk or dopamine. There are a lot more genes on Earth today than there were back then. It turns out that a lot of those extra genes were born from mistakes. Each time a cell divides, it makes new copies of its DNA. Sometimes it accidentally copies the same stretch of DNA twice. In the process, it may make an extra copy of one of its genes. At first, the extra gene works the same as the original one. But over the generations, it may pick up new mutations. Those mutations may change how the new gene works, and that new gene may duplicate again. A surprising number of our mutated genes emerged more recently; many in just the past few million years. The youngest evolved after our own species broke off from our cousins, the apes. While it may take over a million years for a single gene to give rise to a whole family of genes, scientists are finding that once the new genes evolve, they can quickly take on essential functions. For example, we have hundreds of genes for the proteins in our noses that grab odor molecules. The mutations let them grab different molecules, giving us the power to perceive trillions of different smells. Sometimes mutations have a bigger effect on new copies of genes. They may cause a gene to make its protein in a different organ, or at a different time of life, or the protein may start doing a different job altogether. In snakes, for example, there's a gene that makes a protein for killing bacteria. Long ago, the gene duplicated and the new copy mutated. That mutation changed the signal in the gene about where it should make its protein. Instead of becoming active in the snake's pacreas, it started making this bacteria-killing protein in the snake's mouth. So when the snake bit its prey, this enzyme got into the animal's wound. And when this protein proved to have a harmful effect, and helped the snake catch more prey, it became favored. So now what was a gene in the pancreas makes a venom in the mouth that kills the snake's prey. And there are even more incredible ways to make a new gene. The DNA of animals and plants and other species contain huge stretches without any protein coding genes. As far as scientists can tell, its mostly random sequences of genetic gibberish that serve no function. These stretches of DNA sometimes mutate, just like genes do. Sometimes those mutations turn the DNA into a place where a cell can start reading it. Suddenly the cell is making a new protein. At first, the protein may be useless, or even harmful, but more mutations can change the shape of the protein. The protein may start doing something useful, something that makes an organism healthier, stronger, better able to reproduce. Scientists have found these new genes at work in many parts of animal bodies. So our 20,000 genes have many origins, from the origin of life, to new genes still coming into existence from scratch. As long as life is here on Earth, it will be making new genes.

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翻译人员: Xin Chen 校对人员: Chenlu Wang在你的DNA里大约有两万个基因。它们编码了组成你身体的各种分子，从组成你脚趾甲的角蛋白，到你鼻尖的胶原蛋白。再到活跃在脑部的多巴胺。其他的物种有他们自己的基因。蜘蛛有蜘蛛丝的基因。橡树有可以将阳光转化为木头的叶绿素。但是，这些基因都是从哪里来的呢？这还是要取决于基因。科学家们猜测地球上的生命大约起源于40亿年前。较早的生命形态是原始微生物。只有一套用于维持生命基本功能的简单的基因。它们把这些基因传给后代传播了数亿代一些基因还在细胞里做同样的工作，比如说复制DNA。但是其中没有一个是编码蜘蛛丝或者多巴胺的。现在地球上的基因要远远多于从前。它们大多是通过错误诞生的。每一次细胞分裂的时候，都会复制自己的DNA。有时它会意外的复制两次同样的DNA段。在这个过程中，有可能会产生多余的基因。起初，多余的基因和原来的基因有着相同的功能。但是在代代相传中，它有可能会产生新的基因突变。这些突变有可能会改变新基因的功能。然后新的基因也许会被再一次的复制。有相当一部分我们突变的基因是最近才出现的。很多是仅仅在数百万年前产生的。最年轻的基因从人类的表亲，人猿进化而来。虽然说从单个基因到一族基因的转变也许需要超过一百万年科学家们发现，一旦新的基因进化了，他们很快就可以承担起必要的功能。举个例子，有数百个基因编码了鼻子中用来捕捉气味分子的蛋白质这样的突变让他们可以抓到不同的分子，让我们拥有可以识别数万亿种不同味道的能力。有些时候突变对复制的基因会带来更大的影响。他们也许会让一个基因在不同的器官中生产蛋白质。或者是发生在生命中不同的时间段。或者说生产的蛋白质会一起从事不同的工作。用蛇来举例，它体内有一种专门杀死细菌蛋白质的基因很久之前，这基因复制了并且产生了基因突变。这个突变改变了基因上决定在哪个部位生产某种蛋白的信号这种能杀死细菌的蛋白质没有在蛇胰腺中被激活取而代的是，它们被用在了蛇的嘴里当蛇咬到猎物的时候，这种酶就会渗透到动物的伤口里并且当这种蛋白质被证实是有毒的，可以帮助蛇捕捉到更多的猎物，这种蛋白就被保留下来了。所以从前在胰腺中的基因现在成了嘴中用来杀死猎物的毒液新的基因还能通过更难以置信的方式产生动物，植物，以及其他物种的DNA，含有一大部分不编码蛋白质的基因片段。据科学家所知，这些大多是无意义无功能的随机组合这些DNA片段有时候会像基因一样产生突变。有时候这些突变可以变成标志着基因序列开始的起点突然间，该细胞就可以产生新的蛋白质了。期初，这些蛋白质也许是无用的甚至是有害的，但是更多的基因突变可以改变蛋白质的形状。该蛋白质也许会发挥出一些有意义的功能，有时它会让一个器官更加的健康，强壮，更好的繁殖后代。科学家们发现这些新的基因工作在动物身体中的各个部分。所以我们两万个基因有许多种起源，从生命的起源，到刚开始存在的新基因。只要地球上有生命的存在，就会有新的基因产生。

**P137 2014-09-12 Cloudy climate change - How clouds affect Earth's temperature - Jaspe**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=137)

Cloudy climate change: How clouds affect Earth's temperature. Earth's average surface temperature has warmed by .8 Celsius since 1750. When carbon dioxide concentrations in the atmosphere have doubled, which is expected before the end of the 21st century, researchers project global temperatures will have risen by 1.5 to 4.5 degrees Celsius. If the increase is near the low end, 1.5 Celsius, then we're already halfway there, and we should be more able to adapt with some regions becoming drier and less productive, but others becoming warmer, wetter and more productive. On the other hand, a rise of 4.5 degrees Celsius would be similar in magnitude to the warming that's occurred since the last glacial maximum 22,000 years ago, when most of North America was under an ice sheet two kilometers thick. So that would represent a dramatic change of climate. So it's vitally important for scientists to predict the change in temperature with as much precision as possible so that society can plan for the future. The present range of uncertainty is simply too large to be confident of how best to respond to climate change. But this estimate of 1.5 to 4.5 Celsius for a doubling of carbon dioxide hasn't changed in 35 years. Why haven't we been able to narrow it down? The answer is that we don't yet understand aerosols and clouds well enough. But a new experiment at CERN is tackling the problem. In order to predict how the temperature will change, scientists need to know something called Earth's climate sensitivity, the temperature change in response to a radiative forcing. A radiative forcing is a temporary imbalance between the energy received from the Sun and the energy radiated back out to space, like the imbalance caused by an increase of greenhouse gases. To correct the imbalance, Earth warms up or cools down. We can determine Earth's climate sensitivity from the experiment that we've already performed in the industrial age since 1750 and then use this number to determine how much more it will warm for various projected radiative forcings in the 21st century. To do this, we need to know two things: First, the global temperature rise since 1750, and second, the radiative forcing of the present day climate relative to the pre-industrial climate. For the radiative forcings, we know that human activities have increased greenhouse gases in the atmosphere, which have warmed the planet. But our activities have at the same time increased the amount of aerosol particles in clouds, which have cooled the planet. Pre-industrial greenhouse gas concentrations are well measured from bubbles trapped in ice cores obtained in Greenland and Antarctica. So the greenhouse gas forcings are precisely known. But we have no way of directly measuring how cloudy it was in 1750. And that's the main source of uncertainty in Earth's climate sensitivity. To understand pre-industrial cloudiness, we must use computer models that reliably simulate the processes responsible for forming aerosols in clouds. Now to most people, aerosols are the thing that make your hair stick, but that's only one type of aerosol. Atmospheric aerosols are tiny liquid or solid particles suspended in the air. They are either primary, from dust, sea spray salt or burning biomass, or secondary, formed by gas to particle conversion in the atmosphere, also known as particle nucleation. Aerosols are everywhere in the atmosphere, and they can block out the sun in polluted urban environments, or bathe distant mountains in a blue haze. More importantly, a cloud droplet cannot form without an aerosol particle seed. So without aerosol particles, there'd be no clouds, and without clouds, there'd be no fresh water. The climate would be much hotter, and there would be no life. So we owe our existence to aerosol particles. However, despite their importance, how aerosol particles form in the atmosphere and their effect on clouds are poorly understood. Even the vapors responsible for aerosol particle formation are not well established because they're present in only minute amounts, near one molecule per million million molecules of air. This lack of understanding is the main reason for the large uncertainty in climate sensitivity, and the corresponding wide range of future climate projections. However, an experiment underway at CERN, named, perhaps unsurprisingly, "Cloud" has managed to build a steel vessel that's large enough and has a low enough contamination, that aerosol formation can, for the first time, be measured under tightly controlled atmospheric conditions in the laboratory. In its first five years of operation, Cloud has identified the vapors responsible for aerosol particle formation in the atmosphere, which include sulfuric acid, ammonia, amines, and biogenic vapors from trees. Using an ionizing particle beam from the CERN proton synchrotron, Cloud is also investigating if galactic cosmic rays enhance the formation of aerosols in clouds. This has been suggested as a possible unaccounted natural climate forcing agent since the flux of cosmic rays raining down on the atmosphere varies with solar activity. So Cloud is addressing two big questions: Firstly, how cloudy was the pre-industrial climate? And, hence, how much have clouds changed due to human activities? That knowledge will help sharpen climate projections in the 21st century. And secondly, could the puzzling observations of solar climate variability in the pre-industrial climate be explained by an influence of galactic cosmic rays on clouds? Ambitious but realistic goals when your head's in the clouds.

**P137 2014-09-12 Cloudy climate change - How clouds affect Earth's temperature - Jaspe**

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翻译人员: Yingfei Xue 校对人员: Qiwen Lu云与气候变迁： 云如何影响地球温度自从1750年开始，地球表面的 平均温度已升高了摄氏0.8度当大气层的二氧化碳含量翻倍研究者预测全球的温度 将在二十一世纪结束前将上升1.5 到4.5 度如果升温较少 也就是1.5度的话那么现在已经升温一半了 我们应更能够适应其变迁：一些区域变得更干燥、更缺地力而其他地方则变得 更暖、更湿，也更肥沃另外，摄氏4.5 的升温，约略等于自二万二千年前最后一次 冰河时期以来的所有升温总和那时大部份的北美洲 都埋于两公里深冰层之下那将是一种剧烈的气候变迁所以科学家对于 温度变化的预测是极为重要的越精准预测，人类社会 才能越早未雨绸缪目前，预测的不确定性实在太大了以至于无法以最好的方式来处理气候变迁但是这关于摄氏1.5到4.5度之间 二氧化碳成倍增加的预测在这35 年来都没有改变那我们为什么无法将不确定性的 落差范围缩小呢？答案是，我们尚未能够了解气溶胶与云层但欧洲核子研究组织(CERN)的 新实验正在处理这个问题为了预测气温将如何改变科学家必须了解一种叫 地球气候敏感性的东西气温会随着辐射强迫而改变辐射强迫是介于吸收太阳能 和将其释放回太空之间的一种短暂的不平衡比如温室气体增生所导致的不平衡为了纠正这种不平衡 地球会增加或降低温度从1750 年工业革命以来所作的实验中我们可以确定地球的气候敏感性然后使用这些数据来判断在二十一世纪时它由于 辐射强迫所带来的增温状况为此，我们必须知道两件事：首先，自从1750 年来，全球气温已增高许多第二，当今气候的辐射强迫现象与前工业化时代的气候相关对于辐射强迫来说，我们知道人类的活动造成了温室气体在大气中积累已造成地球的暖化与此同时，我们的活动也增加了云层中气溶胶粒子的数量 它们使地球的温度冷却人们已准确地 从在格陵兰岛和南极洲的冰芯泡泡中 测量了前工业化时期温室气体的累积所以科学家已精确地 掌握了温室气体强迫的状况但我们仍然缺乏有效的工具 来直接测量云层在1750年时的状态那便是人们对于地球气候敏感性 仍然感到不确定的成因为了了解前工业化时期的云层状况我们必须使用电脑模型来模拟气溶胶云的形成过程对许多人来说，溶胶是一种 可以让你的头发卷曲的东西但那只是多种溶胶中的一种大气气溶胶是一种微小的液体 或是一种悬浮于空气中的固态颗粒。它们要不是那些主要来自灰尘、浪花盐、生物质的燃烧就是转化自大气中的粒子也就是所谓的粒子成核气溶胶无所不在地存在于大气之中它们会在高度污染的都市环境中遮蔽阳光或产生一层蓝色薄雾遮蔽远处的山峦更重要的是，若是没有气溶胶颗粒的种子 云滴是无法形成的因此，若是缺少了气溶胶颗粒，就没有云没有云，就没有新鲜的水气候会变得更热，生命将无法存在因此气溶胶颗粒的存在 使我们得以存活然而，尽管它们极具重要性人们尚未理解气溶胶颗粒 是如何在大气中形成的以及它们如何影响云即使导致气溶胶粒子产生的蒸汽也尚未被科学家详实研究过因为它们仅存于一瞬之间近似​​于百万亿空气中分子之一由于缺乏对其了解导致我们对于目前对气候敏感性 仍不确定这也是为什么我们对于未来的气候推测 是如此不确定的原因了然而一个在欧洲核子研究中心 所进行的实验﹣「云」﹣已成功在一个足够大的 钢制容器和低污染条件下形成气溶胶这也是第一次气溶胶可以在实验室中被科学家严密地控制、追踪与测量在最初五年的运作过程中 「云」已确定了与大气中气溶胶形成过程所相关的蒸气它们包涵了硫酸、氨、胺以及来自树木的生物蒸气利用来自欧洲核子研究中心的 质子同步加速器所取得的电离粒子束这个「云」实验也正在调查银河宇宙射线是否会增强气溶胶云的形成科学家指出，这可能是一种 潜在的得以改变自然气候强迫的因子因为宇宙射线穿过大气而下会随着太阳活动而改变因此「云」尝试解决两大问题：首先，工业化前的气候中，云层的状态为何？有多少的云层变化 是由人类活动所引致的？这些知识将有助于增强 科学家在二十一世纪的气候预测其次，关于工业化时代以前 太阳气候变化的谜题，我们可以拿云层上银河宇宙射线的影响 来解释这一现象吗？即便毫无头绪，这依然是一个雄心勃勃、可以实现的目标

**P138 2014-09-12 Particles and waves - The central mystery of quantum mechanics - Chad**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=138)

One of the most amazing facts in physics is this: everything in the universe, from light to electrons to atoms, behaves like both a particle and a wave at the same time. All of the other weird stuff you might have heard about quantum physics, Schrodinger's Cat, God playing dice, spooky action at a distance, all of it follows directly from the fact that everything has both particle and wave nature. This might sound crazy. If you look around, you'll see waves in water and particles of rock, and they're nothing alike. So why would you think to combine them? Physicists didn't just decide to mash these things together out of no where. Rather, they were led to the dual nature of the universe through a process of small steps, fitting together lots of bits of evidence, like pieces in a puzzle. The first person to seriously suggest the dual nature of light was Albert Einstein in 1905, but he was picking up an earlier idea from Max Planck. Planck explained the colors of light emitted by hot objects, like the filament in a light bulb, but to do it, he needed a desperate trick: he said the object was made up of oscillators that could only emit light in discrete chunks, units of energy that depend on the frequency of the light. Planck was never really happy with this, but Einstein picked it up and ran with it. He applied Planck's idea to light itself, saying that light, which everybody knew was a wave, is really a stream of photons, each with a discrete amount of energy. Einstein himself called this the only truly revolutionary thing he did, but it explains the way light shining on a metal surface knocks loose electrons. Even people who hated the idea had to agree that it works brilliantly. The next puzzle piece came from Ernest Rutherford in England. In 1909, Ernest Marsden and Hans Geiger, working for Rutherford, shot alpha particles at gold atoms and were stunned to find that some bounced straight backwards. This showed that most of the mass of the atom is concentrated in a tiny nucleus. The cartoon atom you learn in grade school, with electrons orbiting like a miniature solar system, that's Rutherford's. There's one little problem with Rutherford's atom: it can't work. Classical physics tells us that an electron whipping around in a circle emits light, and we use this all the time to generate radio waves and X-rays. Rutherford's atoms should spray X-rays in all directions for a brief instant before the electron spirals in to crash into the nucleus. But Niels Bohr, a Danish theoretical physicist working with Rutherford, pointed out that atoms obviously exist, so maybe the rules of physics needed to change. Bohr proposed that an electron in certain special orbits doesn't emit any light at all. Atoms absorb and emit light only when electrons change orbits, and the frequency of the light depends on the energy difference in just the way Planck and Einstein introduced. Bohr's atom fixes Rutherford's problem and explains why atoms emit only very specific colors of light. Each element has its own special orbits, and thus its own unique set of frequencies. The Bohr model has one tiny problem: there's no reason for those orbits to be special. But Louis de Broglie, a French PhD student, brought everything full circle. He pointed out that if light, which everyone knew is a wave, behaves like a particle, maybe the electron, which everyone knew is a particle, behaves like a wave. And if electrons are waves, it's easy to explain Bohr's rule for picking out the special orbits. Once you have the idea that electrons behave like waves, you can go look for it. And within a few years, scientists in the US and UK had observed wave behavior from electrons. These days we have a wonderfully clear demonstration of this: shooting single electrons at a barrier with slits cut in it. Each electron is detected at a specific place at a specific time, like a particle. But when you repeat the experiment many times, all the individual electrons trace out a pattern of stripes, characteristic of wave behavior. The idea that particles behave like waves, and vice versa, is one of the strangest and most powerful in physics. Richard Feynman famously said that this illustrates the central mystery of quantum mechanics. Everything else follows from this, like pieces of a puzzle falling into place.

**P138 2014-09-12 Particles and waves - The central mystery of quantum mechanics - Chad**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=138)

翻译人员: Yuyang Zhao 校对人员: Yolanda Zhang在物理学中最神奇的一个事实是：宇宙中的任何事物，从光到电子再到原子都同时表现得既像粒子，又像波你可能听说过这些关于物理学的怪事薛定谔的猫，掷骰子的上帝，超距作用所有这些事情都遵从一个事实：任何事物都同时具有粒子性和波动性这听起来可能很疯狂看看你的四周，你可以看见 水中的水波和石头当中的颗粒但他们没有一点相像之处那我们为什么会将这两者联系在一起呢？物理学家们并不是无缘无故地 它们混搭在一起实际上，他们通过一点一点的过程把许多证据像拼图一样组合起来，发现了波粒二象性爱因斯坦在1905第一次正式提出了光的波粒二象性但他的理论是建立在 早先普朗克的观点基础之上的普朗克的理论很好的解释了为什么 像灯丝这样的热物质会放出不同颜色的光但是它建立在一个近乎不可能的前提下：他认为这样的物体由振荡器构成，只能向外发射特定的、 不连续的能量块（量子），能量单位的大小取决于光的频率普朗克对自己的理论一直不满意， 而爱因斯坦在此基础上进行了深入研究他将普朗克的观点应用到光线本身， 他认为众所周知光线是一种波， 但实际上，光线是粒子流每颗粒子都由不连续的能量组成爱因斯坦称这是他唯一做过的革命性的事这恰好能够解释光线照在 金属表面发生的电子逃逸的现象即使是反对这一观点的人 都不得不同意它是极其合理的接下来补全这块拼图的是英国人罗斯福1909年，罗斯福的助手盖革和马斯登用α粒子轰击金箔令人震惊的是，一部分α粒子被直接反弹了回去这表明原子的大部分质量 都集中在非常小的核上你上小学时见到的 电子环绕原子核运动的模型，很像小型的太阳系，这就是由罗斯福提出的但是罗斯福的原子模型有一个问题—— 它解释不通经典物理学告诉我们一个电子做圆周运动会产生光我们一直运用这个原理来 产生无线电波和X射线在电子旋转至撞到原子核以前罗斯福原子应在瞬间向各个方向上发出X光但是和罗斯福一起工作的丹麦物理学家波尔明确指出原子是存在的所以可能很多物理法则都需要改变波尔提出，在特定轨道中的电子不会产生光原子只在电子改变轨道时吸收并发射光线而且光的频率取决于能量的差异就像爱因斯坦和普朗克介绍的那样波尔的原子解决了罗斯福的问题还解释了为什么原子只产生特定颜色的光每一种元素都有自己特殊的轨道因此有独一无二的频率波尔模型有一个小问题：无法解释轨道的特殊性但一个法国的博士生Louis de Broglie补齐了这个缺口他指出如果光像一个粒子一样运动而不是人们所熟知的波也许电子会像波一样运动而不是人们所熟知的粒子而且如果电子是波就可以很容易解释波尔的特殊轨道定律了当你知道电子像波一样运动后你就知道如何观察它了在短短几年内，美国和英国的科学家就观察到了电子的波动性现在我们可以轻而易举地证明：向有缝隙的障碍物上射出单电子每一个电子都会在 特定的时间和位置被检测到，像粒子一样但当你重复这个实验很多次之后所有的独立电子会脱离条纹模式表现出波的特性粒子具有波动性的概念和它的逆定理是物理学中最奇怪的也是最重要的理论理查德费曼曾说过一句著名的话这个（波粒二象性） 解开了量子力学的中心谜团其它一切理论都从这里开始像拼图一样完善着我们的认知

**P139 2014-09-15 Schrödinger's cat - A thought experiment in quantum mechanics - Chad**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=139)

Austrian physicist Erwin Schrödinger is one of the founders of quantum mechanics, but he's most famous for something he never actually did: a thought experiment involving a cat. He imagined taking a cat and placing it in a sealed box with a device that had a 50% chance of killing the cat in the next hour. At the end of that hour, he asked, "What is the state of the cat?" Common sense suggests that the cat is either alive or dead, but Schrödinger pointed out that according to quantum physics, at the instant before the box is opened, the cat is equal parts alive and dead, at the same time. It's only when the box is opened that we see a single definite state. Until then, the cat is a blur of probability, half one thing and half the other. This seems absurd, which was Schrödinger's point. He found quantum physics so philosophically disturbing, that he abandoned the theory he had helped make and turned to writing about biology. As absurd as it may seem, though, Schrödinger's cat is very real. In fact, it's essential. If it weren't possible for quantum objects to be in two states at once, the computer you're using to watch this couldn't exist. The quantum phenomenon of superposition is a consequence of the dual particle and wave nature of everything. In order for an object to have a wavelength, it must extend over some region of space, which means it occupies many positions at the same time. The wavelength of an object limited to a small region of space can't be perfectly defined, though. So it exists in many different wavelengths at the same time. We don't see these wave properties for everyday objects because the wavelength decreases as the momentum increases. And a cat is relatively big and heavy. If we took a single atom and blew it up to the size of the Solar System, the wavelength of a cat running from a physicist would be as small as an atom within that Solar System. That's far too small to detect, so we'll never see wave behavior from a cat. A tiny particle, like an electron, though, can show dramatic evidence of its dual nature. If we shoot electrons one at a time at a set of two narrow slits cut in a barrier, each electron on the far side is detected at a single place at a specific instant, like a particle. But if you repeat this experiment many times, keeping track of all the individual detections, you'll see them trace out a pattern that's characteristic of wave behavior: a set of stripes - regions with many electrons separated by regions where there are none at all. Block one of the slits and the stripes go away. This shows that the pattern is a result of each electron going through both slits at the same time. A single electron isn't choosing to go left or right but left and right simultaneously. This superposition of states also leads to modern technology. An electron near the nucleus of an atom exists in a spread out, wave-like orbit. Bring two atoms close together, and the electrons don't need to choose just one atom but are shared between them. This is how some chemical bonds form. An electron in a molecule isn't on just atom A or atom B, but A+ B. As you add more atoms, the electrons spread out more, shared between vast numbers of atoms at the same time. The electrons in a solid aren't bound to a particular atom but shared among all of them, extending over a large range of space. This gigantic superposition of states determines the ways electrons move through the material, whether it's a conductor or an insulator or a semiconductor. Understanding how electrons are shared among atoms allows us to precisely control the properties of semiconductor materials, like silicon. Combining different semiconductors in the right way allows us to make transistors on a tiny scale, millions on a single computer chip. Those chips and their spread out electrons power the computer you're using to watch this video. An old joke says that the Internet exists to allow the sharing of cat videos. At a very deep level, though, the Internet owes its existance to an Austrian physicist and his imaginary cat.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=139)

翻译人员: LI HAO 校对人员: Qiwen Lu奥地利物理学家埃尔·文薛定谔是量子力学的奠基人之一，但是他最为大众所知的却是他从未做过的一项试验：一个关于猫的思想试验（即薛定谔的猫）他假想将一只猫置于一个密闭盒子内，里面安放了一个一小时内有50%几率杀死猫的装置。在那一小时的结尾，他提出一个问题，现在猫是活的还是死的常识告诉我们猫不是活的就是死的但是，薛定谔指出，根据量子物理在打开盒子的前一瞬间，猫既是活的也是死的，即猫处于生与死的混合状态同时只有打开了盒子，我们才能知道猫是生还是死除此之前，猫一直处于一种混沌可能性的状态，既生又死。薛定谔的观点听起来很荒谬他发觉量子物理如此难以理解以至于他本人都放弃验证此理论并转而研究生物虽然薛定谔的猫看上去很荒谬，但是，它却是很真实的，实际上，也是很基础的如果量子物体不能同时处于双重状态，我们现在用来观看此视频的电脑就不会存在量子的叠加现象是自然物质波粒二象性作用的结果一个物体要想有波长，就必须扩展空间范围这就意味着它必须同时占据许多位置限制在很小空间的不可能太明晰物体的波长所以它同时存在于波长内的许多不同地点我们在日常生活的物品中看不到这些波因为波长在变短的同时却有增长的趋势而因为猫相对而言比较大和重如果我们取一个原子并放大到太阳系大小那么猫奔向物理学家产生的波长就相当于太阳系里的一个小原子它小到很难去探测，所以我们从未看到猫的波动但是，很小的物质，比如说一个电子却是能表明波粒二象性存在的证据如果我们一次把一个电子射向一个有两个狭窄裂缝的装置远处的电子会像物质一样马上被探测出在哪个位置我们大量重复此实验持续追踪所有电子的轨迹你会发现它们的轨迹表现出了波的特征条纹区间内集聚了大量电子夹杂在没有电子的区间之中遮挡住一个细微裂缝，条纹区间就不复存在这表明电子的集聚形式是电子同时有两个裂缝可穿过的作用结果一个电子无法选择通过哪个裂缝，但是，通过裂缝的电子却是同时发生的这种状态叠加也可由现代科学解释饶原子核旋转的电子的轨道是分散的似波轨道使两个原子靠近，电子不需要选择原子轨道，只需要共享轨道这就是化学键的形式分子中的电子不是在原子A或B中，是在A和B中如果你添加更多的原子，电子会更加扩散，同时被大量原子共享电子并不是牢固地绕某个原子旋转，却在空间内绕着分子旋转这种庞大的状态叠加表明了电子是如何在导体，绝缘体和半导体间运动的了解电子被原子共享的方式使我们有可能精确地控制半导体材料的性能比如说，硅将不同的半导体以正确的方式组合令我们可以将晶体管制造成很小的规模集成大规模集成电路放在电脑芯片里这些芯片和扩散的电子掌控你们正在看此视频的电脑有这么一个老笑话，互联网的存在使我们可以分享关于薛定谔的猫的视频但是，溯本求源，互联网的出现却要归功于一位奥地利物理学家和那只虚构的猫

**P140 2014-09-18 Is telekinesis real - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=140)

When the infamous fictional character, Carrie White, left her high school prom hall ablaze, and brought terror upon her town, she relied on her powers of telekinesis, the ability to manipulate physical objects using the power of the mind alone. But while Carrie is just a fictional film based upon a fictional book, belief in telekinesis isn't fictional at all. For centuries, humans have claimed they really do have the power to control the motion of objects using only their minds. Levitation, opening doors at will and spoon bending are all intriguing examples. It happens in the Matrix when Neo freezes bullets midair, and it's a skill that Yoda has honed to a T. But is telekinesis real, or just as fictional as Carrie, Yoda and Neo combined? To investigate, we need to evaluate telekinetic claims through a scientific lens using the scientific method. Telekinesis is part of the discipline called parapsychology, in which researchers study psychic phenomena. Parapsychologists regard what they do as a science, but other scientists disagree. Let's start with a few basic observations. Observation #1: While there are loads of anecdotes out there about telekinesis, there's no scientific proof that it exists; no studies conducted according to the scientific method and repeated under lab conditions can show that its real. In the 1930s, the so-called father of parapsychology, Joseph Banks Rhine, tested in the lab whether people could use telekinesis to make a dice roll the way they wanted it to. But afterwards, scientists couldn't replicate his results, and since replication is key to proving an idea, that was a problem. Aside from scientists, there are also countless self-proclaimed telekinetics, but all have been exposed as tricksters, or can't perform under conditions where they're not totally in control, suggesting that they manipulate the situation to get the results they want. Today, there's even a huge stash of prize money available from lots of organizations for anyone who can prove that psychic abilities, like telekinesis, are real. But these riches remain unclaimed. Observation #2: When we investigate telekinesis, there's no consensus about what exactly is being measured. Are powerful, Yoda-like brainwaves at work perhaps? Since nobody agrees, it's difficult to apply a research standard, something required in all other types of science to test the validity of ideas. Observation #3: The point of science is to discover the unknown, and in the history of scientific investigation, it's definitely happened that new discoveries have gone against established science, and even overturned whole branches of science. Such discoveries must be proven extra carefully to withstand skepticism. In the case of telekinesis, the idea goes against established science, but lacks the powerful evidence in favor of it. Our universe is controlled and explained by the laws of physics, and one of these laws tells us that brain waves can't control objects because they're neither strong nor far-reaching enough to influence anything outside of our skulls. Physics also tells us that the only forces that can influence objects from afar are magnetic and gravitational. Probably the closest thing to telekinesis that science can explain is the use of thoughts to control a robotic arm. In the brains of stroke patients who can't move, researchers can implant tiny wires into the region that controls movement, and then train the patient to concentrate on moving a robotic arm, which acts like an extension of their minds, and it works. It's amazing, but it isn't telekinesis. The patients thoughts aren't just vague, undetectable things. They're measurable brain signals, translated through wires into a robot. Science can measure, test and explain the motion, and that's how we've shown that this kind of mind control is real. Science is a slow process of accumulating the evidence that either stands for or against an idea. When we stack up evidence, we can see which tower grows tallest, and in the case of telekinesis, it's not the tower showing that it exists. Some say this mystical phenomenon can't fit within the confines of science, and that's okay. But then telekinesis becomes purely a matter of personal conviction. If something can't be assessed scientifically, then it can't be described as scientific either. So the results of our investigation reveal that however much we may want to believe that the force really is within us, the case for telekinesis remains weak. Sorry Neo, Carrie and Yoda. Your skills are mind-blowing, but for now, they belong in the movies.

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翻译人员: nancy liu 校对人员: Jenny Yang当臭名昭著的虚构人物魔女嘉莉离开了陷入火海的 高中毕业舞会的大厅给她在的小镇带来了恐慌她靠心灵遥感的力量即通过意念控制物体虽然魔女嘉莉只是一个基于小说的 虚构的电影里的人物但是心灵遥感却一点都不虚幻数百年来，有人就曾声称他们的确有能够用意念控制物体的力量用意念悬浮，开门并弄弯汤勺这些都是有趣的例子在《黑客帝国》里， 尼欧可以将子弹停在半空中在《星球大战》里,尤达控制他的飞机但是心灵遥感真的存在吗？还是像嘉莉，尤达和尼欧一样都是虚构的？为了弄清楚这件事，我们需要验证心灵遥感的真实性通过科学的透镜，使用科学的方法心灵遥感的定律源于心灵学心灵学研究的研究对象是超自然现象心灵学家视自己研究的事物为科学其他科学家却不这么看让我们用几个基本的实验观察结果作为开始观察结果1虽然市面上有很多关于心灵遥感的传言但是没有一点科学证据能证明其存在没有在实验室条件下按照科学方法进行的研究能证明这是真实的在1930年左右，所谓的心灵遥感之父，约瑟夫·本克斯·莱茵在实验室里进行了测验测验的内容是人们是否能够通过心灵遥感的使用使投骰子的结果受自己的控制但是在此之后， 科学家们无法得到相同的实验结果然而得到相同的实验结果是证明一个理论的关键所以它无法被证实除了科学家以外世上也有许多自封的心灵遥感学家但是他们都被揭露实际上是骗子或者无法在不受他们控制的环境里再次进行心灵遥感这些情况表明他们是在操纵周边的环境来得到自己想要的结果如今，世界上甚至还有许多组织设置的许多不公开的奖项用来奖励可以证实超自然能力的人，比如可以证明心灵遥感是真的的人但是这些奖项一直没有被授予观察结果2当我们调查心灵遥感的时候我们没有一致的测量对象我们要测量的是尤达一样强有力的脑电波么？由于大家都没有达成一致，很难确定出一个一致的调查标准而一致实验标准却是所有类型的科学实验所要求的没有它就无法测试理论的有效性观察结果3科学的意义在于发现未知在科学调查的历史中新的发现与已经建立起来的体系相违背的现象并不罕见甚至有时一个新的发现会改变科学之中一整枝分支得方向这种与之前体系相违背的发现必须被带着审慎得态度来进行谨慎的验证在心灵遥感的例子里这种理论虽然与之前建立起的科学体系相违背却又缺乏强有力的证据来支持它我们的宇宙被物理学定律所诠释和支配然而其中一条定律告诉我们脑电波无法控制物体因为它们既不强烈又没有那么广的控制范围因此无法影响我们头骨意外的东西物理学也告诉我们唯一能够在远距离情况下影响物体的具有磁力或者具有引力的物体科学能解释的，与心灵遥感最相近的现象可能就是用思想来控制机器手臂的实验了脑中风患者无法移动身体研究者可以将一些细线埋植入大脑中控制运动的区域然后训练这些患者使他们集中精力来移动机械手臂使得机械手臂仿佛他们思想的实质化，而且实验取得了成功这个实验令人震惊，但它终究不是心灵遥感患者的思想并不模糊，也不是无法侦测的它们是可以测量的脑信号它们被翻译，通过细线传入进入机械手臂科学可以被测量，被检验，然后解释其这种现象这就是我们如何证实这种思想控制外物的真实性科学是一个慢慢积累的过程慢慢积累一些或支持或反对某一现象的证据当我们把这些证据堆叠在一起我们就能看出哪一座塔更高而在心灵遥感的例子中，证明它成立的证据之塔并不是最高的一些人可能会说这种神秘的现象只是无法在现有的科学理论中被证明那好吧但是这样的话心灵遥感就变成了纯粹的个人观点如果事物无法向科学靠拢那它也就不能被称为“科学的”所以，我们调查的结果揭示了无论我们多么想要相信我们真的拥有这种力量但是心灵遥感的理论依旧禁不起考量对不起啦尼欧，嘉莉和尤达你们的能力虽然令人印象深刻，但是现在，它们只存在于电影中

**P141 2014-09-18 The great brain debate - Ted Altschuler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=141)

In 1861, two scientists got into a very brainy argument. Specifically, they had opposing ideas of how speech and memory operated within the human brain. Ernest Aubertin, with his localistic model, argued that a particular region or the brain was devoted to each separate process. Pierre Gratiolet, on the other hand, argued for the distributed model, where different regions work together to accomplish all of these various functions. The debate they began reverberated throughout the rest of the century, involving some of the greatest scientific minds of the time. Aubertin and his localistic model had some big names on his side. In the 17th century, René Descartes had assigned the quality of free will and the human soul to the pineal gland. And in the late 18th century, a young student named Franz Joseph Gall had observed that the best memorizers in his class had the most prominent eyes and decided that this was due to higher development in the adjacent part of the brain. As a physician, Gall went on to establish the study of phrenology, which held that strong mental faculties corresponded to highly developed brain regions, observable as bumps in the skull. The widespread popularity of phrenology throughout the early 19th century tipped the scales towards Aubertin's localism. But the problem was that Gall had never bothered to scientifically test whether the individual brain maps he had constructed applied to all people. And in the 1840's, Pierre Flourens challenged phrenology by selectively destroying parts of animal brains and observing which functions were lost. Flourens found that damaging the cortex interfered with judgement or movement in general, but failed to identify any region associated with one specific function, concluding that the cortex carried out brain functions as an entire unit. Flourens had scored a victory for Gratiolet, but it was not to last. Gall's former student, Jean-Baptiste Bouillaud, challenged Flourens' conclusion, observing that patients with speech disorders all had damage to the frontal lobe. And after Paul Broca's 1861 autopsy of a patient who had lost the power to produce speech, but not the power to understand it, revealed highly localized frontal lobe damage, the distributed model seemed doomed. Localism took off. In the 1870's, Karl Wernicke associated part of the left temporal lobe with speech comprehension. Soon after, Eduard Hitzig and Gustav Fritsch stimulated a dog's cortex and discovered a frontal lobe region responsible for muscular movements. Building on their work, David Ferrier mapped each piece of cortex associated with moving a part of the body. And in 1909, Korbinian Brodmann built his own cortex map with 52 separate areas. It appeared that the victory of Aubertin's localistic model was sealed. But neurologist Karl Wernicke had come up with an interesting idea. He reasoned that since the regions for speech production and comprehension were not adjacent, then injuring the area connecting them might result in a special type of language loss, now known as receptive aphasia. Wernicke's connectionist model helped explain disorders that didn't result from the dysfunction of just one area. Modern neuroscience tools reveal a brain more complex than Gratiolet, Aubertin, or even Wernicke imagined. Today, the hippocampus is associated with two distinct brain functions: creating memories and processing location in space. We also now measure two kinds of connectivity: anatomical connectivity between two adjoining regions of cortex working together, and functional connectivity between separated regions working together to accomplish one process. A seemingly basic function like vision is actually composed of many smaller functions, with different parts of the cortex representing shape, color and location in space. When certain areas stop functioning, we may recognize an object, but not see it, or vice versa. There are even different kinds of memory for facts and for routines. And remembering something like your first bicycle involves a network of different regions each representing the concept of vehicles, the bicycle's shape, the sound of the bell, and the emotions associated with that memory. In the end, both Gratiolet and Aubertin turned out to be right. And we still use both of their models to understand how cognition happens. For example, we can now measure brain activity on such a fine time scale that we can see the individual localized processes that comprise a single act of remembering. But it is the integration of these different processes and regions that creates the coherent memory we experience. The supposedly competing theories prove to be two aspects of a more comprehensive model, which will in turn be revised and refined as our scientific techologies and methods for understanding the brain improve.

**P141 2014-09-18 The great brain debate - Ted Altschuler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=141)

翻译人员: Will Jay 校对人员: Yuanqing Edberg1861年，两位科学家卷入了一场绝妙的争论。具体来说， 他们对语言和记忆在人类大脑中的运作有着相反的想法。尔宁斯特·奥博丁的局部理念摸板争议大脑的各个区域有着不同的分工。而另一方面， 皮尔斯 ·哥拉提欧雷提出分布模型，指出大脑不同的区域同时运转以实现多种不同的功能。这个争论延续了整个世纪，牵涉了当时很多最伟大的科学思想。奥博丁和他的逻辑思考模板在支持 他的一方颇具名声。在17世纪， 勒内笛卡儿把自由意志的特征和人类灵魂归结于脑部松果体。在18世纪末， 一个年轻的学生绋兰兹.约瑟夫.吉尔在他班里观察到拥有最好记忆的人 都有着引人注目的眼睛于是他认为这是由于大脑各个部位在连接处的高度发展。作为一名物理家， 吉尔建立了颅相学的学习。颅相学是说强健的脑力对应于高度发达的大脑区域， 所以能看到头骨的突出。19世纪风靡全球的颅相学研究让更多人偏向奥博丁的局部理念。但是，问题是吉尔从来没有想在科学上证实他创造的大脑个体地图是否适用于所有人。然后，在1840年代， 皮儿佛洛棱 挑战了颅相学。他选择性地毁坏了动物的部分大脑然后观察动物失去了哪些功能。佛洛冷发现，神经中枢的损害，总体地干涉着判断能力和行动能力，但是他不能辨别大脑各区域的独立功能，就推断出大脑皮层是 作为一个整体来运行的。佛洛冷已为哥拉提欧雷赢得胜利， 但是这没有持续很久。吉尔的前任学生，Jean-Baptiste Bouillaud挑战了佛洛冷的结论，他观察到有语言障碍的病人都在大脑的额叶有过损伤。1861年，在paul Broca 解剖了一个失去了说话能力但还能理解语言的病人，发现大脑受到的损伤高度局限。分布模型看来就没用了。局部学出现了。在1870年代，Karl Wernicke 把大脑的颞叶和语言理解能力联系了起来。不久，Eduard Hitzig 和 Gustav Fritsch刺激了狗的大脑皮层然后发现了额叶区是负责肌肉运动的。基于他们的工作， david ferrier 绘制了皮层的每一个有关动作的部分。在1909, Korbinian Brodmann创造了 他自己的神经中枢图，包括52个不同区域。看起来奥博定的局部理念模型就铁定了。但神经学家Karl Wernicke 构思了一个新的想法。他提出因为语言表达和理解的区域不是相邻的，连接它们的部分受损会导致一种特别的语言失落， 现在称之为感觉性失语。Wernicke的连接学模式帮助解释了失调不是由于一个区域的功能缺失而引起的.现代神经学工具揭示大脑比Gratiolet,Aubertin, 和 Wernicke想象的更复杂。今天，海马体联系到两个独特的大脑功能：创造性记忆和空间关系处理。我们也测量到两种连接方式：中枢邻接区域的解剖l性连接会协调运行，而两个分开区域的功能性连接也会协同运作以完成一个功能。一个如同视觉这样的基本工作实际上由很多很小的功能组成，在神经中枢的各区域表现出不同形状，颜色， 和空间位置。当某些区域功能缺失， 我们可能认知一个事物但却看不见它，或者相反。（中枢）甚至对事实和常规也有不同的记忆记住一些像你的第一部自行车这样的事包括了大脑不同区域的联网综合， 各个区域代表了交通工具的理念，自行车的形状， 铃声的响声，以及跟那个记忆相关的情绪。最后，gratiolet和奥博定都是正确的。我们仍然用他们俩人的模型 去理解认知的形成。比方说，我们现在可以 在精细的时间轴上来测量大脑，我们可以看见各个局部区域的运动包括记住事情的各个单一行为但它的确是那些不同的区域处理的综合形成了我们对于经验的连贯性记忆。所以说两个竞争的理论 证明了一个更全面的模型的两个方面，随着我们科学技术和了解大脑方法的提升它们会有进一步的修改和完善。

**P142 2014-09-19 A brief history of melancholy - Courtney Stephens**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=142)

Sadness is part of the human experience, but for centuries there has been vast disagreement over what exactly it is and what, if anything, to do about it. In its simplest terms, sadness is often thought of as the natural reaction to a difficult situation. You feel sad when a friend moves away or when a pet dies. When a friend says, "I'm sad," you often respond by asking, "What happened?" But your assumption that sadness has an external cause outside the self is a relatively new idea. Ancient Greek doctors didn't view sadness that way. They believed it was a dark fluid inside the body. According to their humoral system, the human body and soul were controlled by four fluids, known as humors, and their balance directly influenced a person's health and temperament. Melancholia comes from melaina kole, the word for black bile, the humor believed to cause sadness. By changing your diet and through medical practices, you could bring your humors into balance. Even though we now know much more about the systems that govern the human body, these Greek ideas about sadness resonate with current views, not on the sadness we all occasionally feel, but on clinical depression. Doctors believe that certain kinds of long-term, unexplained emotional states are at least partially related to brain chemistry, the balance of various chemicals present inside the brain. Like the Greek system, changing the balance of these chemicals can deeply alter how we respond to even extremely difficult circumstances. There's also a long tradition of attempting to discern the value of sadness, and in that discussion, you'll find a strong argument that sadness is not only an inevitable part of life but an essential one. If you've never felt melancholy, you've missed out on part of what it means to be human. Many thinkers contend that melancholy is necessary in gaining wisdom. Robert Burton, born in 1577, spent his life studying the causes and experience of sadness. In his masterpiece "The Anatomy of Melancholy," Burton wrote, "He that increaseth wisdom increaseth sorrow." The Romantic poets of the early 19th century believed melancholy allows us to more deeply understand other profound emotions, like beauty and joy. To understand the sadness of the trees losing their leaves in the fall is to more fully understand the cycle of life that brings flowers in the spring. But wisdom and emotional intelligence seem pretty high on the hierarchy of needs. Does sadness have value on a more basic, tangible, maybe even evolutionary level? Scientists think that crying and feeling withdrawn is what originally helped our ancestors secure social bonds and helped them get the support they needed. Sadness, as opposed to anger or violence, was an expression of suffering that could immediately bring people closer to the suffering person, and this helped both the person and the larger community to thrive. Perhaps sadness helped generate the unity we needed to survive, but many have wondered whether the suffering felt by others is anything like the suffering we experience ourselves. The poet Emily Dickinson wrote, "I measure every Grief I meet With narrow, probing Eyes - I wonder if it weighs like MIne - Or has an Easier size." And in the 20th century, medical anthropologists, like Arthur Kleinman, gathered evidence from the way people talk about pain to suggest that emotions aren't universal at all, and that culture, particularly the way we use language, can influence how we feel. When we talk about heartbreak, the feeling of brokenness becomes part of our experience, where as in a culture that talks about a bruised heart, there actually seems to be a different subjective experience. Some contemporary thinkers aren't interested in sadness' subjectivity versus universality, and would rather use technology to eliminate suffering in all its forms. David Pearce has suggested that genetic engineering and other contemporary processes cannot only alter the way humans experience emotional and physical pain, but that world ecosystems ought to be redesigned so that animals don't suffer in the wild. He calls his project "paradise engineering." But is there something sad about a world without sadness? Our cavemen ancestors and favorite poets might not want any part of such a paradise. In fact, the only things about sadness that seem universally agreed upon are that it has been felt by most people throughout time, and that for thousands of years, one of the best ways we have to deal with this difficult emotion is to articulate it, to try to express what feels inexpressable. In the words of Emily Dickinson, "'Hope' is the thing with feathers - That perches in the soul - "And sings the tune without the words - And never stops - at all -"

**P142 2014-09-19 A brief history of melancholy - Courtney Stephens**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=142)

翻译人员: Saduo Dangui 校对人员: Xinze Jiang悲伤是人类必经的感受但几个世纪以来，人们既没有判断出它到底是什么也不知我们应该以怎样的态度去面对它简单来说悲伤常被人们理解为面对艰难处境时的自然反应朋友搬走了或是宠物死了你都会感到悲伤当一个朋友说“我好伤心”时你经常会问他们“发生什么了？”但你对于悲伤是由外界因素导致的假设还是个比较新的想法古希腊医生可不是这么看待悲伤的他们觉得悲伤是体内一种深色的液体根据他们创造的体液系统理论人体和灵魂是由四种体液控制的于是它们之间的平衡会直接影响到一个人的健康和性情精神忧郁来自于一种叫Melaina Kole也就是黑胆汁，一种被认为会产生悲伤的体液改善伙食和医疗手段都可以有效地使你的体液处于平衡状态虽然现在我们对控制人类身体的系统了解已经很多了这些古希腊人有关于悲伤的想法还是可以和当今的观点产生共鸣不仅仅是我们偶尔会感到的悲伤也包括医学上所说的忧郁医生们认为有些长期无法解释的感情状态和大脑内部各种化学物质的平衡多少有些关系像希腊的体液系统理论改变这些物质的平衡就可以甚至可以深刻地影响到我们面对极端困难环境时的反应长久以来，我们不断地尝试去无视掉悲伤的价值但在以下的讨论中你会发现一个强有力的证据说悲伤不仅仅是生命中无法避免的一部分而且还是不可或缺的一部分如果你从来没有感受过忧郁那你已经失去了一部分作为人类的意义许多学者反映，长智商的必要条件之一是忧郁1577年出生的Robert Burton贡献了一生的时间研究悲伤的起因和过程在他的著作The Anatomy of Melancholy中他写道：“积累智慧的同时也会积累忧伤。”19世纪初期的浪漫主义诗人们相信忧郁可以使我们更很深刻地了解其他深沉的感受比如说美好和快乐要了解秋季黄叶满地的忧伤就是更完善地认识可以带来春花的生命周期但智慧和情商看起来像是更高层次的需求那悲伤在更基础可触，或甚至是进化的层面有没有价值？科学家认为哭泣以及沉默寡言是最初帮助我们祖先之间牢牢建立社会关系并帮助他们寻求到他们所需要的支持的和愤怒和暴力不同，悲伤是可以立马唤起别人同情的痛苦的表现，人与人之间距离一下子就近了这样，双方都会得到帮助，更大的群体也会得以发展壮大也许，悲伤可以产生我们生存所需的集体感但很多人都在想，别人所感受到的痛苦和我们所感受到的是否一样。诗人Emily Dickinson写道，“我眯着眼视察每个我所遇见的悲痛-心想它是否和我的一样重-或者只是小如橡皮。”在20世纪像Arthur Kleinman这样的人类医学家收集了人们阐述自己悲伤的方式作为证据来证明感情其实根本不是普遍的而且文化，尤其是我们使用语言的方式都会影响到我们所感所受当我们说到心碎时破碎的感觉就变成了我们体验的一部分但是当另一个文化说起淤血的心时这其实好像又有另外一种客观的体验有些当代思想家们对悲伤的客观性和普遍性部不是很感兴趣而且他们会更愿意用科技去消除各种形态的痛苦David Pearce觉得，基因工程和其它当代的科学手段不应该只改变人们历经精神上和身体上的伤痛而应把世界的生态系统都重新设计一遍那样野生动物也不会受苦难他把他的项目叫做“天堂工程”但一个没有悲伤的世界不是有点令人伤感吗？我们的山顶洞人始祖们和最受人喜爱的诗人可不会想在这样的一个天堂里其实，关于悲伤唯一一些大家都同意的是几乎所有历史上的人都曾感受过而且几千年来人们面对艰难的感情时最好的方式就是把它说出来，试着讲述讲不出的东西用Emily Dickinson的话说，“’希望‘是有翅膀的东西-在灵魂里窥视“它歌唱着没有文字的旋律-而且永不停息-”

**P143 2014-09-22 Einstein's brilliant mistake - Entangled states - Chad Orzel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=143)

Albert Einstein played a key role in launching quantum mechanics through his theory of the photoelectric effect but remained deeply bothered by its philosophical implications. And though most of us still remember him for deriving E=MC^2, his last great contribution to physics was actually a 1935 paper, coauthored with his young colleagues Boris Podolsky and Nathan Rosen. Regarded as an odd philosophical footnote well into the 1980s, this EPR paper has recently become central to a new understanding of quantum physics, with its description of a strange phenomenon now known as entangled states. The paper begins by considering a source that spits out pairs of particles, each with two measurable properties. Each of these measurements has two possible results of equal probability. Let's say zero or one for the first property, and A or B for the second. Once a measurement is performed, subsequent measurements of the same property in the same particle will yield the same result. The strange implication of this scenario is not only that the state of a single particle is indeterminate until it's measured, but that the measurement then determines the state. What's more, the measurements affect each other. If you measure a particle as being in state 1, and follow it up with the second type of measurement, you'll have a 50% chance of getting either A or B, but if you then repeat the first measurement, you'll have a a 50% chance of getting zero even though the particle had already been measured at one. So switching the property being measured scrambles the original result, allowing for a new, random value. Things get even stranger when you look at both particles. Each of the particles will produce random results, but if you compare the two, you will find that they are always perfectly correlated. For example, if both particles are measured at zero, the relationship will always hold. The states of the two are entangled. Measuring one will tell you the other with absolute certainty. But this entanglement seems to defy Einstein's famous theory of relativity because there is nothing to limit the distance between particles. If you measure one in New York at noon, and the other in San Francisco a nanosecond later, they still give exactly the same result. But if the measurement does determine the value, then this would require one particle sending some sort of signal to the other at 13,000,000 times the speed of light, which according to relativity, is impossible. For this reason, Einstein dismissed entanglement as "spuckafte ferwirklung," or spooky action at a distance. He decided that quantum mechanics must be incomplete, a mere approximation of a deeper reality in which both particles have predetermined states that are hidden from us. Supporters of orthodox quantum theory lead by Niels Bohr maintained that quantum states really are fundamentally indeterminate, and entanglement allows the state of one particle to depend on that of its distant partner. For 30 years, physics remained at an impasse, until John Bell figured out that the key to testing the EPR argument was to look at cases involving different measurements on the two particles. The local hidden variable theories favored by Einstein, Podolsky and Rosen, strictly limited how often you could get results like 1A or B0 because the outcomes would have to be defined in advanced. Bell showed that the purely quantum approach, where the state is truly indeterminate until measured, has different limits and predicts mixed measurement results that are impossible in the predetermined scenario. Once Bell had worked out how to test the EPR argument, physicists went out and did it. Beginning with John Clauster in the 70s and Alain Aspect in the early 80s, dozens of experiments have tested the EPR prediction, and all have found the same thing: quantum mechanics is correct. The correlations between the indeterminate states of entangled particles are real and cannot be explained by any deeper variable. The EPR paper turned out to be wrong but brilliantly so. By leading physicists to think deeply about the foundations of quantum physics, it led to further elaboration of the theory and helped launch research into subjects like quantum information, now a thriving field with the potential to develop computers of unparalleled power. Unfortunately, the randomness of the measured results prevents science fiction scenarios, like using entangled particles to send messages faster than light. So relativity is safe, for now. But the quantum universe is far stranger than Einstein wanted to believe.

**P143 2014-09-22 Einstein's brilliant mistake - Entangled states - Chad Orzel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=143)

翻译人员: Jinyuan Liu 校对人员: Qingqing Mao凭借着光电效应理论，阿尔伯特·爱因斯坦在量子力学领域奠定了重要的地位。但他对这一理论的哲学蕴意始终深感困扰。虽然爱因斯坦以推导出质能方程E＝mc^2而闻名于世，但实际上，他对物理学的最后巨献 是一篇发表于1935年的论文。论文合著者是他年轻的同事们： 鲍里斯·波多尔斯基和纳森·罗森。即使直到20上世纪80年代， 它都被当作一个奇怪的哲学脚注，这篇阐述爱因斯坦－波多尔斯基－罗森悖论（简称EPR） 的论文现在成为了重新理解量子物理学的中心，因为文中描述了一个奇怪的现象,现在人们称这种现象为纠缠态。这篇论文先考虑一个可以产生成对的粒子的源，每个粒子有两个可测量的属性，每个属性的测量都有两种可能的结果，两种结果出现的概率是相等的。假设第一个属性的测量结果是：状态0或者状态1，第二个属性的测量结果是：状态A或者状态B。一旦一个粒子的一个属性被测量了一次，无论再测量多少次这一个粒子中的这一个属性，都会得到同样的结果。这种现象的奇怪之处在于，它不仅表明了一个单粒子的状态在被测量之前是不确定的，它也表明了，测量这个行为本身 决定了粒子的状态。而且，测量之间也是互相影响的。如果你测量一个粒子的第一个属性， 它的测量结果是状态1，你接着测量这个粒子的第二个属性,你有50%的几率得到状态A或者状态B。但是，如果你再回头去测量第一个属性，即使它已经被测量过一次并得到了结果1，你也将有50%的几率得到状态0。所以，轮流测量一个粒子的不同属性会重置原始的结果，让一个全新的、随机的结果变成可能。如果你同时观察一对粒子，结果会变得更奇怪。两个粒子都会得到随机的测量结果，但是，如果你把它们放在一起比较，你会发现，它们总是完美地彼此相关。比如，如果两个粒子的测量结果都是状态0，它们的关联现象就会一直这样保持着。这两个粒子的状态会互相纠缠。测试其中的一个粒子， 就能准确无误地预测另一个粒子的状态。但是量子纠缠似乎违背了爱因斯坦提出的著名的相对论，因为两个粒子之间的距离是没有限制的。如果中午时，你在纽约测量一个粒子，一纳秒后，你在旧金山测试另一个粒子，它们还是会得出同样的测量结果。但是，如果测量这一行为决定了所得的结果，那么第一个粒子，就需要以光速的一千三百万倍的速度向第二个粒子传递某些信息，而相对论认为，这是不可能实现的事情。基于这个理由， 爱因斯坦驳斥这一现象为"spuckafte ferwirklung"，或者说“远距离幽灵行为”。他认为，这一定是因为量子力学本身并不完善，两个粒子一定有一个我们所不知道的先决状态，而量子力学太过肤浅，不足以揭露与解释这一事实。而在尼尔斯·玻尔的带领下, 正统的量子理论支持者们坚称量子状态是真的不可确定，量子纠缠让一个粒子的状态 受另一个粒子的状态的影响，即使它们相隔甚远。物理学因此陷入僵局，直至30年后，约翰·贝尔发现要解决EPR争论，我们应当观测对两个粒子的不同属性的测量。爱因斯坦、波尔多斯基、和罗森的“局域隐变量理论”严格地限定了得到1A或者B0这样的结果的几率，因为结果是可以被提前定义的。贝尔展示了纯粹的量子方法——粒子的状态在测量前是完全不可确定时——有着不同的限制，并以此预测了混合的测量结果，这些结果在粒子状态可预定的情况下不可能存在。贝尔得出检验EPR的理论的方法后，物理学家们照此展开了实验。从70年代的约翰·克劳泽 和80年代早期的阿兰·阿斯佩开始，大量实验检验了EPR预测，并得出了同样的结论：量子力学是正确的。两个互相纠缠的粒子之间的 不确定状态的相关性是真实存在的，而且无法被任何更深层次的变量所解释。那篇EPR论文被证明是错的，但它是个伟大的错误。通过引导物理学家们更深入地思考量子物理的基础，这篇论文使得量子理论得到了进一步的阐述和完善，也推动了对相关课题的研究，比如说量子信息学。这是一个新兴的领域，具有创造出超级电脑的潜力。不幸的是，测量结果的随机性让科幻小说里的场景无法成为现实，比如利用纠缠粒子超光速地传递信息。所以就现在而言，相对论是安全的，但是量子宇宙的奇特之处远远超出爱因斯坦的想像。

**P144 2014-09-26 Is math discovered or invented - Jeff Dekofsky**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=144)

Would mathematics exist if people didn't? Since ancient times, mankind has hotly debated whether mathematics was discovered or invented. Did we create mathematical concepts to help us understand the universe around us, or is math the native language of the universe itself, existing whether we find its truths or not? Are numbers, polygons and equations truly real, or merely ethereal representations of some theoretical ideal? The independent reality of math has some ancient advocates. The Pythagoreans of 5th Century Greece believed numbers were both living entities and universal principles. They called the number one, "the monad," the generator of all other numbers and source of all creation. Numbers were active agents in nature. Plato argued mathematical concepts were concrete and as real as the universe itself, regardless of our knowledge of them. Euclid, the father of geometry, believed nature itself was the physical manifestation of mathematical laws. Others argue that while numbers may or may not exist physically, mathematical statements definitely don't. Their truth values are based on rules that humans created. Mathematics is thus an invented logic exercise, with no existence outside mankind's conscious thought, a language of abstract relationships based on patterns discerned by brains, built to use those patterns to invent useful but artificial order from chaos. One proponent of this sort of idea was Leopold Kronecker, a professor of mathematics in 19th century Germany. His belief is summed up in his famous statement: "God created the natural numbers, all else is the work of man." During mathematician David Hilbert's lifetime, there was a push to establish mathematics as a logical construct. Hilbert attempted to axiomatize all of mathematics, as Euclid had done with geometry. He and others who attempted this saw mathematics as a deeply philosophical game but a game nonetheless. Henri Poincaré, one of the father's of non-Euclidean geometry, believed that the existence of non-Euclidean geometry, dealing with the non-flat surfaces of hyperbolic and elliptical curvatures, proved that Euclidean geometry, the long standing geometry of flat surfaces, was not a universal truth, but rather one outcome of using one particular set of game rules. But in 1960, Nobel Physics laureate Eugene Wigner coined the phrase, "the unreasonable effectiveness of mathematics," pushing strongly for the idea that mathematics is real and discovered by people. Wigner pointed out that many purely mathematical theories developed in a vacuum, often with no view towards describing any physical phenomena, have proven decades or even centuries later, to be the framework necessary to explain how the universe has been working all along. For instance, the number theory of British mathematician Gottfried Hardy, who had boasted that none of his work would ever be found useful in describing any phenomena in the real world, helped establish cryptography. Another piece of his purely theoretical work became known as the Hardy-Weinberg law in genetics, and won a Nobel prize. And Fibonacci stumbled upon his famous sequence while looking at the growth of an idealized rabbit population. Mankind later found the sequence everywhere in nature, from sunflower seeds and flower petal arrangements, to the structure of a pineapple, even the branching of bronchi in the lungs. Or there's the non-Euclidean work of Bernhard Riemann in the 1850s, which Einstein used in the model for general relativity a century later. Here's an even bigger jump: mathematical knot theory, first developed around 1771 to describe the geometry of position, was used in the late 20th century to explain how DNA unravels itself during the replication process. It may even provide key explanations for string theory. Some of the most influential mathematicians and scientists of all of human history have chimed in on the issue as well, often in surprising ways. So, is mathematics an invention or a discovery? Artificial construct or universal truth? Human product or natural, possibly divine, creation? These questions are so deep the debate often becomes spiritual in nature. The answer might depend on the specific concept being looked at, but it can all feel like a distorted zen koan. If there's a number of trees in a forest, but no one's there to count them, does that number exist?

**P144 2014-09-26 Is math discovered or invented - Jeff Dekofsky**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=144)

翻译人员: Yuanqing Edberg 校对人员: Cissy Yun如果没有人的存在还会有数学吗？在古时侯，人类就为此热烈地争辩数学到底是被发明的或是被发现的人们创造数学概念是为了 更好得了解周围的世界呢还是数学本就是宇宙的语言，一直存在于这世界上 不管人类的介入或不数字，多边形和对等是真的吗？或只是些空洞的理论概念？数学的独立存在有很多古代支持者五世纪希腊的毕达哥拉斯相信数字既是存活的实体又是宇宙的规则。他们把数字1唤作 ”单子，“ 是所有其它数字的启动器是所有东西的来源数字是大自然的活性剂柏拉图认为 数学概念是具体的数学概念就像宇宙自身一样真实， 不管我们是否意识到它们的存在欧几里德，几何之父， 相信自然本身就是数学定律的物理表现。而有些人却说因为数字并非一定有实体，所以数学的命题绝对不会有它们的真实价值是 基于人类所创立的规则数学是一种 被发明的逻辑练习，在人类的理性的思想之外， 并不会存在它是一种能被大脑识别的 基于某种格式的抽象语言，利用这些模式 在混乱中来发明有用的人为秩序这种理论的支持者 是Leopold Kronecker一位十九世纪德国的数学教授他的信条可在他著名的宣言 中总结如下：“上帝创造了自然数， 除此而外都是人类的工作。“在数学家David Hilbert的一生中，对将数学看做一种逻辑的建树 有很大的推动Hibert曾尝试将所有的数学公理化就像欧几里德在几何上所做的他和其他尝试这件事的数学家把数学 看成是一场深奥的哲学游戏但依旧只是一个游戏。Henri Poincaré,，是 非欧几里德几何之父，他相信非欧几里德几何的存在用于处理非平面的 双曲线和椭圆曲率从而证明欧几里德了的平面几何 这一长时间被认同的理论并不是全部的宇宙真相，只是遵从了游戏规则的一种的结果但在1960年，诺贝尔物理学奖得主 Eugene Wigner创造了名言，“无理的 数学效率，”强烈得灌输了数学得真实存在并且是由人们发现的Wigner指出很多纯粹的数学理论是在真空里发展出来的，常常 无视任何物理现象，这些理论在几十年或几个世纪 后被证明它们仅仅是空空的骨架， 需要进一步地阐述整个宇宙是如何 一直维持运行的。比如，英国数学家 Gottfried Hardy的数字理论，他曾自嘲说， 他的作品在描述实用现象上的价值 没有一件是有用的但是他帮助建立密码学这是他的另一个纯理论成果也变成了著名的遗传学上的 Hardy-Weinberg定律并且赢得了诺贝尔奖。费伯纳齐突破至他最有名的序列是在观察假设的兔群增长时而人类后来发现自然中到处都存在序列，从葵花籽到葵花花瓣的排列以及菠萝的结构，甚至肺中的支气管分支。另外在1850年，伯奈德瑞曼的非欧几里德 成果在一个世纪后， 爱因斯坦用此为模版创立了广义相对论。这儿甚至有着更大的飞跃：数学结的理论，开创的时候是1771年用以描述几何形状的方位，这在二十世纪的后期用来解释DNA，在复制的过程中，如何解开它的螺旋结构这甚至为弦理论提供了关键的解释人类史上一些最有影响力的 数学和科学家们都以令人吃惊的方式倾向于这个说法。所以，数学是一种发明 还是一种发现？是人工的构建或是宇宙的真相？是人类的产物或是自然或 神圣的创造？这些问题让争辩更为深入， 而成为自然的精髓。问题的答案也许在于审视数学时的一个具体概念，但它让所有人都感到像 扭曲的禅宗公案。如果在森林中有很多树， 但没有人去数它们，那么数字会存在吗？

**P145 2014-09-26 The language of lying — Noah Zandan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=145)

"Sorry, my phone died." "It's nothing. I'm fine." "These allegations are completely unfounded." "The company was not aware of any wrongdoing." "I love you." We hear anywhere from 10 to 200 lies a day, and we spent much of our history coming up with ways to detect them, from medieval torture devices to polygraphs, blood-pressure and breathing monitors, voice-stress analyzers, eye trackers, infrared brain scanners, and even the 400-pound electroencephalogram. But although such tools have worked under certain circumstances, most can be fooled with enough preparation, and none are considered reliable enough to even be admissible in court. But, what if the problem is not with the techniques, but the underlying assumption that lying spurs physiological changes? What if we took a more direct approach, using communication science to analyze the lies themselves? On a psychological level, we lie partly to paint a better picture of ourselves, connecting our fantasies to the person we wish we were rather than the person we are. But while our brain is busy dreaming, it's letting plenty of signals slip by. Our conscious mind only controls about 5% of our cognitive function, including communication, while the other 95% occurs beyond our awareness, and according to the literature on reality monitoring, stories based on imagined experiences are qualitatively different from those based on real experiences. This suggests that creating a false story about a personal topic takes work and results in a different pattern of language use. A technology known as linguistic text analysis has helped to identify four such common patterns in the subconscious language of deception. First, liars reference themselves less, when making deceptive statements. They write or talk more about others, often using the third person to distance and disassociate themselves from their lie, which sounds more false: "Absolutely no party took place at this house," or "I didn't host a party here." Second, liars tend to be more negative, because on a subconscious level, they feel guilty about lying. For example, a liar might say something like, "Sorry, my stupid phone battery died. I hate that thing." Third, liars typically explain events in simple terms since our brains struggle to build a complex lie. Judgment and evaluation are complex things for our brains to compute. As a U.S. President once famously insisted: "I did not have sexual relations with that woman." And finally, even though liars keep descriptions simple, they tend to use longer and more convoluted sentence structure, inserting unnecessary words and irrelevant but factual sounding details in order to pad the lie. Another President confronted with a scandal proclaimed: "I can say, categorically, that this investigation indicates that no one on the White House staff, no one in this administration presently employed was involved in this very bizarre incident." Let's apply linguistic analysis to some famous examples. Take seven-time Tour de France winner Lance Armstrong. When comparing a 2005 interview, in which he had denied taking performance-enhancing drugs to a 2013 interview, in which he admitted it, his use of personal pronouns increased by nearly 3/4. Note the contrast between the following two quotes. First: "Okay, you know, a guy in a French, in a Parisian laboratory opens up your sample, you know, Jean-Francis so-and-so, and he tests it. And then you get a phone call from a newspaper that says: 'We found you to be positive six times for EPO." Second: "I lost myself in all of that. I'm sure there would be other people that couldn't handle it, but I certainly couldn't handle it, and I was used to controlling everything in my life. I controlled every outcome in my life." In his denial, Armstrong described a hypothetical situation focused on someone else, removing himself from the situation entirely. In his admission, he owns his statements, delving into his personal emotions and motivations. But the use of personal pronouns is just one indicator of deception. Let's look at another example from former Senator and U.S. Presidential candidate John Edwards: "I only know that the apparent father has said publicly that he is the father of the baby. I also have not been engaged in any activity of any description that requested, agreed to, or supported payments of any kind to the woman or to the apparent father of the baby." Not only is that a pretty long-winded way to say, "The baby isn't mine," but Edwards never calls the other parties by name, instead saying "that baby," "the woman," and "the apparent father." Now let's see what he had to say when later admitting paternity: "I am Quinn's father. I will do everything in my power to provide her with the love and support she deserves." The statement is short and direct, calling the child by name and addressing his role in her life. So how can you apply these lie-spotting techniques to your life? First, remember that many of the lies we encounter on a daily basis are far less serious that these examples, and may even be harmless. But it's still worthwhile to be aware of telltale clues, like minimal self-references, negative language, simple explanations and convoluted phrasing. It just might help you avoid an overvalued stock, an ineffective product, or even a terrible relationship.

**P145 2014-09-26 The language of lying — Noah Zandan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=145)

翻译人员: Justine Bai 校对人员: Qiwen Lu“抱歉，我的电话没电了。”“没什么，我很好。”以上这些都毫无根据。“本公司对此事故并不知情。”我爱你。我们每天能听见100到200个谎言，又花了很长时间来辨别它们。从中世纪的刑具到测谎仪，血压、呼吸频率、语音应力分析仪、眼动仪、红外大脑扫描仪，甚至还有重达400磅 用来测脑电图的机器。这些工具在某些情况下能够起作用，但准备充分还是能骗过其中大多数，并且它们都没有可靠到能被法庭接受。但如果问题不在技术上，而在说谎会引发生理变化 这一假设上呢？如果我们更直接，运用传播学分析谎言本身呢？从心理学角度，说谎部分是因为想营造更好的自己，让我们成为自己幻想中的样子，而不是本来的模样。在我们的大脑忙着做梦时，会有一些电流划过。意识只能控制5%的认知功能，包括交流，剩下的95%都不被我们察觉。根据对文学创作时大脑的现实监控，基于想象的故事同基于真实经历的故事有很大不同。这表明编一个和本人相关的故事很费劲，并使用了不同的语言模式。语言文本分析让我们识别出潜意识欺骗中四种常见的模式。一 说谎者在撒谎时很少提及自己，更多是描写或谈论他人，经常使用第三人称，使自己远离所编的谎话，这听起来更像假的了。“这房子里绝对没开过party。”“我可没在这儿办party。”二 说谎者总会否定，因为潜意识里，他们对谎言感到羞愧。比如，说谎者可能会说：“抱歉，我手机没电了，烦死了。”三 说谎者会在描述时非常简略。因为我们的大脑正纠结着编一个复杂的谎，判断和评估对大脑来说是复杂运算。就像一位美国总统曾说的那样：“我没有同那个女人发生性关系。”最后 虽然说谎者试图简略描绘，但他们常用长且复杂的句式，加入不必要的词语，不相关但冠冕堂皇的细节来补充谎言。另一位总统在否认丑闻时宣称：“我可以明确地讲，这项调查表明没有任何白宫工作人员或是政府官员涉及这一荒唐的事件。“我们在用语言分析看看其他著名案例。来看看七届环法冠军兰斯·阿姆斯特朗。在2005年的采访中，他否认服用兴奋剂。在2013年的采访中他承认这一点时，3/4的话都使用了人称代词。注意比较下面这两句话。第一句 “好吧 ，一个法国人在巴黎的实验室公开了你的样本，是叫让 - 弗朗西斯吧，他做了测试。然后你接到一家报社的电话说：我们发现你尿检四次都是阳性。”第二句 “我在那时失控了。我确信会有其他人控制不住。我当时肯定是没控制住。我以前一直能掌控生活中的一切，掌控所有结果。”否认时，阿姆斯特朗描述了一个假定的场景，集中在别人身上，从整个场景中移除了自己。承认时，他有了自己的立场，发掘内心的情感和动机。但是，人称的使用也可能代表欺骗。让我们来看看另一个例子，来自美国总统候选人约翰·爱德华兹。“我只知道那个明显是孩子父亲的人曾公开表明自己是孩子的父亲。我未涉及任何欺骗活动或是要求、同意、支持给那个女人或孩子父亲一笔钱。”这算是“这孩子不是我的”的超长表达法。爱德华兹从来没用名字称呼所涉及的人物，而是说“那孩子”“那个女人”“那个父亲”。现在我们看看他在承认自己身份时说的话：“我是奎恩的爸爸。我会竭尽全力给予她应得的爱和支持。”这段话简短明了。称呼孩子的名字，加入了他在她生命中的角色。现在你在生活中该如何运用这项技能侦破谎言呢？记住我们日常听到的谎话大多远没有上面那些例子严肃，有些甚至是无害的。但依然值得发现谎言的苗头。比如一些小的自我引用消极的话语，简单的解释和令人费解的措辞。这也许会避免你高估一支股票，一个没什么用处的产品，或是一段糟糕的感情。

**P146 2014-09-26 The unexpected math behind Van Gogh's 'Starry Night' - Natalya St. Cl**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=146)

One of the most remarkable aspects of the human brain is its ability to recognize patterns and describe them. Among the hardest patterns we've tried to understand is the concept of turbulent flow in fluid dynamics. The German physicist Werner Heisenberg said, "When I meet God, I'm going to ask him two questions: why relativity and why turbulence? I really believe he will have an answer for the first." As difficult as turbulence is to understand mathematically, we can use art to depict the way it looks. In June 1889, Vincent van Gogh painted the view just before sunrise from the window of his room at the Saint-Paul-de-Mausole asylum in Saint-Rémy-de-Provence, where he'd admitted himself after mutilating his own ear in a psychotic episode. In "The Starry Night," his circular brushstrokes create a night sky filled with swirling clouds and eddies of stars. Van Gogh and other Impressionists represented light in a different way than their predecessors, seeming to capture its motion, for instance, across sun-dappled waters, or here in star light that twinkles and melts through milky waves of blue night sky. The effect is caused by luminance, the intensity of the light in the colors on the canvas. The more primitive part of our visual cortex, which sees light contrast and motion, but not color, will blend two differently colored areas together if they have the same luminance. But our brains' primate subdivision will see the contrasting colors without blending. With these two interpretations happening at once, the light in many Impressionist works seems to pulse, flicker and radiate oddly. That's how this and other Impressionist works use quickly executed prominent brushstrokes to capture something strikingly real about how light moves. Sixty years later, Russian mathematician Andrey Kolmogorov furthered our mathematical understanding of turbulence when he proposed that energy in a turbulent fluid at length R varies in proportion to the 5/3rds power of R. Experimental measurements show Kolmogorov was remarkably close to the way turbulent flow works, although a complete description of turbulence remains one of the unsolved problems in physics. A turbulent flow is self-similar if there is an energy cascade. In other words, big eddies transfer their energy to smaller eddies, which do likewise at other scales. Examples of this include Jupiter's Great Red Spot, cloud formations and interstellar dust particles. In 2004, using the Hubble Space Telescope, scientists saw the eddies of a distant cloud of dust and gas around a star, and it reminded them of Van Gogh's "Starry Night." This motivated scientists from Mexico, Spain and England to study the luminance in Van Gogh's paintings in detail. They discovered that there is a distinct pattern of turbulent fluid structures close to Kolmogorov's equation hidden in many of Van Gogh's paintings. The researchers digitized the paintings, and measured how brightness varies between any two pixels. From the curves measured for pixel separations, they concluded that paintings from Van Gogh's period of psychotic agitation behave remarkably similar to fluid turbulence. His self-portrait with a pipe, from a calmer period in Van Gogh's life, showed no sign of this correspondence. And neither did other artists' work that seemed equally turbulent at first glance, like Munch's "The Scream." While it's too easy to say Van Gogh's turbulent genius enabled him to depict turbulence, it's also far too difficult to accurately express the rousing beauty of the fact that in a period of intense suffering, Van Gogh was somehow able to perceive and represent one of the most supremely difficult concepts nature has ever brought before mankind, and to unite his unique mind's eye with the deepest mysteries of movement, fluid and light.

**P146 2014-09-26 The unexpected math behind Van Gogh's 'Starry Night' - Natalya St. Cl**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=146)

翻译人员: Sunny Wang 校对人员: Qingqing Mao人脑最神奇的功能之一就是识别出模式并把其描述出来的能力。流体动力学里湍流的概念就是我们探求过的最艰深的模式之一。德国物理学家维尔纳·海森伯格曾说，“如果我碰到上帝，我会问他两个问题：为什么创造相对论？为什么创造湍流？我相信他会对前者有个解释。”因为用数学去理解湍流太困难，我们可以用艺术来描绘它的样子。1899年6月，文森特·梵高在他位于普罗旺斯圣雷米的圣保罗疗养院的房间里，透过窗户画下了日出前的景象。在一次精神病发作中，他自残耳朵，之后便自愿进入疗养院。在《星夜》中，他旋转的画笔创造了一个满是旋转的星云的夜空。梵高和其他印象派画家对光线的表达 采用了不同于前辈们的方法。他们好似能捕捉光线的动感，比如通过波光粼粼的水面表现光的跃动，又如在《星夜》里用深蓝夜空中乳白色的波动来表现星星的闪烁。这种效果源于亮度的不同，即画布上不同颜色反光强度的不同。我们视觉皮层中较初级的部分能区分光强以及感知光的运动但不能感知颜色，所以如果两个不同颜色的色块有相同的亮度，就会被混在一起。可是我们大脑中的灵长类部分能把不同颜色区分开来。当这两种功能同时发生，印象派的画作便流光溢彩地闪烁、跳跃了起来。梵高等印象派画家就是这样用犀利的笔触捕捉了光的动感，使得画作栩栩如生。六十年后，俄国数学家安德雷·柯尔莫哥洛夫推进了我们对湍流的数学理解。他提出：长度为R的湍流的能量与R的三分之五次幂成正比。实验测量显示柯尔莫哥洛夫的结果与湍流的实际运动规律极其近似。然而，物理学界至今也未能完全地描述湍流。湍流是在不同能级上是自相似的，也就是说，大的涡流会把能量传给小的涡流，后者只是前者的缩小版。这样的例子包括：木星的大红斑、云的形成以及星际尘埃。2004年，通过哈勃太空望远镜科学家观测到一颗遥远恒星周围的气体和尘埃云。这让他们想到了梵高的《星夜》。受到启发的墨西哥、西班牙和英国科学家们决定详细地研究梵高画作中的亮度。他们发现：梵高的许多画作中都隐藏着显著的与柯氏方程相近的湍流结构的模式。研究者们把画作数字化，然后测量不同像素间的亮度差异。从反应像素分离的曲线中他们得出结论：梵高精神焦虑时期的画作中表现出了与湍流极其相似的特性。他病情较稳定时期的那副拿着烟斗的自画像则并未出现类似现象。其他艺术家那些第一眼看起来 像是有湍流的作品亦是如此，比如蒙克的《尖叫》。虽然我们不能就这样说梵高具有描绘湍流的天赋。但是有一个美丽的事实同样难以解释清楚：在极度的痛苦中，梵高不可思议地认识并表现出一种在人类之前就已出现的极其深奥的概念，并用他独特的想象力去感受流光动影的终极秘密。

**P147 2014-10-01 Light seconds, light years, light centuries - How to measure extreme**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=147)

Light is the fastest thing we know. It's so fast that we measure enormous distances by how long it takes for light to travel them. In one year, light travels about 6,000,000,000,000 miles, a distance we call one light year. To give you an idea of just how far this is, the Moon, which took the Apollo astronauts four days to reach, is only one light-second from Earth. Meanwhile, the nearest star beyond our own Sun is Proxima Centauri, 4.24 light years away. Our Milky Way is on the order of 100,000 light years across. The nearest galaxy to our own, Andromeda, is about 2.5 million light years away Space is mind-blowingly vast. But wait, how do we know how far away stars and galaxies are? After all, when we look at the sky, we have a flat, two-dimensional view. If you point you finger to one star, you can't tell how far the star is, so how do astrophysicists figure that out? For objects that are very close by, we can use a concept called trigonometric parallax. The idea is pretty simple. Let's do an experiment. Stick out your thumb and close your left eye. Now, open your left eye and close your right eye. It will look like your thumb has moved, while more distant background objects have remained in place. The same concept applies when we look at the stars, but distant stars are much, much farther away than the length of your arm, and the Earth isn't very large, so even if you had different telescopes across the equator, you'd not see much of a shift in position. Instead, we look at the change in the star's apparent location over six months, the halfway point of the Earth's yearlong orbit around the Sun. When we measure the relative positions of the stars in summer, and then again in winter, it's like looking with your other eye. Nearby stars seem to have moved against the background of the more distant stars and galaxies. But this method only works for objects no more than a few thousand light years away. Beyond our own galaxy, the distances are so great that the parallax is too small to detect with even our most sensitive instruments. So at this point we have to rely on a different method using indicators we call standard candles. Standard candles are objects whose intrinsic brightness, or luminosity, we know really well. For example, if you know how bright your light bulb is, and you ask your friend to hold the light bulb and walk away from you, you know that the amount of light you receive from your friend will decrease by the distance squared. So by comparing the amount of light you receive to the intrinsic brightness of the light bulb, you can then tell how far away your friend is. In astronomy, our light bulb turns out to be a special type of star called a cepheid variable. These stars are internally unstable, like a constantly inflating and deflating balloon. And because the expansion and contraction causes their brightness to vary, we can calculate their luminosity by measuring the period of this cycle, with more luminous stars changing more slowly. By comparing the light we observe from these stars to the intrinsic brightness we've calculated this way, we can tell how far away they are. Unfortunately, this is still not the end of the story. We can only observe individual stars up to about 40,000,000 light years away, after which they become too blurry to resolve. But luckily we have another type of standard candle: the famous type 1a supernova. Supernovae, giant stellar explosions are one of the ways that stars die. These explosions are so bright, that they outshine the galaxies where they occur. So even when we can't see individual stars in a galaxy, we can still see supernovae when they happen. And type 1a supernovae turn out to be usable as standard candles because intrinsically bright ones fade slower than fainter ones. Through our understanding of this relationship between brightness and decline rate, we can use these supernovae to probe distances up to several billions of light years away. But why is it important to see such distant objects anyway? Well, remember how fast light travels. For example, the light emitted by the Sun will take eight minutes to reach us, which means that the light we see now is a picture of the Sun eight minutes ago. When you look at the Big Dipper, you're seeing what it looked like 80 years ago. And those smudgy galaxies? They're millions of light years away. It has taken millions of years for that light to reach us. So the universe itself is in some sense an inbuilt time machine. The further we can look back, the younger the universe we are probing. Astrophysicists try to read the history of the universe, and understand how and where we come from. The universe is constantly sending us information in the form of light. All that remains if for us to decode it.

**P147 2014-10-01 Light seconds, light years, light centuries - How to measure extreme**

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翻译人员: Amaranta Heredia Jaén 校对人员: Qingqing Mao光是我们所知道的传播速度最快的物质。正因为光如此之快的传播速度， 我们就用光走过的时间，来描述那些十分遥远的距离的。光在一年中传播的距离大概是六万亿英里，我们称这个距离为一光年。现在我们来举例说明一光年的距离究竟有多远。阿波罗宇航员用时四天登上了月球，而光从月亮到地球只需要一秒钟。另外，比邻星——离太阳系最近的恒星，离我们有4.24光年远。我们所在的银河系的直径大概是十万光年。离我们最近的星系，仙女座星系，离我们有250万光年。我们根本无法想象宇宙之大。但是，我们是如何知道恒星和星系的距离的呢？每当我们抬头看天空， 我们所见的只是一个二维平面视图。当你伸手指向某一颗星星时， 你无法得知这颗星星离你到底有多远。那么天体物理学家们如何得知距离呢？对于离我们比较近的星体，我们只需要用三角视差来估算距离。这个理论很简单。只需要做一个小实验就可以说明。伸出你的大拇指，然后闭上你的左眼。现在，闭上你的左眼，同时睁开你的右眼。你会发现你的大拇指好像移动了。但是相对遥远的背景里的物体却没有动。这个理论同样适用于看恒星的时候。但是恒星离我们的距离相比于 我们胳膊的长度不知道长了多少倍，而且相对来说，地球也不是很大的星体。所以即使你在赤道两边用不同的望远镜观测同一颗星体，你也很难看到这颗星体位置的移动。为了解决这个问题， 我们改为观察六个月内星体位置的移动。这个时间刚好是地球绕太阳轨道旋转半周的时间。我们在夏天观测恒星的相对位置，等到了冬天再观测时，就像我们在用另外一只眼睛看它。离我们近的恒星似乎移动了位置。而遥远距离的恒星和星系保持不动。但是此方法只适用于距离不超过几千光年的天体。在我们的星系之外，其他的天体如此之远，以至于视差太小了， 连最精密的仪器也无法测得。所以，我们必须找到别的办法。这个办法叫标准烛光法。标准烛光是天文学中已经知道光度的天体。打个比方，如果你知道你自家灯泡的亮度，然后你让别人拿着那只灯泡向远离你的方向走去。你知道你看到的灯泡的亮度是以他走的距离的平方在减弱的。所以通过比较你看到的灯泡的亮度和灯泡的原始亮度，你可以计算出他距你有多远。应用到天文学中， 你的灯泡就变成了一些特殊的天体——造父变星。这些星星的内部不是很稳定，就像一只一会儿鼓起来一会儿扁下去的气球。它们的亮度随着膨胀和收缩而变化。我们可以通过它们膨胀收缩的周期来计算它们的亮度。越亮的星星，这个周期越长。通过比较观测到的这些恒星的亮度和我们计算出来的它们原始的亮度，我们就可以知道它们距离我们有多远。可惜，这个方法也有它的局限性。用这个方法，我们只能测量到距离我们 不超过四千万光年的独立的恒星。超过这个距离的恒星会变得太模糊而无法分辨。不过幸运的是，我们还有另一种标准烛光。著名的Ia型超新星。超新星爆发，也就是巨型恒星爆炸， 是恒星死亡的方式之一。这些爆炸是非常亮的。它发生的时候可以照亮整个星系。所以即使我们无法分辨星系中独立的恒星，我们还是可以看到超新星爆发。Ia型超新星被证明是可用的标准烛光。本征亮度较亮的超新星， 其亮度衰减的速率较慢。凭借我们对超新星的亮度和衰减速率的关系的了解，我们可以用这些超新星来测量离我们几十亿光年远的天体。可是我们为什么要观测这么遥远的天体呢？回答这个问题要回到光的传播速度上。光从太阳传播到地球，需要八分钟，这就意味着，我们看到的太阳 是八分钟前太阳的样子。当我们看北斗星时，我们看到的是北斗星80年前的样子。那些朦胧的星系呢？它们距离我们数百万光年。来自它们的光需要传播数百万年才能到达地球。所以我们的宇宙从某种程度上来说 是一个内置时光机。我们看得越远，我们越接近宇宙刚开始的样子。天体物理学家们试图研究宇宙的历史来解答我们如何而来以及我们从哪里来。宇宙不断地以光的形式给我们发送信息，剩下的就等我们来解读。

**P148 2014-10-02 A different way to visualize rhythm - John Varney**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=148)

We usually think of rhythm as an element of music, but it's actually found everywhere in the world around us, from the ocean tides to our own heartbeats, rhythm is essentially an event repeating regularly over time. Even the ticking of a clock itself is a sort of rhythm. But for musical rhythm, a steady string of repeating single beats is not enough. For that, we need at least one opposing beat with a different sound, which can be the unstressed off beat or the accented back beat. There are several ways to make these beats distinct, whether by using high and low drums, or long and short beats. Which ends up being heard as the main beat is not a precise rule, but like the famous Rubin's vase, can be reversed depending on cultural perception. In standard notation, rhythm is indicated on a musical bar line, but there are other ways. Remember that ticking clock? Just as its round face can trace the linear passage of time, the flow of rhythm can be traced in a circle. The continuity of a wheel can be a more intuitive way to visualize rhythm than a linear score that requires moving back and forth along the page. We can mark the beats at different positions around the circle using blue dots for main beats, orange ones for off beats, and white dots for secondary beats. Here is a basic two beat rhythm with a main beat and an opposing off beat. Or a three beat rhythm with a main beat, an off beat, and a secondary beat. And the spaces between each beat can be divided into further sub-beats using multiples of either two or three. Layering multiple patterns using concentric wheels lets us create more complex rhythms. For example, we can combine a basic two beat rhythm with off beats to get a four beat system. This is the recognizable backbone of many genres popular around the world, from rock, country, and jazz, to reggae and cumbia. Or we can combine a two beat rhythm with a three beat one. Eliminating the extra main beat and rotating the inner wheel leaves us with a rhythm whose underlying feel is three-four. This is the basis of the music of Whirling Dervishes, as well as a broad range of Latin American rhythms, such as Joropo, and even Bach's famous Chaconne. Now if we remember Rubin's vase and hear the off beats as the main beats, this will give us a six-eight feel, as found in genres such as Chacarera, and Quechua, Persian music and more. In an eight beat system, we have three layered circles, each rhythm played by a different instrument. We can then add an outermost layer consisting of an additive rhythmic component, reinforcing the main beat and increasing accuracy. Now let's remove everything except for this combined rhythm and the basic two beat on top. This rhythmic configuration is found as the Cuban cinquillo, in the Puerto Rican bomba, and in Northern Romanian music. And rotating the outer circle 90 degrees counterclockwise gives us a pattern often found in Middle Eastern music, as well as Brazilian choro, and Argentinian tango. In all of these examples, the underlying rhythm reinforces the basic one-two, but in different ways depending on arrangement and cultural context. So it turns out that the wheel method is more than just a nifty way of visualizing complex rhythms. By freeing us from the tyranny of the bar line, we can visualize rhythm in terms of time, and a simple turn of the wheel can take us on a musical journey around the world.

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翻译人员: Jinyuan Liu 校对人员: Cora Liu我们总是认为， 节奏只是组成音乐的一个元素，但事实上，从海洋的潮汐， 到我们自身的心跳，节奏无处不在，节奏的本质， 是随着时间有规律地重复着的事件。即使是时钟的嘀嗒声， 也是一种节奏。但是音乐中所用到的节奏，并不只是一个节拍平稳而单一的线性重复。至少要有一个不同声音的拍子与之相对，那可以是一个轻柔的弱拍， 也可以是一个加重的强拍，有几种方法可以让这些拍子各不相同，比如用高低鼓制造不同的声音， 或者用不同的时长制造出长短拍。“结束拍听上去像主拍” 并不是一个准确的规则，就像著名的鲁宾之杯一样，不同的文化对 节奏的规则有不同的定义和理解。在标准的标记系统中， 五线谱上方的横条表示节拍，但是有其它方法可以表达节奏。记得那些滴滴答答的时钟么？既然圆形的钟面可以用于 表达线形的时间,圆环也可以用来表示线性的节奏。相对于需要来回翻页的谱子,一个连续转动的轮子更能直观地 将节奏视觉化。我们在圆轮上的不同位置标记节拍,蓝色的点表示主拍， 橙色的点表示弱拍，白色的点表示次级拍。这就是一个基本的二拍节奏： 一个主拍和一个相对应的弱拍。或者一个三拍的节奏： 一个主拍，一个弱拍，和一个次级拍而每个节拍之间的空间， 可以进一步地以2或者3的倍数分割以嵌入副拍。我们可以用分层同心环 来表示多种的节奏模式的叠加，从而创造出更多复杂的节奏。比如，我们可以将一个基础的 两拍节奏和两个弱拍结合，得到一个四拍节奏。不难发现，世界上流行的很多 音乐类型都使用这个节奏，比如摇滚乐，乡村音乐，爵士乐，雷鬼音乐，比亚舞曲。我们也可以将一个两拍节奏 和一个三拍节奏结合，去掉多余的主拍， 并转动内侧的同心轮，我们会得到一个感觉 像是三四拍的节奏。这就是回旋舞的基础节奏，也是大量拉美音乐中的节奏，比如霍洛波舞曲，甚至巴赫所写的著名的夏康舞曲。现在，如果我们还记得鲁宾之杯 ——将弱拍听作主拍，我们将得到一个六八拍的节奏，这一节奏被运用于恰卡雷拉曲，凯楚阿曲，波斯音乐和其他音乐类型中。构成一个八拍节奏， 我们需要三层同心圆，每一层的节奏都 由不同的乐器演奏。我们可以在最外面再加上一层，构成一个额外的节奏部分，以加强主拍， 并提高节奏的准确性。现在让我们只保留这个组合节奏，和顶端的两个基础的主拍。在古巴音乐中， 这个节拍配置是常见的节奏单位，它也被运用于波多黎各的邦巴曲，和北罗马尼亚音乐。将外层的圆环逆时针旋转90度，则是一个经常在中东音乐中出现的节奏，它也经常出现在巴西科洛曲中，和阿根廷探戈中。以上所有例子中的节奏， 本质上都是对基础一二拍的加强，但由于组合和文化语境的差异， 加强方式有所不同。所以，圆轮并不仅仅是一个 将复杂的节奏视觉化的机灵方法，圆轮将我们从横条的粗暴表达中解放出来，我们可以用时间来视觉化节奏，只要简单地旋转圆轮，我们就可以进行音乐的环球旅行。

**P149 2014-10-02 How do we study the stars - Yuan-Sen Ting**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=149)

The city sky is, frankly, rather boring. If you look up at the patches of murk between buildings, you might be able to pick out The Big Dipper, or perhaps, Orion's Belt. But hold on. Look at that murky patch again and hold our your thumb. How many stars do you think are behind it? Ten, twenty? Guess again. If you looked at that thumbnail-sized patch of sky with the Hubble Space Telescope, instead of points of light, you'd see smudges. These aren't stars. They're galaxies, just like our Milky Way. Cities of billions of stars, and more than 1,000 of them are hidden behind your thumb. The universe is bigger than you can see from the city, and even bigger than the starry sky you can see from the countryside. This is the universe as astrophysicists see it, with more stars than all the grains of sand on Earth. By staring up at the stars at night, you've taken part in the oldest science in human history. The study of the heavens is older than navigation, agriculture, perhaps even language itself. Yet unlike other sciences, astronomy is purely observational. We cannot control the parameters of our experiments from lab benches. Our best technology can send man to the moon, and probes to the edge of the solar system. But these distances are vanishingly small compared to the yawning gulfs between stars. So how can we know so much about other galaxies, what they're made of, how many there are, or that they're even there at all? Well, we can start with the first thing we see when we look up at night: the stars. What we are trying to learn is their properties. What are they made of? How hot are they? How massive? How old? How far are they from Earth? And believe it or not, we can learn all of these things simply from the light shining in the sky. We can decipher one kind of stellar message by turning starlight into rainbows. When you look at a rainbow on Earth, you're really looking at light from our Sun being scattered through water droplets in the atmosphere into all the different wavelengths that make it up. And we study the light from other stars, we can create rainbows on demand using not water droplets, but other specific instruments that disperse light. When we look at the scattered light from our sun, we see something strange: dark lines in our rainbow. These lines are the characteristic fingerprints of atoms. Each type of atom in the solar atmosphere soaks up light at specific wavelengths, and the amount of absorption depends on how many of these atoms there are. So by observing how much light is missing at these characteristic wavelengths, we can tell not only what elements are in the Sun's atmosphere, but even their concentrations. And the same idea can be applied to study other stars. Make a spectral rainbow, see what's missing, and figure out which elements are present. Bingo. Now you know what stars are made of. But we aren't restricted to just the wavelengths that our eyes perceive. Consider radio waves. Yes, they can bring the Billboard Top 100 to your car, but they can also travel almost unimpeded through space. Because they've come so far, radio waves can tell us the very early history of the universe, from just a few thousand years after The Big Bang. We can also study the infrared light, emitted by colder objects, like the gas and dust clouds in space, and the ultraviolet light from the hot stars recently born from those clouds. Studying different wavelengths not only gives us a more complete picture of any single object but also different views of the universe. For this reason, astrophysicists use several different kinds of telescopes covering the spectrum from the infrared to the ultraviolet to the X-ray, from giant radio dishes to giant silver mirrors to space satellites, detecting light that would be otherwise blocked by the Earth's atmosphere. Astrophysicists don't just see the billions of stars among the billions of galaxies in the universe. They hear, feel and sense them through many channels, each revealing a different story. But it all begins with light, the kind we can see and the kind we can't. Want to know the secrets of the Universe? Just follow the light.

**P149 2014-10-02 How do we study the stars - Yuan-Sen Ting**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=149)

翻译人员: jam Scofield 校对人员: Qiwen Lu坦率地说 这个城市的天空相当无聊如果你仰望楼与楼之间昏暗的斑点你也许能够找出那北斗七星又或者是猎户座的区域但是 且慢你再看一次那昏暗的斑点 然后举起你的拇指你认为有多少星星在你拇指的背后呢十？二十？再猜一次如果你用哈勃太空望远镜观察那天空中拇指大小的斑点你看到的将不是光点 而是“浓烟”它们不是星星它们是银河 就像我们的银河系如繁星般多的城市当中就有超过1000个城市隐藏我你的拇指后面宇宙比我们在城市中所能看到的更大甚至比你在乡村中看到的星空还大它有着比地球是的沙粒还多的星星这就是作为一个天体物理学家所看到的宇宙通过整晚盯着那些星星你已经参与进了人类历史上最古老的科学研究关于天的研究远远早于关于航海和农业的研究 甚至比语言本身的研究还早然而 天文学不同于其它科学 它是纯粹的观察我们无法坐在实验室的长凳上掌控实验的参数运用我们最好的科技 我们可以把人送上月球以及探索太阳系的边缘但相比于裂口海湾恒星之间的距离这些距离是微乎其微的所以 我们怎样才能更多地了解其它星系？它们是由什么构成的 它们的数量是多少 又或者它们甚至不在那个地方好了 当我们在夜空中仰望星星时 我们可以开始想的第一件事是我们正在努力研究的是它们的特性它们由什么构成？有多热？有多大？存在多久了？它们离地球多远？而且 不管你信不信我们可以简单地从天空中的星光得知这些答案通过将星光变为彩虹 我们可以破译一种恒星的信息当你在地球上看彩虹你看到的是来自太阳的光光在大气中被水珠散射形成各种不同的波长 从而产生彩虹我们通过学习来自其它恒星的光无需水珠我们也可以根据我们的要求来创造一条彩虹但其它有特效的仪器会把光分散当我们在看从太阳射出的光线时我们注意到有一些奇怪的黑线出现在彩虹中这些线的原子特有的指纹太阳大气中的每一种原子在不同的波长中都吸收了光线而吸收的量则取决于那里有多少这种类型的原子所以 通过观察在这些特定的波长中有多少光丢失了我们不仅可以告诉你在太阳大气中有什么元素甚至能够告诉你它们的浓度同样的方法可以应用于研究其它恒星做一个彩虹的光谱 看看哪些元素消失了然后找出哪些元素还存在你猜对了 现在你知道了恒星是由什么组成的了但我们的研究并不局限于人眼所能看见的波长想一想无线电波对的 它们可以把最受欢迎的前一百个广告带到你的车子里同时它们也可以中几乎无阻地在空间中穿行因为它们已经走了很远了无线电波可以告诉我们关于那段宇宙在大爆炸后几千年的早期的历史我们也可以研究由低温物体发出的红外光比如太空中的气体和尘埃云以及研究那些最近才从尘埃云中诞生的发热星体所发出的紫外光通过研究不同的波长 我们不仅能够对任何单一事物形成更全面的了解也能多角度地了解宇宙正因如此 天文学家们在太空中的巨型收音仪器、巨型银镜和太空卫星中使用了几种不同类型的望远镜其观察范围覆盖了红外线、紫外线以及X射线其观察范围覆盖了红外线、紫外线以及X射线尽可能多地去检测它们 因为它们会被地球的大气层阻隔在外天体物理学家不能只看到宇宙数十亿星系中的十亿颗恒星通过不同的渠道 他们可以听得到、触得到以及感觉得到恒星们各自揭示出来的不同的故事但这一切都源自光 包括我们看得见的和看不见的光你想知道宇宙的秘密吗？只需跟着光走就行了

**P150 2014-10-03 How do vitamins work - Ginnie Trinh Nguyen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=150)

A, C, E, D, B, K. No, this isn't some random, out of order alphabet. These are vitamins, and just like letters build words, they're the building blocks that keep the body running. Vitamins are organic compounds we need to ingest in small amounts to keep functioning. They're the body's builders, defenders and maintenance workers, helping it to build muscle and bone, make use of nutrients, capture and use energy and heal wounds. If you need convincing about vitamin value, just consider the plight of olden day sailors, who had no access to vitamin-rich fresh produce. They got scurvy. But vitamin C, abundant in fruits and vegetables, was the simple antidote to this disease. While bacteria, fungi and plants produce their own vitamins, our bodies can't, so we have to get them from other sources. So how does the body get vitamins from out there into here? That's dependent on the form these compounds take. Vitamins come in two types: lipid-soluble and water-soluble, and the difference between them determines how the body transports and stores vitamins, and gets rid of the excess. The water-solubles are vitamin C and B Complex vitamins that are made up of eight different types that each do something unique. These are dissolved in the watery parts of fruits, vegetables and grains, meaning their passage through the body is relatively straightforward. Once inside the system, these foods are digested and the vitamins within them are taken up directly by the bloodstream. Because blood plasma is water-based, water-soluble vitamins C and B have their transport cut out for them and can move around freely within the body. For lipid-soluble vitamins, dissolved in fat and found in foods like diary, butter and oils, this trip into the blood is a little more adventurous. These vitamins make it through the stomach and the intestine, where an acidic substance called bile flows in from the liver, breaking up the fat and preparing it for absorption through the intestinal wall. Because fat-soluble vitamins can't make use of the blood's watery nature, they need something else to move them around, and that comes from proteins that attach to the vitamins and act like couriers, transporting fat-solubles into the blood and around the body. So, this difference between water- or fat-soluble vitamins determines how they get into the blood, but also how they're stored or rejected from the body. The system's ability to circulate water-soluble vitamins in the bloodstream so easily means that most of them can be passed out equally easily via the kidneys. Because of that, most water-soluble vitamins need to be replenished on a daily basis through the food we eat. But fat-soluble vitamins have staying power because they can be packed into the liver and in fat cells. The body treats these parts like a pantry, storing the vitamins there and rationing them out when needed, meaning we shouldn't overload on this type of vitamin because the body is generally well stocked. Once we figured the logistics of transport and storage, the vitamins are left to do the work they came here to do in the first place. Some, like many of the B Complex vitamins, make up coenzymes, whose job it is to help enzymes release the energy from food. Other B vitamins then help the body to use that energy. From vitamin C, you get the ability to fight infection and make collagen, a kind of tissue that forms bones and teeth and heals wounds. Vitamin A helps make white blood cells, key in the body's defense, helps shape bones and improves vision by keeping the cells of the eye in check. Vitamin D gathers calcium and phosphorus so we can make bones, and vitamin E works as an antioxidant, getting rid of elements in the body that can damage cells. Finally, from Vitamin K, we score the ability to clot blood, since it helps make the proteins that do this job. Without this vitamin variety, humans face deficiencies that cause a range of problems, like fatigue, nerve damage, heart disorders, or diseases like rickets and scurvy. On the other hand, too much of any vitamin can cause toxicity in the body, so there goes the myth that loading yourself with supplements is a great idea. In reality, it's all about getting the balance right, and hitting that vitamin jackpot.

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翻译人员: Sherry Chen 校对人员: Sybil LiA, C, E, D, B, K,不，这不是随机、乱序的字母排序它们是维他命 就像单词是由字母来构成的一样我们身体 是要靠维他命延续的维他命是我们维系生命所需的微量有机混合物它们是身体的建造者、防御者、维护者帮助身体强筋健骨， 利用营养物质，补充能量， 以及治疗伤口如果你需要让人来说服你 维他命的价值那就想一想过去水手们常有的难处他们无法获取含有丰富维他命的新鲜食物而得了坏血病但是，果蔬中富含的维他命C正是此病的简单良药尽管细菌、真菌和植物 都产生它们自身的维他命人体却无法做到这一点 因此我们必须从其他渠道获得维他命那么，人体是如何从外界获取维他命的呢？那要取决于这些混合物的形式维他命往往分为两种类型脂溶性的和水溶性的它们之间的区别 决定了人体将如何运输、储藏维他命 并排出过量的维他命水溶性的便是维他命C和八种不同类型的B族维他命每种类型都有其独特之处这两类维他命溶于水果、蔬菜、 谷物的含水成分也就意味着它们穿过身体的渠道 是相对直截了当的一旦进入了人体系统， 这些食物会被消化而食物中的维他命就会 直接进入血液循环因为血浆的主要成分是水水溶性的维他命C和B族维他命 有了专属的运输通道并能在体内自由移动而脂溶性维他命 则溶解在脂肪中也能在乳制品、黄油和食用油中找到它们进入人体的过程 就稍为“惊险”一些这些维他命通过胃和肠道在此过程中，一种叫“胆汁”的酸性物质 从肝脏中流入分解了脂肪，以备其在肠壁的消化因为脂溶性维他命 无法利用血液中含水的特质它们就需要另外的渠道才能进入人体这渠道就来自于 附着在维他命上的蛋白质像速递一样将脂溶性维他命 传输到血液和身体各处因此，水溶性和脂溶性维他命的区别决定了它们将如何进入血液但也决定了它们会如何被储存 以及从身体中被排出人体系统能够如此简单地传输水溶性维他命意味着它们大多数能够 几乎同样简单地被排出肾脏正因如此 大多水溶性维他命需要通过我们每天吃的食物 被重新补充但是脂溶性维他命能有持久力因为它们能储存于 我们的肝脏和脂肪细胞中这些器官相当于我们身体的储藏室储藏着维他命， 并将它们定额配给给身体这意味着我们不应该 过度摄入这类维他命因为人体内通常有充沛的储存我们一旦了解了维他命 运输和储存的物流过程就能依靠维他命来完成它们原始的使命有些维他命，比如B族， 能生成辅酶它帮助酶从食物中释放出能量其他B族维生素帮助身体 利用这些能量从维生素C中 你能获取抗感染的能力并产生胶原蛋白 生成骨骼、牙齿，及治愈伤口维他命A有助于白血球的形成 它们是身体防御的关键帮助骨骼塑形 并通过控制眼球细胞来提高视力维他命D富含用于骨质生成的钙与磷而维他命E则如同抗氧化剂搞定体内损害细胞的成分最后，维他命K使我们获得凝血能力因为它帮助生成蛋白质 而蛋白质负责凝血功能没有了这么多样化的维生素人体将面临着各种各样的缺陷 会造成各种各样的健康问题比如疲劳，神经受损，心律失常或者佝偻病和坏血病之类的疾病另一方面，过多的维他命 会造成身体中毒因此“多多摄入维他命”这个点子 究竟是好是坏，也就成了个谜实际上，最关键还是要保持营养均衡让体内的维他命发挥最大功效

**P151 2014-10-09 History vs. Christopher Columbus - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=151)

Many people in the United States and Latin America have grown up celebrating the anniversary of Christopher Columbus's voyage, but was he an intrepid explorer who brought two worlds together or a ruthless exploiter who brought colonialism and slavery? And did he even discover America at all? It's time to put Columbus on the stand in History vs. Christopher Columbus. "Order, order in the court. Wait, am I even supposed to be at work today?" <i>Cough</i> "Yes, your Honor. From 1792, Columbus Day was celebrated in many parts of the United States on October 12th, the actual anniversary date. But although it was declared an official holiday in 1934, individual states aren't required to observe it. Only 23 states close public services, and more states are moving away from it completely." <i>Cough</i> "What a pity. In the 70s, we even moved it to the second Monday in October so people could get a nice three-day weekend, but I guess you folks just hate celebrations." "Uh, what are we celebrating again?" "Come on, Your Honor, we all learned it in school. Christopher Columbus convinced the King of Spain to send him on a mission to find a better trade route to India, not by going East over land but sailing West around the globe. Everyone said it was crazy because they still thought the world was flat, but he knew better. And when in 1492 he sailed the ocean blue, he found something better than India: a whole new continent." "What rubbish. First of all, educated people knew the world was round since Aristotle. Secondly, Columbus didn't discover anything. There were already people living here for millennia. And he wasn't even the first European to visit. The Norse had settled Newfoundland almost 500 years before." "You don't say, so how come we're not all wearing those cow helmets?" "Actually, they didn't really wear those either." <i>Cough</i> "Who cares what some Vikings did way back when? Those settlements didn't last, but Columbus's did. And the news he brought back to Europe spread far and wide, inspiring all the explorers and settlers who came after. Without him, none of us would be here today." "And because of him, millions of Native Americans aren't here today. Do you know what Columbus did in the colonies he founded? He took the very first natives he met prisoner and wrote in his journal about how easily he could conquer and enslave all of them." "Oh, come on. Everyone was fighting each other back then. Didn't the natives even tell Columbus about other tribes raiding and taking captives?" "Yes, but tribal warfare was sporadic and limited. It certainly didn't wipe out 90% of the population." "Hmm. Why is celebrating this Columbus so important to you, anyway?" "Your Honor, Columbus's voyage was an inspiration to struggling people all across Europe, symbolizing freedom and new beginnings. And his discovery gave our grandparents and great-grandparents the chance to come here and build better lives for their children. Don't we deserve a hero to remind everyone that our country was build on the struggles of immigrants?" "And what about the struggles of Native Americans who were nearly wiped out and forced into reservations and whose descendants still suffer from poverty and discrimination? How can you make a hero out of a man who caused so much suffering?" "That's history. You can't judge a guy in the 15th century by modern standards. People back then even thought spreading Christianity and civilization across the world was a moral duty." "Actually, he was pretty bad, even by old standards. While governing Hispaniola, he tortured and mutilated natives who didn't bring him enough gold and sold girls as young as nine into sexual slavery, and he was brutal even to the other colonists he ruled, to the point that he was removed from power and thrown in jail. When the missionary, Bartolomé de las Casas, visited the island, he wrote, 'From 1494 to 1508, over 3,000,000 people had perished from war, slavery and the mines. Who in future generations will believe this?'" "Well, I'm not sure I believe those numbers." "Say, aren't there other ways the holiday is celebrated?" "In some Latin American countries, they celebrate the same date under different names, such as Día de la Raza. In these places, it's more a celebration of the native and mixed cultures that survived through the colonial period. Some places in the U.S. have also renamed the holiday, as Native American Day or Indigenous People's Day and changed the celebrations accordingly." "So, why not just change the name if it's such a problem?" "Because it's tradition. Ordinary people need their heroes and their founding myths. Can't we just keep celebrating the way we've been doing for a century, without having to delve into all this serious research? It's not like anyone is actually celebrating genocide." "Traditions change, and the way we choose to keep them alive says a lot about our values." "Well, it looks like giving tired judges a day off isn't one of those values, anyway." Traditions and holidays are important to all cultures, but a hero in one era may become a villain in the next as our historical knowledge expands and our values evolve. And deciding what these traditions should mean today is a major part of putting history on trial.

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翻译人员: Qin Yu 校对人员: Cissy Yun很多生活在美国和拉丁美洲的人是庆祝着克里斯托弗·哥伦布航海的周年纪念日长大的但是他到底是一位使两个世界结合在一起的无畏探险家还是一个带来殖民主义和奴隶制的无情的剥削者？而且他真的发现了美洲吗？该是让历史人物哥伦布和克里斯多弗·哥伦布出庭受审的时候了。安静，请保持法庭中的秩序等一下，我今天真的需要工作吗?（咳嗽）是的，法官大人自1792年起，美国的很多地区就开始在十月十二日庆祝哥伦布发现美洲大陆的日子，“哥伦布周年纪念日”虽然这一天在1934年被宣布为法定假日并不是每一个州都执行只有23个州停止公共服务而更多的州则是完全抛弃了这个法定假日（咳嗽）真是遗憾啊在七十年代，我们甚至把它改动到十月的第二个星期一这样人们就可以拥有一个美好的“三天周末“我看你们这些人真是嫌放假太多了额，我们庆祝什么来着？拜托，法官大人，我们都在学校学过了克里斯托弗·哥伦布向西班牙国王请命去寻找一条更好的通向印度的贸易路线不是向东经大陆进发，而是向西绕地球航行大家都说这太疯狂了 因为他们仍然认为世界是平的但哥伦布心里更明白在1492年，当他向蓝色的海洋中航行时他发现了比印度大陆更好的东西——一个全新的大陆胡说首先，自亚里士多德提出地球呈球状的说法后，受过教育的人就认可这一事实了其次，哥伦布没有发现任何东西已经有人在美洲大陆上生活上千年了而且他甚至都不是第一个到访的欧洲人挪威人在五百年前就已经在纽芬兰定居了不见得吧，那我们为什么不是个个都带着那种牛皮头盔呢?其实挪威人自己也不戴（咳嗽）谁管那些维京海盗以前干了什么事情他们的殖民统治没有延续下去，但哥伦布却做到了而且他带回欧洲的消息被广为传播激励着所有的探险家和殖民者来到美洲大陆没有他，我们今天没人能站在这里但也正是因为因为他， 上百万的印第安土著人今天没能站在这片土地上你知道哥伦布在他发现的殖民地上做了什么吗？他把第一个见到的当地人抓了起来并在日记里描述征服并奴役这些人 是多么轻而易举拜托啦，那时候所有人都在自相残杀。难道那些当地人没告诉哥伦布其他部落突袭并带走俘虏的事情吗？没错，但是部落间的冲突 只会偶尔发生，而且规模有限这肯定没法消灭掉百分之九十的人口唔，不管怎么说了，为什么纪念这个哥伦布对你来说这么重要？法官大人，哥伦布的航行是一件鼓舞人心的事对于在欧洲奋斗着的人们来说，它代表着自由和新的开始而且他的发现给了我们的祖父母和曾祖父母来到这里并为自己的孩子们创造更好的生活的机会难道我们不应该让一个英雄来提醒所有人， 我们的国家是建立在移民者的奋斗上吗那原住民的苦痛又怎么算？他们被屠戮殆尽然后被赶进保留地而他们的后代至今仍承受着贫穷与歧视你怎么能把这样一个制造出这么多苦难的人 理解为英雄呢？这就是历史。你不能用现代的标准去评价一个十五世纪的人那时的人甚至认为传播基督教精神和文明给全世界 是一项道德义务呢事实上，即使用旧标准看，他也是个坏人在统治伊斯帕尼奥拉岛时， 他折磨致残那些进贡黄金不够多的原住民并将只有九岁的女孩作为性奴贩卖而他甚至对其他殖民者也很残忍到了被革职，并打入监狱的程度当传教士巴托洛梅·德拉斯·卡萨斯来到伊岛时，他写道：1494到1508年间，超过3百万人死于战争、奴役和挖矿。未来的一代，谁会相信这样的惨剧？额，我就挺怀疑这些数据的。难道就没有其他方式来庆祝这个节日吗?在一些拉美国家，人们以其他名字庆祝这一天，比如‘民族之日’在这些地方， 这更多是对土著人与多文化融合的庆祝庆祝这些文化熬过了殖民时期美国一些地方也将这个节日重新命名改成印第安土著人节或者原住民节并相应地改变了庆祝方式那既然这么麻烦，为何不直接改掉名字得了？因为传统。普通人们需要英雄，和他们的神秘根源我们难道不能只是单纯地庆祝百年来的节日，而不去深究这些严肃的研究呢？又不是真的会有人庆祝种族大屠杀传统是不断变化的。我们如何继承传统反映的是我们的价值观哎，看起来这种价值观不包括给劳累的法官放一天假节日和传统对所有文化都十分重要但随着历史知识的丰富和价值观的进步曾经的英雄也可能变成狗熊而决定当今人们对传统的看法与态度便是审视历史的重要工作之一

**P152 2014-10-17 How do germs spread (and why do they make us sick) - Yannay Khaikin a**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=152)

The sun is shining. The birds are singing. It looks like the start of another lovely day. You're walking happily in the park, when, "Ah-choo!" A passing stranger has expelled mucus and saliva from their mouth and nose. You can feel the droplets of moisture land on your skin, but what you can't feel are the thousands, or even millions, of microscopic germs that have covertly traveled through the air and onto your clothing, hands and face. As gross as this scenario sounds, it's actually very common for our bodies to be exposed to disease-causing germs, and most of the time, it's not nearly as obvious. Germs are found on almost every surface we come into contact with. When we talk about germs, we're actually referring to many different kinds of microscopic organisms, including bacteria, fungi, protozoa and viruses. But what our germs all have in common is the ability to interact with our bodies and change how we feel and function. Scientists who study infectious diseases have wondered for decades why it is that some of these germs are relatively harmless, while others cause devastating effects and can sometimes be fatal. We still haven't solved the entire puzzle, but what we do know is that the harmfulness, or virulence, of a germ is a result of evolution. How can it be that the same evolutionary process can produce germs that cause very different levels of harm? The answer starts to become clear if we think about a germ's mode of transmission, which is the strategy it uses to get from one host to the next. A common mode of transmission occurs through the air, like the sneeze you just witnessed, and one germ that uses this method is the rhinovirus, which replicates in our upper airways, and is responsible for up to half of all common colds. Now, imagine that after the sneeze, one of three hypothetical varieties of rhinovirus, let's call them "too much," "too little," and "just right," has been lucky enough to land on you. These viruses are hardwired to replicate, but because of genetic differences, they will do so at different rates. "Too much" multiplies very often, making it very successful in the short run. However, this success comes at a cost to you, the host. A quickly replicating virus can cause more damage to your body, making cold symptoms more severe. If you're too sick to leave your home, you don't give the virus any opportunities to jump to a new host. And if the disease should kill you, the virus' own life cycle will end along with yours. "Too little," on the other hand, multiplies rarely and causes you little harm in the process. Although this leaves you healthy enough to interact with other potential hosts, the lack of symptoms means you may not sneeze at all, or if you do, there may be too few viruses in your mucus to infect anyone else. Meanwhile, "just right" has been replicating quickly enough to ensure that you're carrying sufficient amounts of the virus to spread but not so often that you're too sick to get out of bed. And in the end, it's the one that will be most successful at transmitting itself to new hosts and giving rise to the next generation. This describes what scientists call trade-off hypothesis. First developed in the early 1980s, it predicts that germs will evolve to maximize their overall success by achieving a balance between replicating within a host, which causes virulence, and transmission to a new host. In the case of the rhinovirus, the hypothesis predicts that its evolution will favor less virulent forms because it relies on close contact to get to its next victim. For the rhinovirus, a mobile host is a good host, and indeed, that is what we see. While most people experience a runny nose, coughing and sneezing, the common cold is generally mild and only lasts about a week. It would be great if the story ended there, but germs use many other modes of transmission. For example, the malaria parasite, plasmodium, is transmitted by mosquitoes. Unlike the rhinovirus, it doesn't need us to be up and about, and may even benefit from harming us since a sick and immobile person is easier for mosquitoes to bite. We would expect germs that depend less on host mobility, like those transmitted by insects, water or food, to cause more severe symptoms. So, what can we do to reduce the harmfulness of infectious diseases? Evolutionary biologist Dr. Paul Ewald has suggested that we can actually direct their evolution through simple disease-control methods. By mosquito-proofing houses, establishing clean water systems, or staying home when we get a cold, we can obstruct the transmission strategies of harmful germs while creating a greater dependence on host mobility. So, while traditional methods of trying to eradicate germs may only breed stronger ones in the long run, this innovative approach of encouraging them to evolve milder forms could be a win-win situation. (Cough) Well, for the most part.

**P152 2014-10-17 How do germs spread (and why do they make us sick) - Yannay Khaikin a**

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翻译人员: Xiaosen Guo 校对人员: Yuanqing Edberg太阳当空照，小鸟喳喳叫。多么美好的一天又开始了。你在公园里高高兴兴地走着， 直到”阿嚏！“一声，路人甲从嘴和鼻子里喷出了黏液和口水。你能感觉到皮肤上有几许潮湿，但是你不会感觉到有成千上万的、极其微小的细菌正偷偷摸摸地通过空气在你的衣服、手上和脸上着陆。虽然听起来有点恶心，但实际上我们的身体 经常会暴露在有害的病菌下，只是大多数的时候都不会感觉这么明显。在我们可以接触到的所有物体上 几乎都会有细菌存在。当我们提到“细菌”的时候，我们实际上概括了很多种微小的有机体，包括细菌、霉菌、单细胞生物和病毒。但是所有细菌的共同特征是 它们都可以和我们的身体相互影响并且改变我们的感觉和机体功能。研究传染病的科学家们 几十年来一直百思不得其解：为什么有些细菌相对无害而有的却极具破坏性甚至可以致命。虽然还不知道全部的答案，但是我们现在知道了 细菌的有害性和致病性源于它的进化演变。为什么细菌通过同样的进化过程有害程度却如此截然不同呢？当我们想想细菌的传播方式， 也就是如何从一个寄主到下一个目标的时候，这个问题的答案就慢慢清晰起来了。就像你刚刚看到的，最常见的传播方式是通过空气传播。“鼻病毒”就是通过这种方式在我们的上呼吸道进行繁殖半数以上的感冒都是由此引起的。假设那声喷嚏之后有三组鼻病毒，按它们的数量分别为 “过量”、“不足”和“刚刚好”，恰巧落到了你的身上。这些病毒生来就会繁殖但是由于基因的差异， 它们繁殖的速度也有所不同。“过量”在短时间内 迅速繁殖并取得了胜利，但是这对你这个寄主来说 就不是什么好事了。迅速繁殖的病菌 对你身体造成的伤害更大，让你的感冒症状更加严重。如果你病得太严重了以至于无法出门，你也让病菌没有机会找到新的寄主。如果你因此而亡，病菌的生命也将和你一起结束。“不足”繁殖得很少也没对你造成什么伤害。虽然这让你能足够健康地 去接触其他潜在寄主，但是你可能根本就没有打喷嚏的症状，或者你喷嚏中的病菌根本无法传染别人。而“刚刚好“可以确保你身体中繁殖了足够传染别人的病菌数量又不会让你卧床不起。这才是最成功的传染给新寄主并且让下一代崛起的方法。这就是科学家所说的 “权衡利弊”之说。在八十年代提出的时候，它预测了细菌将会进化演变 以达到最大程度的胜算，而这是通过在寄主中 繁殖数量和致病性的平衡，继而引起新寄主的感染而获得的。在鼻病毒的案例中，权衡利弊的假说预测了 细菌会倾向于致病性相对小的演变。因为鼻病毒依赖于近距离的接触 来取得下一个牺牲品。对它来说，一个流动的寄主 就是一个好的寄主。而确实，这就是我们现在所看到的。当大多数人在经过流涕、 咳嗽和打喷嚏等症状时，这种普通感冒的危害通常比较轻微 并且会在一周以内痊愈。如果细菌只有这一种传播方式就好了，但是很不幸的是它还有别的方法。比如说疟疾寄生虫，即疟原虫， 是通过蚊子传染的。和鼻病毒不同的是，它不需要我们到处走动，也可以这样“损人利己”。所以卧床不起的病人更容易遭到叮咬。我们预计那些通过 昆虫、水和食物传播的细菌，不需要寄主的行动，但却可能引发更严重的病症。那么我们如何减少传染病的伤害呢？进化生物学博士 保罗-伊沃德认为我们可以通过简单的疾病控制方法 来影响细菌的演变。借助“防蚊”的房屋、建设净水系统或者感冒时在家养病，我们可以通过干扰有害细菌的传播方法而创造一个极大地 依赖于寄主的流动性的环境。那么，与其尝试用传统方法消灭细菌，不如从长远来看， 迫使其繁殖出更强壮的品种，这种创新的方式会让它们 演变出危害较轻微的形态而取得一个人类和细菌双赢的局面。（咳！咳！）希望吧！

**P153 2014-10-22 Is our climate headed for a mathematical tipping point - Victor J. Do**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=153)

For most of us, two degrees Celsius is a tiny difference in temperature, not even enough to make you crack a window. But scientists have warned that as CO2 levels in the atmosphere rise, an increase in the Earth's temperature by even this amount can lead to catastrophic effects all over the world. How can such a small measurable change in one factor lead to massive and unpredictable changes in other factors? The answer lies in the concept of a mathematical tipping point, which we can understand through the familiar game of billiards. The basic rule of billiard motion is that a ball will go straight until it hits a wall, then bounce off at an angle equal to its incoming angle. For simplicity's sake, we'll assume that there is no friction, so balls can keep moving indefinitely. And to simplify the situation further, let's look at what happens with only one ball on a perfectly circular table. As the ball is struck and begins to move according to the rules, it follows a neat star-shaped pattern. If we start the ball at different locations, or strike it at different angles, some details of the pattern change, but its overall form remains the same. With a few test runs, and some basic mathematical modeling, we can even predict a ball's path before it starts moving, simply based on its starting conditions. But what would happen if we made a minor change in the table's shape by pulling it apart a bit, and inserting two small straight edges along the top and bottom? We can see that as the ball bounces off the flat sides, it begins to move all over the table. The ball is still obeying the same rules of billiard motion, but the resulting movement no longer follows any recognizable pattern. With only a small change to the constraints under which the system operates, we have shifted the billiard motion from behaving in a stable and predictable fashion, to fluctuating wildly, thus creating what mathematicians call chaotic motion. Inserting the straight edges into the table acts as a tipping point, switching the systems behavior from one type of behavior (regular), to another type of behavior (chaotic). So what implications does this simple example have for the much more complicated reality of the Earth's climate? We can think of the shape of the table as being analogous to the CO2 level and Earth's average temperature: Constraints that impact the system's performance in the form of the ball's motion or the climate's behavior. During the past 10,000 years, the fairly constant CO2 atmospheric concentration of 270 parts per million kept the climate within a self-stabilizing pattern, fairly regular and hospitable to human life. But with CO2 levels now at 400 parts per million, and predicted to rise to between 500 and 800 parts per million over the coming century, we may reach a tipping point where even a small additional change in the global average temperature would have the same effect as changing the shape of the table, leading to a dangerous shift in the climate's behavior, with more extreme and intense weather events, less predictability, and most importantly, less hospitably to human life. The hypothetical models that mathematicians study in detail may not always look like actual situations, but they can provide a framework and a way of thinking that can be applied to help understand the more complex problems of the real world. In this case, understanding how slight changes in the constraints impacting a system can have massive impacts gives us a greater appreciation for predicting the dangers that we cannot immediately percieve with our own senses. Because once the results do become visible, it may already be too late.

**P153 2014-10-22 Is our climate headed for a mathematical tipping point - Victor J. Do**

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翻译人员: Kevin Lau 校对人员: Xinze Jiang对于我们大多数人来说，2摄氏度的温度变化并没有多大区别还不足以让你开关窗户但是科学家警告由于大气中二氧化碳浓度的升高地球上即便升高这一点点温度将会在全球导致一个灾难性的影响这样单个可测因素的微小变化是怎样导致其他因素发生大量不可预测的变化的呢？答案就是数学上的一个临界点的概念我们可以从熟悉的桌球游戏中理解桌球的基本运动规律就是它会沿着直线运动，直到撞到壁上会有一个与进入角度相等的反弹角为了简化，我们假设没有摩擦所以球的运动就有很不确定性为了使情况更加简单让我们看看只让一个球在一个绝对圆的桌上运动会发生什么当球被击中并开始按规律运动的时候会形成一个平滑的星形图案如果我们在不同的位置或角度开球图案上的一些细节就会受到影响但是整体情况是一样的经过一些测试和一些基本的数学模型分析后仅仅简单依靠开球的条件我们能在球运动之前就预测它的路线但是如果我们对桌子的形状做一小点改变会发生什么呢？我们将桌子分成两半在顶部和底部插入两条直边我们会看到，随着球从平整的边弹出它开始在整个桌上运动它同样遵循着桌球的运动规律但是运动的结果就不再是我们认识的模型了在这个系统运行的过程中我们只改变了一小点约束条件我们就改变了这个桌球的运动模式从可以预测的、稳定的运动到混乱的、不受控制的运动模式因此创造了一个数学家数学家称作无序运动模型的东西在（圆形）桌子上放置两条直边作为临界点将这个系统的规律运动变成了无序运动对于复杂的地球气候问题我们能从这个简单的例子中得到什么启发呢？我们可以把桌子的形状比作大气中二氧化碳的水平或是地球的平均温度在这个桌球运动或说是气候变化的模型中这两者是影响这个系统表现的条件在过去的一万年里二氧化碳在大气中的当量集中在百万分之二百七十左右以此保证整体系统保持稳定这对于人类的生活相当规律和适宜但现在二氧化碳水平达到了百万分之四百左右的水平而且在下个世纪可能达到五百至八百我们就可能到了“临界点”了那时，在全球平均温度范围内一个小的附加变化可能与桌球实验中的变化有同样的影响导致非常危险的气候变化出现更多难以预测的极端的、激烈的天气事件更重要的是，越发不适宜人类生活数学家们仔细研究的这些假想模型可能与我们的实际情况有所不同但是它提供给我们一个思考的框架和方法能被用于理解更多真实生活中更复杂的问题在这种情况下理解在系统中一个微小的条件变化的影响怎样导致一个更大的影响给我们更多对目前凭我们的感官不能鉴别的预测危险的能力因为一旦我们看到这个结果，那时已经太迟了

**P154 2014-10-27 How a wound heals itself - Sarthak Sinha**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=154)

The largest organ in your body isn't your liver or your brain. It's your skin, with a surface area of about 20 square feet in adults. Though different areas of the skin have different characteristics, much of this surface performs similar functions, such as sweating, feeling heat and cold, and growing hair. But after a deep cut or wound, the newly healed skin will look different from the surrounding area, and may not fully regain all its abilities for a while, or at all. To understand why this happens, we need to look at the structure of the human skin. The top layer, called the epidermis, consists mostly of hardened cells, called keratinocytes, and provides protection. Since its outer layer is constantly being shed and renewed, it's pretty easy to repair. But sometimes a wound penetrates into the dermis, which contains blood vessels and the various glands and nerve endings that enable the skin's many functions. And when that happens, it triggers the four overlapping stages of the regenerative process. The first stage, hemostasis, is the skin's response to two immediate threats: that you're now losing blood and that the physical barrier of the epidermis has been compromised. As the blood vessels tighten to minimize the bleeding, in a process known as vasoconstriction, both threats are averted by forming a blood clot. A special protein known as fibrin forms cross-links on the top of the skin, preventing blood from flowing out and bacteria or pathogens from getting in. After about three hours of this, the skin begins to turn red, signaling the next stage, inflammation. With bleeding under control and the barrier secured, the body sends special cells to fight any pathogens that may have gotten through. Among the most important of these are white blood cells, known as macrophages, which devour bacteria and damage tissue through a process known as phagocytosis, in addition to producing growth factors to spur healing. And because these tiny soldiers need to travel through the blood to get to the wound site, the previously constricted blood vessels now expand in a process called vasodilation. About two to three days after the wound, the proliferative stage occurs, when fibroblast cells begin to enter the wound. In the process of collagen deposition, they produce a fibrous protein called collagen in the wound site, forming connective skin tissue to replace the fibrin from before. As epidermal cells divide to reform the outer layer of skin, the dermis contracts to close the wound. Finally, in the fourth stage of remodeling, the wound matures as the newly deposited collagen is rearranged and converted into specific types. Through this process, which can take over a year, the tensile strength of the new skin is improved, and blood vessels and other connections are strengthened. With time, the new tissue can reach from 50-80% of some of its original healthy function, depending on the severity of the initial wound and on the function itself. But because the skin does not fully recover, scarring continues to be a major clinical issue for doctors around the world. And even though researchers have made significant strides in understanding the healing process, many fundamental mysteries remain unresolved. For instance, do fibroblast cells arrive from the blood vessels or from skin tissue adjacent to the wound? And why do some other mammals, such as deer, heal their wounds much more efficiently and completely than humans? By finding the answers to these questions and others, we may one day be able to heal ourselves so well that scars will be just a memory.

**P154 2014-10-27 How a wound heals itself - Sarthak Sinha**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=154)

翻译人员: Zongzhen Yang 校对人员: Yolanda Zhang你身体中最大的器官并非肝脏， 也不是大脑，而是皮肤。一个成年人的皮肤 展开面积约为1.86平方米。虽然人体不同部位的皮肤 有着不同的特征，但绝大多数都承担着相似的功能，比如排汗、感受冷热以及生长毛发等。当皮肤被深度切伤或创伤时，新愈合的部分看上去 总会有别于周围皮肤，并且可能在短期内， 或者永久性地失去部分功能。要究其原因， 我们先来看看人体皮肤的结构。皮肤最外面的一层叫做表皮，主要由一些硬化细胞组成， 叫做角化细胞，能够提供保护作用。由于表皮本身会经常性地脱落与再生，要修复它也较为容易。但有时候，一些创口伤及真皮层，而真皮层中含有的血管、 多种腺体和神经末梢是皮肤多种功能的保障。当深度伤口产生时， 皮肤将进入由四个相互重叠的阶段构成的再生过程。第一阶段，凝血， 是皮肤在应对以下威胁：你正在失血，并且表皮层的物理屏障已被攻破。为减少出血，血管发生紧缩。这一过程叫做血管收缩， 产生的血凝块能够帮助消除皮肤遭受的两大威胁。此外，一种叫做血纤维蛋白的特殊蛋白质 在皮肤表面形成交叉网状结构，以防止血液的流出和细菌病菌的侵入。第一阶段持续大约三小时后， 皮肤开始变红，这意味着第二阶段的到来， 即炎症反应阶段。此时失血已得到控制， 保护屏障也已形成，人体开始派出特殊的细胞抵抗 可能已经入侵的病菌。这些细胞中最重要的就是白细胞，也被称作巨噬细胞，除了产生生长因子加速愈合， 它们还能够吞噬细菌和损伤的组织，这一吞噬的过程叫做吞噬作用。因为这些体型微小的战士需要通过血液到达伤口，之前收缩的血管此时将发生扩张，这一过程叫做血管舒张。大约在受伤后的两到三天，成纤维细胞开始进入伤口， 意味着第三阶段——增殖阶段的到来。在胶原沉积的过程中，成纤维细胞能在伤口处产生一种 纤维状的蛋白质，名为胶原蛋白，它能形成皮肤结缔组织， 以取代之前的血纤维蛋白。当表皮细胞分裂重新形成外保护层，真皮层也在收缩以闭合伤口。最后一个阶段是组织重组阶段，随着新沉积的胶原蛋白 重组和转化为特定的形态，伤口变得成熟。这一过程可能会持续一年以上，随后新生皮肤的伸缩强度 就会得到提高，血管和其它连接组织也得到增强。随着时间的推移， 依据伤口的严重程度以及皮肤原先功能的好坏，新生组织能够恢复到 原先五成到八成的功能。但是因为皮肤并没有完全复原，疤痕仍是全世界医生 主要关注的临床问题。虽然通过研究， 人们对皮肤伤口愈合的过程有了更深入的认识，但许多重要谜团仍未解开。比如，成纤维细胞到底来自血管，还是来自伤口周围的皮肤组织？又比如， 为什么诸如鹿之类的其它哺乳动物，相比人类能够更有效更彻底地 修复它们的伤口？通过寻求此类问题的答案，人类也许有一天能有足够的修复能力， 那时疤痕困扰也将成为历史。

**P155 2014-10-27 Ideasthesia - How do ideas feel - Danko Nikolić**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=155)

Long before Descartes famously declared, "I think, therefore I am," and long after that, scientists and philosophers alike have puzzled over what they call the mind-body problem. Is the mind some separate, non-material entity piloting a machine of flesh? Or if it's just a particularly elusive part of our physical body, how can it translate the input of our animal senses into the seemingly non-physical experiences that we call thoughts? But though the answers have been debated endlessly, new research suggests that part of the problem lies in how we pose the question in the first place, assuming a distinction between our sensory perception and our ideas that may not really be there. The traditional model of our mental function has been that the senses provide separate data to our brain which are then translated into the appropriate mental phenomena: visual images into trees, auditory experiences into bird songs, and so on. But occasionally, we have come across people whose senses seem to mingle together, allowing them to hear colors, or taste sounds. Until recently, the common understanding was that this phenomenon, called synesthesia, was a direct connection between the parts of the brain responsible for sensory stimuli such as seeing the color yellow immediately upon hearing the tone of b flat. But newer studies have shown that synesthesia is actually mediated through our understanding of the shapes, colors and sounds that our senses apprehend. In order for the cross-sensory experiences to occur, the higher level ideas and concepts that our minds associate with the sensory input must be activated. For example, this shape can be seen as either the letter "s" or the number "5," and synesthetes associate each with different colors or sounds based on how they interpret it despite the purely visual stimulus remaining identical. In another study, synesthetes created novel color associations for unfamiliar letters after learning what the letters were. So because it relies on a connection between ideas and senses, this mental phenomenon underlying synesthesia is known as ideasthesia. Synesthesia only occurs in some people, although it may be more common than previously thought. But ideasthesia itself is a fundamental part of our lives. Virtually all of us recognize the color red as warm and blue as cold. Many would agree that bright colors, italic letters and thin lines are high-pitched, while earth tones are low-pitched. And while many of these associations are acquired through cultural exposure, others have been demonstrated even in infants and apes, suggesting that at least some associations are inborn. When asked to choose between two possible names for these shapes, people from entirely different cultural and language backgrounds overwhelmingly agree that "kiki" is the spiky star, while "bouba" is the rounded blob, both because of the sounds themselves and the shapes our mouths make to produce them. And this leads to even more associations within a rich semantic network. Kiki is described as nervous and clever, while bouba is perceived as lazy and slow. What all of this suggests is that our everyday experiences of colors, sounds and other stimuli do not live on separate sensory islands but are organized in a network of associations similar to our language network. This is what enables us to understand metaphors even though they make no logical sense, such as the comparison of snow to a white blanket, based on the shared sensations of softness and lightness. Ideasthesia may even be crucial to art, which relies on a synthesis of the conceptual and the emotional. In great art, idea and aesthesia enhance each other, whether it's song lyrics combining perfectly with a melody, the thematic content of a painting heightened by its use of colors and brushstrokes, or the well constructed plot of a novel conveyed through perfectly crafted sentences. Most importantly, the network of associations formed by ideasethesia may not only be similar to our linguistic network but may, in fact, be an integral part of it. Rather than the traditional view, where our senses first capture a collection of colors and shapes, or some vibrations in the air, and our mind then classifies them as a tree or a siren, ideasthesia suggests that the two processes occur simultaneously. Our sensory perceptions are shaped by our conceptual understanding of the world. and the two are so connected that one cannot exist without the other. If this model suggested by ideasthesia is accurate, it may have major implications for some of the biggest scientific and philosophical issues surrounding the study of mind. Without a preexisting concept of self, Descartes would not have had an "I" to attribute the thinking to. And without a preexisting network of interrelated and distinct concepts, our sensory experience of the world would be an undifferentiated mass rather than the discrete objects we actually apprehend. For science, the task is to find where this network lies, how it is formed, and how it interacts with external stimuli. For philosophy, the challenge is to rethink what this new model of consciousness means for our understanding of our selves and our relation to the world around us.

**P155 2014-10-27 Ideasthesia - How do ideas feel - Danko Nikolić**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=155)

翻译人员: lena li 校对人员: Daisy Leng几百年前，笛卡尔说了那句名言“我思故我在”很久之后很多科学家和哲学家都在苦苦探索所谓的心身关系问题心灵(mind)是某种独立的非物质实体， 在操控着肉体？还是说，它实际是身体的一部分， 只是非常深奥，我们对它知之甚少？如果是后者，那它如何 把我们各种本能的感触觉转换成非物质性的经验， 也就是我们所说的“想法”？尽管人们对这个问题的解答 莫衷一是但有新研究发现人们之所以观点不一，原因之一在于人们从一开始就假设 感知与想法之间存在差别但这两者可能并没有不同按照传统观点，我们的认知模式是这样的各种感触觉向大脑输入不同的数据这些数据继而被解读成 相应的精神现象：例如，树木以图像存储， 鸟叫声以声音的形式存储，等等但有些人的认知模式并非如此他们的感触觉似乎是混合交融的他们能够听到颜色尝到声音近年来，人们将这种认知模式称为通感(synesthesia)它连通了大脑中的各种感官刺激比如看见黄色会立即听到降B音另有最新研究发现通感实际上是通过我们对形状、颜色、声音的理解来联通的为了实现跨感官现象必须激活思想中跟感官输入有关的更高水平的思想与概念例如，这个形状可以是字母S或者数字5而不同的通感者则会将它跟不同的颜色或声音联系在一起尽管他们接受的是完全相同的视觉刺激另一个研究发现通感者在认识了一个新字母后会为其建立新的颜色关联由于这一现象依靠的是心身连接因此这种隐含于通感的心理现象被称为联觉(ideasthesia)只有少部分人有通感尽管他们的数量比我们预料得要多我们生活中离不开联觉的体验几乎所有人都认为红色代表温暖，蓝色代表寒冷许多人都认同明亮的颜色、斜体和细线是高频率的而大地色系是低频率的尽管这些联系大部分与文化背景有关但有些联系也体现在婴儿和猩猩中这说明有些联系是与生俱来的当让人们给这两个图形配对名称的时候来自不同文化和语言背景的人一致认为kiki是那个尖角星星而bouba是那个圆润的水渍图这是因为两个单词的发音嘴型跟两个图案很像同时语义上的关联也有很多大家都认为Kiki紧张、聪明而bouba又懒又慢这些都说明我们对颜色声音和其他刺激的经验不是分离的而是同处于一个关系网络中就像我们的语言系统一样所以我们能理解比喻义尽管那些比喻毫无逻辑例如把雪比作白色的毯子因为它们都很软很轻联觉甚至对艺术也至关重要艺术依赖于概念与情感的通感伟大的艺术作品中， 思想和美感总是互相作用、彼此增强无论是歌词与旋律的结合一副画作中颜色与笔法对主题思想的烘托或是小说中遣词造句对故事情节的阐述效果最重要的是，由联觉构造的关系网络不仅类似于语言系统事实上可能是语言系统的中不可或缺的一部分传统理论认为感官先接受到一系列颜色、形状空气的震动然后大脑才确认这是一棵树或海妖赛壬而联觉则会同步感知这两个过程感知能力的存在是基于我们对世界的概念理解两者紧密相连、不可分割如果联觉的模型是正确的可能对科学界、心理学界思想领域造成巨大的影响如果不存在个人概念笛卡尔不可能把“我”作为思考的主体如果没有彼此相关又各有区别的概念组成的网络我们对世界的理解也就一团乱麻对科学而言，我们的任务不是理解已知的离散概念而是去发现这一概念网络在哪它是如何形成的，如何与外界刺激进行交互对哲学而言，挑战之处在于重新思考这一全新的模型对我们自身、我们与世界的关系意味着什么

**P156 2014-10-28 How do scars form - Sarthak Sinha**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=156)

Remember the time you fell off your bike or bumped your head on a sharp corner? Childhood injuries are things we'd often like to forget, but our bodies often carry the memories in the form of scars. So what are these unwanted souvenirs and why do we keep them for so long after that unintended vacation to the emergency room? The most common place we see scars are on our skin, a patch that looks slightly different from the normal skin around it. Often, this is considered an unfortunate disfigurement, while other times, deliberate scarification has been used in both traditional and modern cultures, to mark a rite of passage or simply for aesthetic decoration. But the difference isn't only cosmetic. When we look at healthy skin tissue under a microscope, we see the cells that perform various functions connected by an extracellular matrix, or ECM. This is composed of structural proteins, like collagen, secreted by specialized fibroblast cells. Well-arranged ECM allows for transportation of nutrients, cell-to-cell communication, and cell adhesion. But when a deep wound occurs, this arrangement is disrupted. During the process of wound healing, collagen is redeposited at the wound site, but instead of the basket-weave formation found in healthy tissue, the new ECM is aligned in a single direction, impeding inter-cell processes, and reducing durability and elasticity. To make matters worse, the healed tissue contains a higher proportion of ECM than before, reducing its overall function. In the skin, the overabundance of collagen interferes with its original functions, like producing sweat, controlling body temperature and even growing hair. The scar tissue is fragile, sensitive to changes in temperature and sensation, and should be kept in moist environments to maximize healing. This presence of excessive fibrous connective tissue in an organ is known as fibrosis, and if that term sounds familiar, it's because our skin is not the only organ vulnerable to scarring. Cystic fibrosis is a genetic disorder that causes scarring of the pancreas, while pulmonary fibrosis is a scarring of the lungs, resulting in shortness of breath. Scarring of the heart and the buildup of ECM following a heart attack can inhibit its beating, leading to further heart problems. What's common to all these conditions is that although it retains some of the original functions, the scar tissue formed after a wound is inferior to the native tissue it replaces. However, there is hope. Medical researchers are now studying what causes fibroblast cells to secrete excessive amounts of collagen and how we can recruit the body's other cells in regenerating and repopulating the damaged tissue. By learning how to better control wound healing and the formation of scar tissue, we can utilize the multi-billion-dollar budgets currently used to address the aftermath of wounding in a much more efficient manner, and help millions of people live better and healthier lives. But until then, at least some of our scars can help us remember to avoid the sorts of things that cause them.

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翻译人员: Cissy Yun 校对人员: Jenny Yang还记得你从自行车上摔下 或一头撞到尖角之时吗？我们经常选择忘记童年时受的伤但是在我们身体上留下的伤疤依然带着这段回忆但是这些本想要的“纪念品”到底是什么呢？我们又为何在一次不情愿的医院之旅后， 将它们留下呢？最常见的伤疤位置是在我们的皮肤上是一块与看起来正常皮肤不一样的皮肤这经常被认为是一个不幸的“毁容”但有些伤疤是故意为之的在传统和现代文化中都有这种现象， 有时是纪念一个仪式其他则是简单的装饰但是伤疤拥有的不仅仅是外形上的区别当我们在显微镜下观察健康的肌肤组织时我们可以看见各种细胞起到不同的作用被ECM(细胞外基质)所连接ECM由结构蛋白所组成，像是胶原蛋白由成纤维细胞分泌紧密排列的ECM让营养物质得到传输，促成细胞之间的交流和细胞黏附但是当产生一个很深的伤口时 这种排序被打乱在愈合的过程中， 胶原蛋白会在伤口旁重新沉淀但是不同于在健康组织中的篮织形成法新的ECM以单向排列这阻止了细胞间的联系 并且减少了耐久性和伸展性让情况变得更糟的是痊愈后的组织拥有更多的ECM反倒使它的功能不如从前在皮肤中，过量的胶原蛋白会妨碍它原本的作用比如说出汗控制体温或是生长毛发伤疤组织是非常脆弱，并且对于温度的变化十分敏感而且为了达到最好的愈合效果 必须放置在潮湿的环境下这种过量的纤维性结缔组织被称为纤维症 如果这个词听起来十分耳熟的话是因为我们的皮肤并非唯一易有伤疤的器官囊肿性纤维化是一种遗传疾病 会在胰腺上产生伤疤而肺纤维化则是在肺上产生伤疤从而形成呼吸困难在心脏上结疤和产生ECM(细胞外基质) 会导致心脏病会阻止其跳动，并会产生更多的心脏问题所有这些状态的共性是虽然伤疤组织依然有剩余的一些原功能但是在受伤过后它总是不如健康的原始组织的但是，我们还是有希望的医药工作者现在正在研究是什么促使成细胞组织分泌过量的胶原蛋白和我们的身体是如何“召集”其他的体细胞来重新建造被损坏的组织当我们学到如何更好地控制伤口， 愈合收伤处的皮肤组织我们可以利用几十亿的资金现在正用于研究受伤的后果以一个更高的效率并帮助千万人拥有一个更好更健康的生活但在那之前，我们的伤疤会帮助我们记得去避开那些产生伤疤的事情

**P157 2014-10-28 What does the liver do - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=157)

There's a factory inside you that weighs about 1.4 kilograms and runs for 24 hours a day. This is your liver, the heaviest organ in your body, and one of the most crucial. This industrious structure simultaneously acts as a storehouse, a manufacturing hub, and a processing plant. And each of these functions involve so many important subtasks that without the liver, our bodies would simply stop working. One of the liver's main functions is to filter the body's blood, which it receives in regular shipments from two sources: the hepatic artery delivers blood from the heart, while the hepatic portal vein brings it from the intestine. This double delivery fills the liver with nutrients, that it then sorts, processes and stores with the help of thousands of tiny internal processing plants, known as lobules. Both blood flows also deliver the oxygen that the liver needs to function. The blood that is received from the intestine contains carbohydrates, fats, and vitamins and other nutrients dissolved in it from the food you've consumed. These must be processed in different ways. In the case of carbohydrates, the liver breaks them down and converts them into sugars for the body to use as energy when the filtered blood is sent back out. Sometimes the body has leftovers of nutrients that it doesn't immediately require. When that happens, the liver holds some back, and stacks them in its storage facility. This facility works like a pantry for future cases when the body might be in need of nutrients. But the blood flowing into the liver isn't always full of good things. It also contains toxins and byproducts that the body can't use. And the liver monitors these strictly. When it spots a useless or toxic substance, it either converts it into a product that can't hurt the body or isolates it and whisks it away, channeling it through the kidneys and intestine to be excreted. Of course, we wouldn't consider the liver a factory if it didn't also manufacture things. This organ makes everything from various blood plasma proteins that transport fatty acids and help form blood clots, to the cholesterol that helps the body create hormones. It also makes vitamin D and substances that help digestion. But one of its most vital products is bile. Like an eco-friendly treatment plant, the liver uses cells called hepatocytes to convert toxic waste products into this bitter greenish liquid. As it's produced, bile is funneled into a small container below the liver, called the gallbladder, before being trickled into the intestine to help break down fats, destroy microbes, and neutralize extra stomach acid. Bile also helps carry other toxins and byproducts from the liver out of the body. So as you can see, the liver is an extremely efficient industrial site, performing multiple tasks that support each other. But such a complex system needs to be kept running smoothly by keeping it healthy and not overloading it with more toxins than it can handle. This is one factory we simply can't afford to shut down.

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翻译人员: Cissy Yun 校对人员: Jenny Yang在你的身体里有一个1.4千克重的工厂它全天24小时都在工作它就是你的肝脏 身体中最重的器官也是最重要的器官之一这个勤奋工作的器官同时也扮演仓库的角色或是作为一个制造中心也是一个处理工厂肝的每一个功能都有很多重要的子任务没有肝脏的存在 我们的身体将会停止运作肝脏最重要的功能之一 便是过滤人体中的血液肝平常会从两个地方接收血液肝动脉，从心脏传输血液而肠道中的血液流入肝门静脉这种双传输使肝脏充满营养然后在数以千计，被称为小叶的内部加工工厂的帮助下肝脏将会将营养分类、加工和储存两种血液流动同时也将肝脏运作所需的氧气 运送到了肝脏中从肠道流来的血液中有着碳水化合物，脂肪维他命以及一些其他营养溶解于其中这些来自于你摄取的食物它们必须由不同的方法进行加工比如说碳水化合物肝脏将它们分解 并将其转化成糖为使被过滤后的血液传输回身体时 可被用作能量有时人体还会有剩余的营养物质那些并不被及时需要的营养当这种情况发生时，肝脏会储存其中的一些并将其堆在它的储存设备中这种设备像是一个食品储存室为的是以后身体可能需要营养这种情况但是流入肝脏的血液中 并不都是好的物质它也包含着人体无法运用的一些毒素和副产品肝脏会严格的监管它们当它发现一个无用的，或是有毒的物质时肝脏会将其转化成一种对身体无害的物质或是将它隔离，然后弹出并引导它从肾和肠道排出当然，我们不会将肝脏当作一个工厂如果它不生产任何东西的话这个器官制造很多东西，从制造可以传送脂肪酸和帮助凝血的血浆蛋白到制造帮助身体生产荷尔蒙的胆固醇它还生产维他命D和 其他帮助消化的一些物质但肝脏最重要的产物之一便是胆汁就像一个环保的处理厂肝脏用一种名叫肝细胞的细胞来将有毒的废弃产品转化成这种绿色，苦涩的液体产生之后，胆汁会流向 一个位于肝脏下方的小容器内被称为胆囊在流入肠道之前它会帮助分解脂肪， 消除微生物以及中和多余的胃酸胆汁也可以帮助将肝脏中的毒素和副产品搬运出体外正如你们所知道的肝脏是一个十分有效率的工业场所执行不同的，但却支持彼此的任务但为了使这样一个复杂的系统流畅地运转需要保持它的健康和不要让它承受过多的毒素 从而造成超负荷这是一个我们无法负担得起它关闭的工厂

**P158 2014-11-03 How to understand power - Eric Liu**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=158)

Every day of your life, you move through systems of power that other people made. Do you sense them? Do you understand power? Do you realize why it matters? Power is something we are often uncomfortable talking about. That's especially true in civic life, how we live together in community. In a democracy, power is supposed to reside with the people, period. Any further talk about power and who really has it seems a little dirty, maybe even evil. But power is no more inherently good or evil than fire or physics. It just is. It governs how any form of government works. It determines who gets to determine the rules of the game. So learning how power operates is key to being effective, being taken seriously, and not being taken advantage of. In this lesson, we'll look at where power comes from, how it's exercised and what you can do to become more powerful in public life. Let's start with a basic definition. Power is the ability to make others do what you would have them do. Of course, this plays out in all arenas of life, from family to the workplace to our relationships. Our focus is on the civic arena, where power means getting a community to make the choices and to take the actions that you want. There are six main sources of civic power. First, there's physical force and a capacity for violence. Control of the means of force, whether in the police or a militia, is power at its most primal. A second core source of power is wealth. Money creates the ability to buy results and to buy almost any other kind of power. The third form of power is state action, government. This is the use of law and bureaucracy to compel people to do or not do certain things. In a democracy, for example, we the people, theoretically, give government its power through elections. In a dictatorship, state power emerges from the threat of force, not the consent of the governed. The fourth type of power is social norms or what other people think is okay. Norms don't have the centralized machinery of government. They operate in a softer way, peer to peer. They can certainly make people change behavior and even change laws. Think about how norms around marriage equality today are evolving. The fifth form of power is ideas. An idea, individual liberties, say, or racial equality, can generate boundless amounts of power if it motivates enough people to change their thinking and actions. And so the sixth source of power is numbers, lots of humans. A vocal mass of people creates power by expressing collective intensity of interest and by asserting legitimacy. Think of the Arab Spring or the rise of the Tea Party. Crowds count. These are the six main sources of power, what power is. So now, let's think about how power operates. There are three laws of power worth examining. Law number one: power is never static. It's always either accumulating or decaying in a civic arena. So if you aren't taking action, you're being acted upon. Law number two: power is like water. It flows like a current through everyday life. Politics is the work of harnessing that flow in a direction you prefer. Policymaking is an effort to freeze and perpetuate a particular flow of power. Policy is power frozen. Law number three: power compounds. Power begets more power, and so does powerlessness. The only thing that keeps law number three from leading to a situation where only one person has all the power is how we apply laws one and two. What rules do we set up so that a few people don't accumulate too much power, and so that they can't enshrine their privilege in policy? That's the question of democracy, and you can see each of these laws at work in any news story. Low wage workers organize to get higher pay. Oil companies push to get a big pipeline approved. Gay and lesbian couples seek the legal right to marry. Urban parents demand school vouchers. You may support these efforts or not. Whether you get what you want depends on how adept you are with power, which brings us finally to what you can do to become more powerful in public life. Here, it's useful to think in terms of literacy. Your challenge is to learn how to read power and write power. To read power means to pay attention to as many texts of power as you can. I don't mean books only. I mean seeing society as a set of texts. Don't like how things are in your campus or city or country? Map out who has what kind of power, arrayed in what systems. Understand why it turned out this way, who's made it so, and who wants to keep it so. Study the strategies others in such situations used: frontal attack or indirection, coalitions or charismatic authority. Read so you may write. To write power requires first that you believe you have the right to write, to be an author of change. You do. As with any kind of writing, you learn to express yourself, speak up in a voice that's authentic. Organize your ideas, then organize other people. Practice consensus building. Practice conflict. As with writing, it's all about practice. Every day you have a chance to practice, in your neighborhood and beyond. Set objectives, then bigger ones. Watch the patterns, see what works. Adapt, repeat. This is citizenship. In this short lesson, we've explored where civic power comes from, how it works and what you can do to exercise it. One big question remaining is the "why" of power. Do you want power to benefit everyone or only you? Are your purposes pro-social or anti-social? This question isn't about strategy. It's about character, and that's another set of lessons. But remember this: Power plus character equals a great citizen, and you have the power to be one.

**P158 2014-11-03 How to understand power - Eric Liu**

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翻译人员: Stella Lin 校对人员: Tianshu Wang在生命的每一天你都生活在由他人创造的权力系统中你注意到过它们吗？你了解权力吗？你知道为什么这很重要吗？我们常常不愿意讨论权力尤其在它涉及到公民生活，涉及到我们如何在一个团体中共存时在民主社会中，权力被认为属于人民，讨论结束。任何关于权力的深入讨论和谁真正拥有权力似乎都显得有一点肮脏甚至邪恶但权力和火或者其他物理现象一样，并不存在天生的好坏权力仅仅就是权力而已。权力规定了任何政府的运作方式它决定了谁来制定游戏规则。因此了解权力如何运作才能变得高效才能不被人忽视，不被人利用。在这一课中，我们就来了解一下权力从何而来，如何使用权力，以及如何让自己在公共生活中变得更有权力。让我们先从基本定义开始。权力是一种让他人按照你的意愿行动的能力。当然，权力被运用在生活的方方面面。从家庭，到工作场合，到人与人之间的关系。我们关注的是社会生活领域。此时权力指的是让公众按照你的意愿做出选择并且采取行动社会权力主要来源于六个方面。第一是生理上的力量和实施暴力的能力无论警方还是民兵组织权力最初体现在对各种武力的控制财富是权力的第二个主要来源钱能够买到成果和几乎所有其它的权力政府行为是权力的第三种形式利用法律和官僚来统治人民规定人们能做什么，不能做什么在民主国家里，比如我们，人民在理论上，通过选举把权力交给政府在专政国家中，国家权力来自武力威胁而不是人民对政府统治的许可权力的第四种形式是社会规范，也就是人们认为对的事情规范并不像政府那样，有中央集权的运作机构它们有一套更温和的运作方式它们确实能使人们改变行为，甚至改变法律想想当今关于婚姻公平的理念是如何发展的权力的第五种形式是信念一个信念，例如个人自由，或种族平等如果能够驱动人们去改变他们的想法和行动便能创造出无限的权力因此，权力的第六种来源是数量，是大量的人勇于发声的人民群众通过传达集体对权益的强烈关注和支持正义来创造权力想一想阿拉伯之春和美国茶叶党的兴起便能看出群众是有力量的这就是权力的六种来源，也解释了什么是权力。现在，让我们思考一下权力是如何运作的三种权力定律值得我们探讨定律一，权力从来不是静态的在公民领域，权力总是处于积累或衰弱的过程中你不采取行动，别人就要对你采取行动定律二：权力就像水一样它像水流，流过我们的日常生活政治实际上就是把这股水流往你希望的方向引政策的制定就是要把“权力水流“保持在一个特定的流向政策是冻住的权力定律三：权力会引发连锁反应权力会导致更多权力，反之亦然定律三最终会导致所有的权力集中在一人手中想要阻止这种情况发生就只能看我们如何运用定律一和定律二了我们应该制定什么样的规定来避免少数人积累起过多的权力，从而在政治领域享有神圣的特权？这是一个关于民主的问题在每一条新闻中，你都能看到这三条定律在起着作用低收入的工人组织要求更高的工资石油公司争取大输油管道的批准同性恋者为同性婚姻的合法化呼喊城市父母则要求得到教育补助金劵你可能支持或反对这些行为你是否能够得到你想要的取决于你有多擅长运用你的权力我们最终回到了你应如何使自己在公众生活中更加有权力这个命题在这里，从文学的角度来思考有益于我们理解这个问题你的挑战是学习如何阅读权力和书写权力阅读权力意味着你应该尽可能地多看有关权力的文本我指的不仅仅是书籍我的意思是把社会当做是一组文本你不喜欢你发生在所在的学校、城市或乡村的事情？标出什么人拥有什么权力，是由什么体系决定的想想为什么事情会变成这个样子是谁让事情变成这个样子，又是谁想让事情保持现状学习其他人在这种情况下使用的策略是直接进击还是采取迂回战术是利用联合力量还是魅力型权威阅读是为了写作书写权力首先要求你相信自己有书写的权利去主导改变你确实有在任何一种写作中，你都要学会去表达自己说出自己真实的想法组织好你的观点，再组织起其他人练习如何建立统一练习如何面对矛盾就像写作一样，练习是不二法则每天你都会有机会在你的邻居之间或之外进行练习设立一些目标，再设立更大的目标看看哪种形式起作用不断运用这就是公民在这堂短课中，我们学习了权力的由来权力的运作方式和我们可以怎么实施权力还有一个重要问题，为什么要有权力？你想用权力来为造福大众，还是仅仅为了自己的好处？你的目的是有利于社会的还是反社会的？这个问题无关策略而关于人的品性，这就是另一堂课了但记住权力加上品性等于好公民而你有这个能力去当一个好公民

**P159 2014-11-05 Why elephants never forget - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=159)

It's a common saying that elephants never forget, but these magnificent animals are more than giant walking hard drives. The more we learn about elephants, the more it appears that their impressive memory is only one aspect of an incredible intelligence that makes them some of the most social, creative, and benevolent creatures on Earth. Unlike many proverbs, the one about elephant memory is scientifically accurate. Elephants know every member in their herd, able to recognize as many as 30 companions by sight or smell. This is a great help when migrating or encountering other potentially hostile elephants. They also remember and distinguish particular cues that signal danger and can recall important locations long after their last visit. But it's the memories unrelated to survival that are the most fascinating. Elephants remember not only their herd companions but other creatures who have made a strong impression on them. In one case, two circus elephants that had briefly performed together rejoiced when crossing paths 23 years later. This recognition isn't limited to others of their species. Elephants have also recognized humans they've bonded with after decades apart. All of this shows that elephant memory goes beyond responses to stimuli. Looking inside their heads, we can see why. The elephant boasts the largest brain of any land mammal, as well as an impressive encephalization quotient. This is the size of the brain relative to what we'd expect for an animal's body size, and the elephant's EQ is nearly as high as a chimpanzee's. And despite the distant relation, convergent evolution has made it remarkably similar to the human brain, with as many neurons and synapses and a highly developed hippocampus and cerebral cortex. It is the hippocampus, strongly associated with emotion, that aids recollection by encoding important experiences into long-term memories. The ability to distinguish this importance makes elephant memory a complex and adaptable faculty beyond rote memorization. It's what allows elephants who survived a drought in their youth to recognize its warning signs in adulthood, which is why clans with older matriarchs have higher survival rates. Unfortunately, it's also what makes elephants one of the few non-human animals to suffer from post-traumatic stress disorder. The cerebral cortex, on the other hand, enables problem solving, which elephants display in many creative ways. They also tackle problems cooperatively, sometimes even outwitting the researchers and manipulating their partners. And they've grasped basic arithmetic, keeping track of the relative amounts of fruit in two baskets after multiple changes. The rare combination of memory and problem solving can explain some of elephants' most clever behaviors, but it doesn't explain some of the things we're just beginning to learn about their mental lives. Elephants communicate using everything from body signals and vocalizations, to infrasound rumbles that can be heard kilometers away. And their understanding of syntax suggests that they have their own language and grammar. This sense of language may even go beyond simple communication. Elephants create art by carefully choosing and combining different colors and elements. They can also recognize twelve distinct tones of music and recreate melodies. And yes, there is an elephant band. But perhaps the most amazing thing about elephants is a capacity even more important than cleverness: their sense of empathy, altruism, and justice. Elephants are the only non-human animals to mourn their dead, performing burial rituals and returning to visit graves. They have shown concern for other species, as well. One working elephant refused to set a log down into a hole where a dog was sleeping, while elephants encountering injured humans have sometimes stood guard and gently comforted them with their trunk. On the other hand, elephant attacks on human villages have usually occurred right after massive poachings or cullings, suggesting deliberate revenge. When we consider all this evidence, along with the fact that elephants are one of the few species who can recognize themselves in a mirror, it's hard to escape the conclusion that they are conscious, intelligent, and emotional beings. Unfortunately, humanity's treatment of elephants does not reflect this, as they continue to suffer from habitat destruction in Asia, ivory poaching in Africa, and mistreatment in captivity worldwide. Given what we now know about elephants and what they continue to teach us about animal intelligence, it is more important than ever to ensure that what the English poet John Donne described as "nature's great masterpiece" does not vanish from the world's canvas.

**P159 2014-11-05 Why elephants never forget - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=159)

翻译人员: Melody Tang 校对人员: Sherry Chen有句老话说，“大象从不忘事”但这些巨大的生物可不仅仅是 巨大的移动硬盘我们对大象的了解越多越了解到，大象那令人钦佩的记忆力只是它们惊人智慧的一方面而已这样的智慧使得大象成为地球上 最具社交能力，最有创造力和最友善的生物与众多谚语不同的是这一个关于大象记忆力的谚语， 从科学角度看是精准的大象认识它的兽群中的每一位同伴它们能够通过视觉或味觉， 识别出多达30位同伴这一能力，在象群迁移或是遇到有敌意的象群时， 都大有帮助大象也能记住和分辨出 某些预示危险的特殊信号并且即便在很久之后，它们也仍能 回想起之前去过的重要地点但最令人们着迷的，是大象的 那些无关生死的记忆大象不仅能记住它的兽群中的同伴还能够记住那些给它们 留下深刻印象的其他生物比如说，有两只大象曾经 短暂的在同一个马戏团表演结果当它们23年之后再见时， 双方都高兴得不得了这样的记忆，不仅局限于大象 这一物种大象在与当时结缘的人类 分别几十年之后，仍能记得他们这一切都显示，大象的记忆力 远超出应激反应这一水平细看大象的大脑，我们就能 理解为什么了大象的大脑尺寸是所有陆地上 哺乳动物中最大的同时大象的脑化商数 也是令人印象颇深这一商数指的是用 生物大脑的尺寸除以我们预期的生物体型大小 而得到的结果大象的情绪商数几乎 和大猩猩的一样高而且尽管大象与人类属于 远缘进化亲系趋同进化令大象的大脑 呈现出了极其近似人类大脑的结构同样具有很多神经元和神经突触以及高度发达的海马体和大脑皮层与情感密切关联的是海马体它能将重要体验嵌入长期记忆这种对重要程度的区分能力， 使得大象的记忆力成为一个复杂、具有适应能力的载体远超机械记忆那些早年挺过旱灾的大象成年后能够认出旱灾的预警信号， 靠的就是这种能力这就是为什么有年长女族长的 象群的存活率更高然而不幸的是，这种能力也使得 大象成为非人类动物中少有的几个会受创伤后 应激障碍所困的动物之一另一方面，大脑皮层赋予大象 具有处理问题的能力这一点可以從大象的 多种创新表现看出来它们同时也能够合作解决问题有些时候，它们操纵同伴的方式 甚至胜过研究者它们还拥有了基本的算数能力在两篮水果的数目变化多次后， 它们仍能记住水果的数目这种少见的记忆力及 解决问题能力的结合可以解释大象的一些极聪明的行为但是对于我们刚刚开始理解的 大象的心理却无法解释大象经常用各种渠道沟通： 身体语言和声音还有数公里之外都能 听到的红外低频咆声它们对句法的理解， 表明它们有自己的语言和语法这类语言可能甚至超出 简单沟通的水平大象谨慎地将不同的颜色和元素 结合起来创造艺术之美它们还能够记住12个不同的音阶， 然后再创造出同样的旋律没错，确实有一个大象乐队但是大象最令人叹为观止的或许是大象身上比聪明 更重要的一个能力是它们的悲悯、奉献和正义感除了人类以外，大象是 唯一一种会为逝者哀悼的动物它们举行葬礼仪式，并会回访墓地它们也展现出了对其他物种的关切一只干活的大象拒绝将原木 放在一个洞里因为有一只狗正在里面睡觉当大象遇到受伤的人类时， 它们有时会站在一旁保卫伤者并用象鼻轻轻安抚他们另一方面，大象对于 人类村庄的攻击通常是在大规模的猎杀后发生的因此可推断那是它们蓄意报复的行为当我们考虑这些证据的时候再想一想大象是少数几个能从镜子中认出自己的物种之一我们很难不如此下结论：大象是有自我意识、聪明 且有情感的物种不幸的是，人类对大象的所作所为 却并没有反映出这一点在亚洲，它们的栖息地 一再遭到破坏在非洲，象牙被非法猎取， 世界其他各地有对它们的囚禁和虐待以我们现在对大象的了解以及它们不断让我们了解到 关于动物智能的信息当前最重要的是要保证正如英国诗人约翰·当德（John Donne） 所形容的那样：“自然的伟大杰作”不会从 世界的油画布上消失（音乐）

**P160 2014-11-10 How do lungs work - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=160)

Many of us have hundreds of things on our minds at any moment, often struggling to keep track of everything we need to do. But fortunately, there's one important thing we don't have to worry about remembering: breathing. When you breathe, you transport oxygen to the body's cells to keep them working and clear your system of the carbon dioxide that this work generates. Breathing, in other words, keeps the body alive. So, how do we accomplish this crucial and complex task without even thinking about it? The answer lies in our body's respiratory system. Like any machinery, it consists of specialized components, and requires a trigger to start functioning. Here, the components are the structures and tissues making up the lungs, as well as the various other respiratory organs connected to them. And to get this machine moving, we need the autonomic nervous system, our brain's unconscious control center for the vital functions. As the body prepares to take in oxygen-rich air, this system sends a signal to the muscles around your lungs, flattening the diaphragm and contracting the intercostal muscles between your ribs to create more space for the lungs to expand. Air then wooshes into your nose and mouth, through your trachea, and into the bronchi that split at the trachea's base, with one entering each lung. Like tree branches, these small tubes divide into thousands of tinier passages called bronchioles. It's tempting to think of the lungs as huge balloons, but instead of being hollow, they're actually spongy inside, with the bronchioles running throughout the parenchyma tissue. At the end of each bronchiole is a little air sack called an alveolus, wrapped in capillaries full of red blood cells containing special proteins called hemoglobin. The air you've breathed in fills these sacks, causing the lungs to inflate. Here is where the vital exchange occurs. At this point, the capillaries are packed with carbon dioxide, and the air sacks are full of oxygen. But due to the basic process of diffusion, the molecules of each gas want to move to a place where there's a lower concentration of their kind. So as oxygen crosses over to the capillaries, the hemoglobin grabs it up, while the carbon dioxide is unloaded into the lungs. The oxygen-rich hemoglobin is then transported throughout the body via the bloodstream. But what do our lungs do with all that carbon dioxide? Exhale it, of course. The autonomic nervous system kicks in again, causing the diaphragm to ball up, and the intercostal muscles to relax, making the chest cavities smaller and forcing the lungs to compress. The carbon dioxide-rich air is expelled, and the cycle begins again. So that's how these spongy organs keep our bodies efficiently supplied with air. Lungs inhale and exhale between 15 and 25 times a minute, which amounts to an incredible 10,000 liters of air each day. That's a lot of work, but don't sweat it. Your lungs and your autonomic nervous system have got it covered.

**P160 2014-11-10 How do lungs work - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=160)

翻译人员: Cissy Yun 校对人员: Yutao Ma时常，我们会有许多事同时在脑海中出现为了关注每一件必须做的事情 我们需要花费许多功夫可幸的是有一件重要的事，不用花功夫去记得那就是呼吸当你呼吸的时候，你将氧气传送到身体的细胞内 并保持它们一直工作同时，也将细胞工作时产生的时二氧化碳清理出去呼吸，使人活着那我们到底如何是在不经意的情况下完成这一项关键又复杂的任务的呢？问题的答案藏在人体的呼吸系统内就像任何机器一样，呼吸系统有着许多不同的零件为了开始工作， 它还需要一个触发点这里的所说的零件 就是组成肺的结构与组织和其他将所有连接在一起的呼吸器官为了使这座机器启动， 我们需要自主神经系统的参与那就是大脑中的掌控重要功能的 潜意识控制中心当人们的身体准备好接受氧气充足的空气时神经系统会发送一个信号给肺部的肌肉使横膈膜变得扁平并收缩肋骨中间的肋间肌这是为了让肺扩张时有更多的空间接着，空气被鼻子与口中吸入并通过气管进入在气管底部分叉的支气管两股空气分别流入两个肺中就像树枝一样 这些细小的气管还会有数以千计的更细的分叉名叫细支气管肺很容易被以为类似一个巨大的气球然而，肺的内部并非是空的 是像海绵一样细支气管遍布在肺部的薄壁组织中在每一根细支气管的底端 都有一个名叫肺泡的空气囊这个气囊被充满红细胞的毛细血管包裹着红细胞中包含着特殊的蛋白质，名叫血红蛋白吸进的空气便会充满着些气囊并且使得肺部扩张这就是关键的交换之地此刻，毛细血管中挤满了二氧化碳而气囊中则充满了氧气按照基本的扩散原理所有气体中的分子 都会想要移动到一个同类分子密度较低的地方所以，氧气将会进入毛细血管血红蛋白会抓住这些氧气而二氧化碳则会被填入肺中然后，充满氧气的血红蛋白会随血流传送到身体各处但是，当我们的肺部充满着二氧化碳时， 它会做什么呢？当然是将其呼出这时，自主神经系统又介入其中让横膈膜上移肋间肌放松使得胸腔变小 从而迫使肺部压缩充满二氧化碳的气体就这样被排出体外 循环便会再次开始这就是这些海绵一的器官使我们的身体 一直有着充足气体的支撑的方法肺部吸气与呼气在一分钟可进行15到25次每一天都会有10,000公升气体介入这是一项巨大的工作，但千万不用担心你的肺和自主神经系统会将他们统统搞定

**P161 2014-11-10 How to create cleaner coal - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=161)

What lights up the screen that you're looking at right now? Trace back the battery chargers and power cords and you'll end up at an electrical outlet, providing easy, safe access to reliable electricity. But beyond that outlet, the picture gets messier. It takes a lot of fuel to heat our homes, preserve our food, and our power our gadgets around the clock. And for 40% of the world, that fuel is cheap, plentiful, and it's called coal. But coal also releases pollutants into the air, like sulfur dioxide, nitrogen oxides, soot, and toxic metals, like mercury. These cause environmental damage, like acid rain, and serious health problems. In fact, in 1952, coal burning caused such heavy smog in London that pedestrians couldn't even see their feet, and thousands of people died from ill health. Since then, many countries have deployed technology to remove most of these pollutants before they reach the air. But now we have a new air pollution problem on our hands, one that doesn't show up in a cloud of dark smog, but in rising seas, floods, and heat waves. It's global climate change, and again, the main culprit is coal. It's responsible for 44% of global carbon dioxide emissions, which trap the sun's heat in the Earth's atmosphere, instead of letting it escape. So now the question is how do we remove that bad stuff as well? That's the idea behind cleaner coal. Creating cleaner coal is really about trying to contain its ill effects with the help of special technologies that make the end product more acceptable. Just like the most intriguing superheroes often have their own dark powers to overcome, so we can try and keep coal's negative forces in check. But why don't we just exterminate coal if it takes that much effort to clean it up? Simply, coal is extremely valuable to us, and it's easy to come by. Compressed underground for ages, coal holds chemical energy from plants that were fed from by the sun hundreds of millions of years ago, long before humans evolved. That makes coal energy dense, meaning it can be burned 'round the clock. It's also cheap, if you ignore the pollution costs, and should last us through the end of the 21st century. We've already got all the infrastructure in place for harnessing its power, and globally, although countries are making a move towards energy from cleaner and more renewable sources, there's no sign yet that coal use is slowing down. In fact, as of 2012, over 1000 new coal plants have been proposed, mostly in China and India. Since for the time being coal is here to stay, experts say that if we want to reduce its emissions' impact on the atmosphere, and slow down climate change, we'll have to think of creative ways of reducing coal's destructive power. To do that, we need to strip it of its foul forces, all that toxic carbon dioxide that causes havoc in the atmosphere. Then, we need to store the CO2 somewhere else. This mission is called carbon capture and sequestration, or CCS. And as if carbon dioxide were some evil genie we didn't want to escape, once it has been separated from coal, we've devised ways to banish it underground. We can do this by injecting it deep into the Earth, or by placing it deep under the ocean's surface. Stripping away coal's negative elements can happen in three ways. First, and most commonly, as coal burns, the exhaust gas can be mixed with a compound called monoethanolamine. Like a forceful power-stripping magnet, this compound bonds to the CO2, yanking it out of the gas stream so it can be stored separately underground. Another method is to relieve coal of its CO2 before it even has a chance to be released as exhaust. In this process, steam and oxygen swoop in to the rescue to convert coal into a special product called syngas, made up of carbon monoxide and hydrogen and some CO2. Zap that with some water vapor, and the carbon monoxide gets converted into carbon dioxide, which can be isolated. The leftover hydrogen gas is then used as energy to generate electricity, so there's an added bonus. A third technique exposes coal to pure oxygen, instead of burning it in air. This creates exhaust gas with higher concentrations of carbon dioxide, which makes it easy to isolate and to banish to the chasms below. All this can reduce emissions at a power plant by up to 90%, but as with any superhero struggling with their destructive powers, it takes a lot of effort to switch over from the dark side. So these positive pollution-busting forces, although they're available, have barely been used in commercial power plants because they cost a lot. But ultimately, the bigger problem is that in most parts of the world, it's still too easy and much cheaper to keep emitting carbon dioxide, and that makes it tempting to completely ignore coal's dark side. In this case, the most powerful force for good is regulation, the rules that can restrict the amount of carbon dioxide emitted from power plants, and make energy companies around the world wary of what they put into the air. Until then, every time you turn on a screen or flick a light switch, coal is lurking in the background, carrying its dark powers with it wherever it goes.

**P161 2014-11-10 How to create cleaner coal - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=161)

翻译人员: Sanqiang Xiao 校对人员: Melody Tang什么点亮了你正在看的屏幕？从电池充电器和电源回溯，你会找到电源插座，它是提供可靠电力的简便、安全途径，但在电源插座后面，画面就混乱许多。大量的燃料被用来 保持我们的房间的温暖、保持食物的新鲜、及不间断地为我们的电子产品充电。世界上40%的燃料是廉价，丰富的被称为煤炭的东西。但煤炭也会向空气中排放污染物，比如二氧化硫、一氧化氮、煤灰、及例如汞的有毒金屬这些造成环境破坏，如酸雨，也造成的严重的健康问题。事实上，在1952年，煤炭的燃烧 在伦敦造成了严重的雾霾，行人甚至看不到他们的脚，成千上万的人死于健康问题。从那以后，许多的国家已采用科学技术使得污染物在进入空气前就被去除掉了。但现在我们手头上有新的污染问题，一个是它不会展现黑色雾霾云，而是海平面上升、洪水、及热浪。这是全球气候变化，而其主要元凶又是煤炭。它造成了全球44%的二氧化碳排放，把太阳的热量捕获到地球大气中，而不是让它排放出去。所以现在的问题是， 我们该如何也除掉这个坏东西？这是比较清洁的煤炭背后的理念。制造更清洁的煤炭在于抑制它的副作用，使用特殊的技术使得 最终的产物更加容易被接受。正如大多数神秘的超级英雄往往需要克服它们自身的黑暗能量，我们也应该尝试把煤炭的负面作用 控制在一定范围内。既然清洁煤炭需要花这么多功夫， 为什么我们不摈弃它呢？简单地说，碳对我们有非常重要的价值，而且它非常容易获得。通过在地下长时间的压缩，煤炭包含了亿万年间从太阳到这个星球上来的化学能量，比人类演化史还长。这使得煤炭的能量很密集，意味着它能燃烧很久。它也很便宜，如果不计算污染成本的话，而且应该能一直用到21世纪末。我们已经建立了治理它的设施，从全球来看，尽管各个国家在尝试获得清洁能源和可再生能源的方法，目前仍没有现象显示， 煤炭的消耗正在减少。事实上，在2012年至少1000个新的煤炭工厂 正在被计划兴建。大部分在中国和印度。由于暂时煤炭还不会被取代，专家称如果我们希望减少 碳排放对大气的影响，延缓气候变化，我们需要想出一个 减少煤炭破坏力的创新方法。首先，我们需要限制它副作用，那就是对大气造成严重污染的 有毒二氧化碳。其次，我们需要把二氧化碳 储存到其他地方，这个任务被称为“碳捕获和封存”。即CCS。二氧化碳是我们不想放跑的邪恶精灵，一旦它从煤炭中分离出来，我们设计了一些方法把它埋藏到地下。我们可以把它注射到地底深处，或放置到深海底下。消除煤炭的不良影响 可以通过三种途径：首先，也是最普遍的，煤炭燃烧时排出的气体可以与 被称为乙醇胺的复合物混合，像一个强力的磁铁， 将二氧化碳吸附起来，从而将CO2从大气中剥离出来，让我们可以将它单独地储存到地下。另一个方法是减少煤炭中的二氧化碳，在它还没有能被释放之前。在这个过程中，氧气和蒸汽 被引入作为还原剂将煤炭转化为一种特殊的产物， 称为“合成气”它由一氧化碳，氢气和二氧化碳组成。将其与水蒸气混合，一氧化碳可以转化为二氧化碳。进而被隔离出来。剩下的氢气就可作为发电的原料，一举两得。第三个技术是在纯氧中燃烧煤炭，而不是在空气中。这会释放高浓度的二氧化碳，使得碳的分离变得简单，这最多可以减少90%的碳排放。但正如任何一位超级英雄 挣扎着克服自己黑暗的一面，从黑暗面中解脱出来非常困难。所以这些解决方案，尽管可行，但在商业发电厂几乎没有被采用，因为实在太贵了。但最终，最大的问题是 在世界上大部分的地区，放任二氧化碳排放依旧是 非常简单而且廉价的方法。使得人们倾向于完全忽视碳的黑暗面。在这种情况下，最有效的方法 就是制定规范，限制发电厂的二氧化碳的排放，使得全世界的能源公司明白他们往空气中排放了什么。直到那时为止，当你每一次打开荧幕或点亮灯泡时，煤炭都潜伏在背后，带着他的黑暗能量走向各处。（音乐）

**P162 2014-11-10 What are those floaty things in your eye - Michael Mauser**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=162)

Have you ever noticed something swimming in your field of vision? It may look like a tiny worm or a transparent blob, and whenever you try to get a closer look, it disappears, only to reappear as soon as you shift your glance. But don't go rinsing out your eyes! What you are seeing is a common phenomenon known as a floater. The scientific name for these objects is Muscae volitantes, Latin for "flying flies," and true to their name, they can be somewhat annoying. But they're not actually bugs or any kind of external objects at all. Rather, they exist inside your eyeball. Floaters may seem to be alive, since they move and change shape, but they are not alive. Floaters are tiny objects that cast shadows on the retina, the light-sensitive tissue at the back of your eye. They might be bits of tissue, red blood cells, or clumps of protein. And because they're suspended within the vitreous humor, the gel-like liquid that fills the inside of your eye, floaters drift along with your eye movements, and seem to bounce a little when your eye stops. Floaters may be only barely distinguishable most of the time. They become more visible the closer they are to the retina, just as holding your hand closer to a table with an overhead light will result in a more sharply defined shadow. And floaters are particularly noticeable when you are looking at a uniform bright surface, like a blank computer screen, snow, or a clear sky, where the consistency of the background makes them easier to distinguish. The brighter the light is, the more your pupil contracts. This has an effect similar to replacing a large diffuse light fixture with a single overhead light bulb, which also makes the shadow appear clearer. There is another visual phenomenon that looks similar to floaters but is in fact unrelated. If you've seen tiny dots of light darting about when looking at a bright blue sky, you've experienced what is known as the blue field entoptic phenomenon. In some ways, this is the opposite of seeing floaters. Here, you are not seeing shadows but little moving windows letting light through to your retina. The windows are actually caused by white blood cells moving through the capillaries along your retina's surface. These leukocytes can be so large that they nearly fill a capillary causing a plasma space to open up in front of them. Because the space and the white blood cells are both more transparent to blue light than the red blood cells normally present in capillaries, we see a moving dot of light wherever this happens, following the paths of your capillaries and moving in time with your pulse. Under ideal viewing conditions, you might even see what looks like a dark tail following the dot. This is the red blood cells that have bunched up behind the leukocyte. Some science museums have an exhibit which consists of a screen of blue light, allowing you to see these blue sky sprites much more clearly than you normally would. While everybody's eyes experience these sort of effects, the number and type vary greatly. In the case of floaters, they often go unnoticed, as our brain learns to ignore them. However, abnormally numerous or large floaters that interfere with vision may be a sign of a more serious condition, requiring immediate medical treatment. But the majority of the time entoptic phenomena, such as floaters and blue sky sprites, are just a gentle reminder that what we think we see depends just as much on our biology and minds as it does on the external world.

**P162 2014-11-10 What are those floaty things in your eye - Michael Mauser**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=162)

翻译人员: Yingfei Xue 校对人员: Cissy Yun你是否会注意到自己的视线中有漂浮物？它看起来像是小虫或者透明液滴但当你想要更仔细地看它的时候 它又消失了转换视线之后 它又会出现但你别去冲洗眼睛！你看的其实是一种常见现象，飞蚊症科学界称之为 Muscae volitantes是拉丁语中飞蚊的意思物如其名，它们有时很讨厌但它们不是真正的虫或者身外之物它们就存在于你的眼球中因为“飞蚊”会不断地变形 所以人们会觉得它们是有生命的其实不是“飞蚊”是一种极小的物质，投影于视网膜也就是眼球后部的光敏组织它们可能是小块组织红细胞或是蛋白质团由于它们悬浮于玻璃体也就是眼内的胶状组织“飞蚊”会随眼球而移动眼球停止转动时 它又会少许地弹动“飞蚊”大多数时候不易被察觉当它们靠近视网膜时，它们变得可看见这就相当于你把手放在吊灯下 更接近桌子时手的阴影会更明显“飞蚊”也会很明显比如当你盯着发光的表面时像是空白的屏幕雪或是晴空因为颜色一致的背景会使“飞蚊”更明显当看到的光越亮 瞳孔会收缩的更厉害这就好比把许多散射的光换成一个大的聚光灯也会使得阴影更加明显另外也有一种视觉现象与飞蚊症类似但与之无关当你仰望蓝天时会看到小光点在快速闪动这被称之为谢瑞尔氏现象这与看到飞蚊相反此时,你看到的不是阴影而是一些移动的小开口让光进入视网膜这些开口是由白细胞造成的白细胞穿梭在视网膜表面的毛细血管白细胞可以大到填满整个毛细血管这导致了白细胞身前的空隙由于这些空隙和白细胞本身相比于血管中的红细胞更能让蓝光透过我们因此看到小光点沿着毛细血管移动 也随着脉搏而移动在理想状况下甚至会看到光点后有条黑尾巴这是白细胞身后堆积的红细胞造成的有些科技馆中 会展览出一整屏幕的蓝光这会让你跟清楚的看到这一现象因为虽然每个人都会经历这些现象每个人看到的程度都不同就飞蚊症而言大多数会被我们的大脑所忽视但是数目异常多或者大到影响视线的飞蚊可能意味着你需要紧急医疗救助但是多数的眼内现象比如飞蚊或者谢瑞尔氏现象只是委婉地提醒我们自认为看到的东西取决于我们的生理和大脑就和取决于外部世界一样

**P163 2014-11-12 The mighty mathematics of the lever - Andy Peterson and Zack Patterso**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=163)

A famous Ancient Greek once said, "Give me a place to stand, and I shall move the Earth." But this wasn't some wizard claiming to perform impossible feats. It was the mathematician Archimedes describing the fundamental principle behind the lever. The idea of a person moving such a huge mass on their own might sound like magic, but chances are you've seen it in your everyday life. One of the best examples is something you might recognize from a childhood playground: a teeter-totter, or seesaw. Let's say you and a friend decide to hop on. If you both weigh about the same, you can totter back and forth pretty easily. But what happens if your friend weighs more? Suddenly, you're stuck up in the air. Fortunately, you probably know what to do. Just move back on the seesaw, and down you go. This may seem simple and intuitive, but what you're actually doing is using a lever to lift a weight that would otherwise be too heavy. This lever is one type of what we call simple machines, basic devices that reduce the amount of energy required for a task by cleverly applying the basic laws of physics. Let's take a look at how it works. Every lever consists of three main components: the effort arm, the resistance arm, and the fulcrum. In this case, your weight is the effort force, while your friend's weight provides the resistance force. What Archimedes learned was that there is an important relationship between the magnitudes of these forces and their distances from the fulcrum. The lever is balanced when the product of the effort force and the length of the effort arm equals the product of the resistance force and the length of the resistance arm. This relies on one of the basic laws of physics, which states that work measured in joules is equal to force applied over a distance. A lever can't reduce the amount of work needed to lift something, but it does give you a trade-off. Increase the distance and you can apply less force. Rather than trying to lift an object directly, the lever makes the job easier by dispersing its weight across the entire length of the effort and resistance arms. So if your friend weighs twice as much as you, you'd need to sit twice as far from the center as him in order to lift him. By the same token, his little sister, whose weight is only a quarter of yours, could lift you by sitting four times as far as you. Seesaws may be fun, but the implications and possible uses of levers get much more impressive than that. With a big enough lever, you can lift some pretty heavy things. A person weighing 150 pounds, or 68 kilograms, could use a lever just 3.7 meters long to balance a smart car, or a ten meter lever to lift a 2.5 ton stone block, like the ones used to build the Pyramids. If you wanted to lift the Eiffel Tower, your lever would have to be a bit longer, about 40.6 kilometers. And what about Archimedes' famous boast? Sure, it's hypothetically possible. The Earth weighs 6 x 10^24 kilograms, and the Moon that's about 384,400 kilometers away would make a great fulcrum. So all you'd need to lift the Earth is a lever with a length of about a quadrillion light years, 1.5 billion times the distance to the Andromeda Galaxy. And of course a place to stand so you can use it. So for such a simple machine, the lever is capable of some pretty amazing things. And the basic elements of levers and other simple machines are found all around us in the various instruments and tools that we, and even some other animals, use to increase our chances of survival, or just make our lives easier. After all, it's the mathematical principles behind these devices that make the world go round.

**P163 2014-11-12 The mighty mathematics of the lever - Andy Peterson and Zack Patterso**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=163)

翻译人员: Qin Yu 校对人员: Qiwen Lu一个有名的古希腊人曾说：”给我一个支点，我可以撬动地球。“这可不是哪个巫师在吹他的通天大法这是数学家阿基米德对杠杆的基本原理的描述一个人能撬动这么大的质量可能听起来不可思议但其实你很可能在日常生活中已经看到过了其中一个最好的例子你在儿童游乐园就可能看出来那就是跷跷板假如你和你朋友想要玩跷跷板如果你倆儿一样重你就可以上上下下自如运动但如果你朋友比你重呢？那你只能一直停在上面幸好，你估计知道怎么做只需要向后移一点，你就下来了这看上去好像简单到你生下来就会但是你实际上已经在使用杠杆举起平时举不起的重物了杠杆是我们所称的简单机械的一种他们都巧妙的运用了基本物理原理减少了完成任务所需的能量让我们来看看这背后的原理每一个杠杆都主要由三部分组成动力臂，阻力臂和支点在跷跷板的例子中，你的重力是动力你朋友的重力是阻力阿基米德发现，力的大小与到支点的距离之间有着重要的关系杠杆的平衡条件是：动力与动力臂的乘积与阻力和阻力臂的乘积相等原因是一条基本物理原理，即以焦耳计量的功等于力与力的作用距离的乘积杠杆不能减少提起重物所需的功但是你可以拿距离换力，即增加做功距离，减小作用力无须直接把重物举起来杠杆可以把重量分散到整个力臂上，从而降低了工作难度所以如果你朋友是你的两倍体重你需要坐到离支点两倍远的距离才能把他翘起来同样的，他那个只有你四分之一重的小妹妹也可以坐到四倍距离处把你翘起来有趣的跷跷板背后隐藏的是深刻的杠杆的原理和可能用途你可以用一个足够大的杠杆举起很重的东西一个150磅（68千克）重的人可以用一根仅仅3.7米长的杠杆举起一辆小轿车或者用10米长的杠杆举起一块2.5吨的石块跟建金字塔的那些差不多如果你想举起埃菲尔铁塔，你的杠杆恐怕得长一点大概40.6公里长那阿基米德的那个著名牛皮呢？当然，理论上是有可能的地球重6乘以10的24次方千克而离距地球384400公里的月亮刚好成为一个支点所以要举起地球，你只需一根一千万亿光年长的杠杆便可等于到仙女座星系距离的一百五十万倍当然了，你还需要一个站的地方所以别看它只是个简单机械，杠杆可是能做很多神奇的事情呢而杠杆等简单机械里的基本元素也可见于生活中的各种器械和工具中人类和其他动物用它们来求生存或求便捷说到底，是这些工具背后的数学原理支配着这大千世界

**P164 2014-11-17 How does cancer spread through the body - Ivan Seah Yu Jun**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=164)

The onset of cancer usually begins as a solitary tumor in a specific area of the body. If the tumor is not removed, cancer has the ability to spread to nearby organs, as well as places far away from the origin, such as the brain. So how does cancer move to new areas, and why are some organs more likely to get infected than others? The process of cancer spreading across the body is known as metastasis. It begins when cancer cells from an initial tumor invade nearby normal tissue. As the cells proliferate, they spread via one of the three common routes of metastasis: transcoelomic, lymphatic, or hematogenous spread. In transcoelomic spread, malignant cells penetrate the covering surfaces of cavities in our body. These surfaces are known as peritoneum and serve as walls to segment the body cavity. Malignant cells in ovarian cancer, for example, spread through peritoneum, which connects the ovary to the liver, resulting in metastasis on the liver surface. Next, cancerous cells invade blood vessels when they undergo hematogenous spread. As there are blood vessels almost everywhere in the body, malignant cells utilize this to reach more distant parts of the body. Finally, lymphatic spread occurs when the cancer invades the lymph nodes, and travels to other parts of the body via the lymphatic system. As this system drains many parts of the body, it also provides a large network for the cancer. In addition, the lymphatic vessels empty into the blood circulation, allowing the malignant cells to undergo hematogenous spread. Once at a new site, the cells once again undergo proliferation, and form small tumors known as micrometastases. These small tumors then grow into full-fledged tumors, and complete the metastatic process. Different cancers have been known to have specific sites of metastasis. For example, prostate cancer commonly metastasizes to the bone, while colon cancer metastasizes to the liver. Various theories have been proposed to explain the migration pattern of malignant cells. Of particular interest are two conflicting theories. Stephen Paget, an English surgeon, came up with the seed and soil theory of metastasis. The seed and soil theory stated that cancer cells die easily in the wrong microenvironment, hence they only metastasize to a location with similar characteristics. However, James Ewing, the first professor of pathology at Cornell University, challenged the seed and soil theory, and proposed that the site of metastasis was determined by the location of the vascular and lymphatic channels which drain the primary tumor. Patients with primary tumors that were drained by vessels leading to the lung would eventually develop lung metastases. Today, we know that both theories contain valuable truths. Yet the full stories of metastasis is much more complicated than either of the two proposed theories. Factors like the cancer cell's properties, and the effectiveness of the immune system in eliminating the cancer cells, also play a role in determining the success of metastasis. Unfortunately, many questions about metastasis remain unanswered until today. Understanding the exact mechanism holds an important key to finding a cure for advanced stage cancers. By studying both the genetic and environmental factors, which contribute to successful metastasis, we can pinpoint ways to shut down the process. The war against cancer is a constant struggle, and scientists are hard at work developing new methods against metastasis. Of recent interest is immunotherapy, a modality which involves harnessing the power of the immune system to destroy the migrating cells. This can be done in different ways, such as training immune cells to recognize cancerous cells via vaccines. The growth and activity of the immune cells can also be stimulated by injecting man-made interleukins, chemicals which are usually secreted by the immune cells of the body. These two treatments are only the tip of the iceberg. With the collaborated research efforts of governments, companies and scientists, perhaps the process of metastasis will be stopped for good.

**P164 2014-11-17 How does cancer spread through the body - Ivan Seah Yu Jun**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=164)

翻译人员: Chelsea Luo 校对人员: Matt Chan癌症一般是由身体某处单独的肿瘤演变而来的。一旦肿瘤没被及时去除，癌细胞便有能力扩散到附近的器官，甚至更远，例如大脑。那么到底癌症是怎么转移到新的区域的呢？为什么有些器官受感染的可能性会更大呢？癌细胞在体内扩散的过程叫做转移。当癌细胞离开原发肿瘤部位侵入附近正常的细胞组织， 这一过程便开始了。随着细胞的快速扩散，它们通过三种不同转移路径中的其中一条， 扩散到体内其他部位。分别是种植性转移，血道转移和淋巴转移。在种植性转移中，恶性细胞 穿透体内腔体的表层。这些表层叫做腹膜。它们像墙一样把我们的体腔分隔开来。举个例子，卵巢癌的恶性细胞穿过连接卵巢和肝脏的腹膜，使得癌症转移到肝脏表层。接着，癌细胞侵入血管并开始血道转移，它们随着这些遍布全身的血管到达身体较远的地方。最后，癌细胞侵入淋巴结 发生淋巴转移通过淋巴系统到达身体的其他部位。因为淋巴系统灌溉身体各处这为癌症转移提供了巨大的网络。汇入血液的淋巴管让 恶性细胞进入血液循环，给了它们血道转移的机会。一旦到达新位置，恶性细胞再次 快速繁殖并形成小肿瘤，叫做微转移。这些小肿块最终繁殖成 发育完全的肿瘤，完成转移的过程。现在已经知道，不同类型的癌细胞会向不同的地方转移。比如说，前列腺癌通常转移到骨骼而直肠癌一般向肝脏转移。人们给出了许多理论来解释癌细胞的迁移模式。其中最引人注意的是两个相互矛盾的理论。一位英国外科医生， 斯蒂芬·派吉特提出了种子-土壤学说。这种理论认为，在错误的微环境下癌细胞很容易死亡，因此它们只往相似的环境转移。而詹姆斯·尤因，康奈尔大学的第一位病理学教授，却给出了与土壤学说相反的解释。他认为，转移的地点是由初期肿瘤进入的血管和淋巴管的位置决定的。当一个患者初期肿瘤的脉管通向肺部，他的癌细胞便会转移到肺部。如今，我们知道这两个理论都有一定的道理，不过癌细胞的转移比它们解释的 要复杂太多太多。许多因素，例如癌细胞的特点和免疫系统去除这些细胞的效力都影响着癌症转移的成功率。不幸的是，很多关于转移 的问题至今仍是未解之谜。完全了解该机理对于寻找治疗晚期癌症的方法来说至关重要。研究使癌细胞转移成功的基因因素和环境因素可以让我们找到阻止这过程的方法。与癌症的战斗是持续而艰难的，科学家们依旧在研究 新的抑制转移的方法。最近备受关注的是免疫疗法：通过加强免疫系统的能力来消灭迁移的细胞。许多方式都能达到这种效果，例如通过疫苗让免疫细胞 识别癌细胞。或者注射人造白介素，一种通常由 免疫系统分泌的化学成份，来刺激免疫细胞的生长和活动。这两种治疗方式都只是冰山一角。在政府，公司和科学家们 的共同努力下也许有一天，我们真的能成功制止癌症转移。

**P165 2014-11-24 The hidden worlds within natural history museums - Joshua Drew**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=165)

When you think of natural history museums, you probably picture exhibits filled with ancient lifeless things, like dinosaurs meteroites, and gemstones. But behind that educational exterior, which only includes about 1% of a museum's collection, there are hidden laboratories where scientific breakthroughs are made. Beyond the unmarked doors, and on the floors the elevators won't take you to, you'd find windows into amazing worlds. This maze of halls and laboratories is a scientific sanctuary that houses a seemingly endless variety of specimens. Here, researchers work to unravel mysteries of evolution, cosmic origins, and the history of our planet. One museum alone may have millions of specimens. The American Museum of Natural History in New York City has over 32,000,000 in its collection. Let's take a look at just one of them. Scientists have logged exactly where and when it was found and used various dating techniques to pinpoint when it originated. Repeat that a million times over, and these plants, animals, minerals, fossils, and artifacts present windows into times and places around the world and across billions of years of history. When a research problem emerges, scientists peer through these windows and test hypotheses about the past. For example, in the 1950s, populations of predatory birds, like peregrine falcons, owls, and eagles started to mysteriously crash, to the point where a number of species, including the bald eagle, were declared endangered. Fortunately, scientists in The Field Museum in Chicago had been collecting the eggs of these predatory birds for decades. They discovered that the egg shells used to be thicker and had started to thin around the time when an insecticide called DDT started being sprayed on crops. DDT worked very well to kill insects, but when birds came and ate those heaps of dead bugs, the DDT accumulated in their bodies. It worked its way up the food chain and was absorbed by apex predator birds in such high concentrations that it thinned their eggs so that they couldn't support the nesting bird's weight. There were omelettes everywhere until scientists from The Field Museum in Chicago, and other institutions, helped solve the mystery and save the day. America thanks you, Field Museum. Natural history museums windows into the past have solved many other scientific mysteries. Museum scientists have used their collections to sequence the Neanderthal genome, discover genes that gave mammoths red fur, and even pinpoint where ancient giant sharks gave birth. There are about 900 natural history museums in the world, and every year they make new discoveries and insights into the Earth's past, present and future. Museum collections even help us understand how modern threats, such as global climate change, are impacting our world. For instance, naturalists have been collecting samples for over 100 years from Walden Pond, famously immortalized by Henry David Thoreau. Thanks to those naturalists, who count Thoreau among their number, we know that the plants around Walden Pond are blooming over three weeks earlier than they did 150 years ago. Because these changes have taken place gradually, one person may not have noticed them over the span of a few decades, but thanks to museum collections, we have an uninterrupted record showing how our world is changing. So the next time you're exploring a natural history museum, remember that what you're seeing is just one gem of a colossal scientific treasure trove. Behind those walls and under your feet are windows into forgotten worlds. And who knows? One day some future scientist may peer through one and see you.

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翻译人员: Jian Zhipeng 校对人员: Jenny Yang当你想到自然历史博物馆时你可能会想起各种古老 又毫无生命的陈列品比如，恐龙陨石和宝石在充满教育意义的外表的背后这些仅仅占博物馆收藏品的1%这里隐藏着 进行许多科学技术突破的实验室在没有标示的门后在搭乘电梯无法到达的楼层上你会发现一个让你 进入令人惊奇的世界的窗口这个由走廊和实验室构建而成的 迷宫堪称科研的圣殿因为它储藏着无穷而多样的标本在这里，科研人员致力于 解开进化论的谜团宇宙的起源和地球的历史任何一座自然历史博物馆 都可能有数百万的标本座落于纽约市的 美国自然历史博物馆收藏的标本就超过三千两百万件让我们看看其中的一件科学家们准确地记录下 找到这件标本的时间和地点并采用各种年代测定技术， 精确判断它发源于何时他们重复以上步骤一百万次以上，这些植物们动物，矿石,化石，和文物所呈现的是世界各地在不同时期的样貌并且跨越数十亿年的历史当一个研究问题浮现时科研家们透过这些标本 所呈现的画面并测试对过去的假设例如，在1950年代， 对鸟类的捕食例如，游隼，猫头鹰，和老鹰的数量开始 神秘地骤减若干鸟类甚至濒临灭绝其中包括秃头鹰万幸的是，美国芝加哥 自然历史博物馆的科学家们几十年来一直在收集这些 捕食鸟类所产的蛋他们发现蛋壳以前比较厚而从杀虫剂DDT开始 被用于农作物上时蛋壳开始变薄DDT杀虫效果非常显著但当鸟类吃了成堆的这些死虫DDT进而在鸟类体内堆积DDT成为了食物链的一部分位于食物链顶端的捕食鸟类吸收了高浓度的DDT以至于产下的蛋壳都变薄了薄得无法承受巢鸟的重量碎鸡蛋遍地都是直到美国芝加哥自然历史博物馆的科学家们和其他机构的专家一起解开了谜团， 挽救了局面美国感谢您，自然历史博物馆自然历史博物馆给了我们 窥视历史的窗口从而解决了许多其他科研的谜团博物馆科学家们曾利用馆藏计算出穴居人的染色体序列发现了猛玛象的红毛基因甚至精确的定位 古老巨鲨的分娩的地方世界各地大约有900座 自然历史博物馆每一年，它们都会有新的发现和有关于地球的过去，现在， 和未来的见解博物馆藏品甚至能帮助 我们理解现世的危机例如，全球气候变化正在影响着我们的世界举个例子，在过去的100年里，自然学家从瓦尔登湖采集样本瓦尔登湖因为美国先验论者 大卫‧梭罗而闻名于世由于这些自然学家参考了 梭罗的纪录我们才知道瓦尔登湖一带的植物比起150年前， 开花期提早了3个星期因为这些变化发生得很缓慢人们在几十年间可能无法 察觉这类变化但是多亏了博物馆的藏品我们才有连续的纪录， 向我们展示世界不断的变化所以下一次当你探索一所 自然历史博物馆时记住，你所看到的只是 巨大科研宝藏中的一颗宝石在那些墙的背后，在你的脚下， 是进入被人遗忘的世界的窗口谁知道呢？也许在未来某天，科学家们 会从其中的一个窗口看到你（音乐）

**P166 2014-11-24 The pharaoh that wouldn't be forgotten - Kate Green**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=166)

Three and a half thousand years ago in Egypt, a noble pharaoh was the victim of a violent attack. But the attack was not physical. This royal had been dead for 20 years. The attack was historical, an act of damnatio memoriae, the damnation of memory. Somebody smashed the pharaoh's statues, took a chisel and attempted to erase the pharaoh's name and image from history. Who was this pharaoh, and what was behind the attack? Here's the key: the pharaoh Hatshepsut was a woman. In the normal course of things, she should never have been pharaoh. Although it was legal for a woman to be a monarch, it disturbed some essential Egyptian beliefs. Firstly, the pharaoh was known as the living embodiment of the male god Horus. Secondly, disturbance to the tradition of rule by men was a serious challenge to Maat, a word for "truth," expressing a belief in order and justice, vital to the Egyptians. Hatshepsut had perhaps tried to adapt to this belief in the link between order and patriarchy through her titles. She took the name Maatkare, and sometimes referred to herself as Hatshepsu, with a masculine word ending. But apparently, these efforts didn't convince everyone, and perhaps someone erased Hatshepsut's image so that the world would forget the disturbance to Maat, and Egypt could be balanced again. Hatshepsut, moreover, was not the legitimate heir to the thrown, but a regent, a kind of stand-in co-monarch. The Egyptian kingship traditionally passed from father to son. It passed from Thutmose I to his son Thutmose II, Hatshepsut's husband. It should have passed from Thutmose II directly to his son Thutmose III, but Thutmose III was a little boy when his father died. Hatshepsut, the dead pharaoh's chief wife and widow, stepped in to help as her stepson's regent but ended up ruling beside him as a fully fledged pharaoh. Perhaps Thutmose III was angry about this. Perhaps he was the one who erased her images. It's also possible that someone wanted to dishonor Hatshepsut because she was a bad pharaoh. But the evidence suggests she was actually pretty good. She competently fulfilled the traditional roles of the office. She was a great builder. Her mortuary temple, Djeser-Djeseru, was an architectural phenomenon at the time and is still admired today. She enhanced the economy of Egypt, conducting a very successful trade mission to the distant land of Punt. She had strong religious connections. She even claimed to be the daughter of the state god, Amun. And she had a successful military career, with a Nubian campaign, and claims she fought alongside her soldiers in battle. Of course, we have to be careful when we assess the success of Hatshepsut's career, since most of the evidence was written by Hatshepsut herself. She tells her own story in pictures and writing on the walls of her mortuary temple and the red chapel she built for Amun. So who committed the crimes against Hatshepsut's memory? The most popular suspect is her stepson, nephew and co-ruler, Thutmose III. Did he do it out of anger because she stole his throne? This is unlikely since the damage wasn't done until 20 years after Hatshepsut died. That's a long time to hang onto anger and then act in a rage. Maybe Thutmose III did it to make his own reign look stronger. But it is most likely that he or someone else erased the images so that people would forget that a woman ever sat on Egypt's throne. This gender anomaly was simply too much of a threat to Maat and had to be obliterated from history. Happily, the ancient censors were not quite thorough enough. Enough evidence survived for us to piece together what happened, so the story of this unique powerful woman can now be told.

**P166 2014-11-24 The pharaoh that wouldn't be forgotten - Kate Green**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=166)

翻译人员: Enshu Cheng 校对人员: Cissy Yun在三千五百多年前的埃及一位高贵的法老成为了一次激烈的攻击中的受害者但是那次攻击不是物质层面的这位法老已经死亡了二十年了那次攻击有极大的历史价值那是一次除名毁忆，一种对记忆的毁灭有人将法老的雕像粉碎用凿子试图将法老的名字和形象从历史中除去这位法老是谁？ 这次攻击又是谁在背后指使的？这里是关键：法老哈特谢普苏特是位女性在正常情况下，她是无法当上法老的尽管女性成为最高统治者是合法的这还是妨碍了一些基本的埃及信仰首先，法老被认为是男神荷鲁斯的活化身第二，对男性统治的传统的动摇对Maat来说是一个严峻的挑战Maat意思是“真理”，象征着对规律和公正的信仰这对埃及人来说十分关键哈特谢普苏特可能尝试过用她的名称适应这种规则和父系社会紧密相连的信仰她给自己命名为马卡里并且有时叫自己哈特谢普苏特，一个更有男子气概尾音的名字但是很明显，这些努力并没有让每个人都信服可能有些人认为抹去哈特谢普苏特的形象这个世界就会忘了她对真理的干扰然后埃及就可以重新安定了哈特谢普苏特，此外，也不是王位的合理继承者而是一个摄政王，一种常务，代理统治者埃及王权传统上是从父亲传给儿子它从图特摩斯一世传给他的儿子图特摩斯二世哈特谢普苏特的配偶王位应该再从图特摩斯二世直接传给他的儿子，图特摩斯三世但是图特摩斯三世在他父亲去世时还是一个小男孩哈特谢普苏特，那位死去法老的主配偶，一个寡妇介入并帮助她的继子统治但是最后变成了在他旁边统治的独立的法老估计图特摩斯三世对这个情况十分生气可能他就是那个抹去她形象的人但也有可能是有的人想玷辱哈特谢普苏特因为她是一个不好的法老但是证据显示，她其实还是不错的她完全履行了传统上统治的职责她是一个伟大的建筑者她的祭庙，Djeser-Djeseri那时是建筑上的奇迹现在仍然被景仰着她促进了埃及的经济十分成功的管理了一个前往遥远蓬特的交易任务她有很强的宗教关联她甚至声称是主神阿蒙的女儿并且在努比亚作战时有一个成功的军事生涯并且声称她在战争中与她的战士们一同作战当然，我们不得不小心的评价哈特谢普苏特的成功因为大部分证据都是哈特谢普苏特自己写的她在图画的文字中写她自己的故事画写在她祭庙的墙上和她为阿蒙建造的红色礼拜堂中所以是谁对哈特谢普苏特的历史形象下了黑手？最普遍认为的嫌疑人是她的继子、侄子、一同统治时的人，图特摩斯三世是他因为她抢走了他的王位而生气 进而做了这一切？这不太可能，因为那些破坏直到哈特谢普苏特死后二十年后才进行对于一直气愤，最后在大怒中实施破坏来说， 这时间太长了可能图特摩斯三世这样做来加固自己的统治但是最有可能的是他或者其他人抹去她的形象这样人们就会忘记有个女性曾经拥有过埃及的王位这个异常的性别对Maat简单来说就是太大的威胁了必须在历史中去除高兴的是，古时的检查没有那么彻底足够的证据存留了下来，让我们拼凑明白了发生了什么所以这位独特的、有影响力的女人的故事 现在可以被传颂了

**P167 2014-12-01 What we know (and don't know) about Ebola - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=167)

In the summer of 1976, a mysterious epidemic suddenly struck two central African towns, killing the majority of its victims. Medical researchers suspected the deadly Marburg virus to be the culprit. But what they saw in microscope images was an entirely new pathogen, which would be named after the nearby Ebola river. Like yellow fever or dengue, the disease caused by the Ebola virus is a severe type of hemorrhagic fever. It begins by attacking the immune system's cells and neutralizing its responses, allowing the virus to proliferate. Starting anywhere from two to twenty days after contraction, initial symptoms like high temperature, aching, and sore throat resemble those of a typical flu, but quickly escalate to vomiting, rashes, and diarrhea. And as the virus spreads, it invades the lymph nodes and vital organs, such as kidneys and liver, causing them to lose function. But the virus itself is not what kills Ebola victims. Instead, the mounting cell deaths trigger an immune system overload, known as a cytokine storm, an explosion of immune responses that damages blood vessels, causing both internal and external bleeding. The excessive fluid loss and resulting complications can be fatal within six to sixteen days of the first symptoms, though proper care and rehydration therapy can significantly reduce mortality rates in patients. Fortunately, while Ebola is highly virulent, several factors limit its contagiousness. Unlike viruses that proliferate through small, airborne particles, Ebola only exists in bodily fluids, such as saliva, blood, mucus, vomit, or feces. In order to spread, these must be transmitted from an infected person into another's body through passageways such as the eyes, mouth, or nose. And because the disease's severity increases directly along with the viral load, even an infected person is unlikely to be contagious until they have begun to show symptoms. While Ebola has been shown to survive on surfaces for several hours, and transmission through sneezing or coughing is theoretically possible, virtually all known cases of contraction have been through direct contact with the severely ill, with the greatest risk posed to medical workers and friends or relatives of the victims. This is why, despite its horrifying effects, Ebola has been far less deadly overall than more common infections, such as measles, malaria, or even influenza. Once an outbreak has been contained, the virus does not exist in the human population until the next outbreak begins. But while this is undoubtedly a good thing, it also makes Ebola difficult to study. Scientists believe fruit bats to be its natural carriers, but just how it is transmitted to humans remains unknown. Furthermore, many of the countries where Ebola outbreaks occur suffer from poor infrastructure and sanitation, which enables the disease to spread. And the poverty of these regions, combined with the relatively low amount of overall cases means there is little economic incentive for drug companies to invest in research. Though some experimental medicines have shown promise, and governments are funding development of a vaccine, as of 2014, the only widespread and effective solutions to an Ebola outbreak remain isolation, sanitation, and information.

**P167 2014-12-01 What we know (and don't know) about Ebola - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=167)

翻译人员: Jenny Yang 校对人员: Yuanqing Edberg在1976年夏天两个中非小镇上爆发了场奇怪的流行病导致大多数病人死亡医学家曾怀疑高危的马尔堡病毒是元凶但通过显微镜 他们发现了一种新的病原它因附近的埃博拉河而得名就像黄热病和登革热由埃博拉病毒引起的疾病 是一种严重的出血性发热。病毒首先攻击免疫系统来减弱免疫反应使自身繁殖被感染后的二到二十天后，最初的症状出现包括高热，身体疼痛，以及喉咙痛这与典型流感相似，但症状迅速加剧至呕吐，红疹和腹泻。病毒扩散时它入侵淋巴结和重要器官，比如肝和肾， 使其功能衰竭。但病毒本身并不是致死原因。大量细胞死亡所导致的免疫系统超负荷运转，也就是”细胞因子风暴“，过度的免疫反应破坏了血管，导致了内出血和外出血过度的体液流失和并发症在症状出现的头六到十六天会是致命的，恰当的治疗和补水能显著减少病人的死亡率。幸好，虽然埃博拉极度致命它的传染性被以下因素所限制与其它的病毒不同埃博拉仅存于体液中比如唾液血液粘膜呕吐物或粪便中埃博拉的传播只能通过病患与健康人之间眼，嘴，或鼻的接触。由于疾病的严重性随着病毒数目的增长而增长，即使是被感染的患者也可能没有传染性直到有症状产生。因为埃博拉可以在物体表面生存数小时，而且疾病理论上可以通过喷嚏和咳嗽传播，几乎所有已知病例都是由于接触严重病患而感染，所以医务人员病人的亲友都属于高危人群。这也是为什么尽管埃博拉很致命，至今，它的致死人数还不及一些常见的感染，比如麻疹，疟疾，和流感，一旦疫情得到控制，病毒不会存在于人群中直到它下一次爆发。虽然这肯定是件好事但也使埃博拉难以被研究科学家认为果蝠是病毒的携带者但它们也不知道病毒是如何传染给人类的另外，许多爆发埃博拉的国家都缺乏良好的基础和卫生设施，这也导致了疾病的蔓延。同时，由于这些地区较为贫穷，加上偏少的患病人数所以药企无法得到较高利润 也限制了对埃博拉的研究虽然有些药物已崭露头角，并且政府也在支持发展疫苗，但就2014年来说，唯一能有效应对埃博拉爆发的措施是隔离病患，卫生措施，和信息公开。

**P168 2014-12-03 The 2,400-year search for the atom - Theresa Doud**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=168)

What do an ancient Greek philosopher and a 19th century Quaker have in common with Nobel Prize-winning scientists? Although they are separated over 2,400 years of history, each of them contributed to answering the eternal question: what is stuff made of? It was around 440 BCE that Democritus first proposed that everything in the world was made up of tiny particles surrounded by empty space. And he even speculated that they vary in size and shape depending on the substance they compose. He called these particles "atomos," Greek for indivisible. His ideas were opposed by the more popular philosophers of his day. Aristotle, for instance, disagreed completely, stating instead that matter was made of four elements: earth, wind, water and fire, and most later scientists followed suit. Atoms would remain all but forgotten until 1808, when a Quaker teacher named John Dalton sought to challenge Aristotelian theory. Whereas Democritus's atomism had been purely theoretical, Dalton showed that common substances always broke down into the same elements in the same proportions. He concluded that the various compounds were combinations of atoms of different elements, each of a particular size and mass that could neither be created nor destroyed. Though he received many honors for his work, as a Quaker, Dalton lived modestly until the end of his days. Atomic theory was now accepted by the scientific community, but the next major advancement would not come until nearly a century later with the physicist J.J. Thompson's 1897 discovery of the electron. In what we might call the chocolate chip cookie model of the atom, he showed atoms as uniformly packed spheres of positive matter filled with negatively charged electrons. Thompson won a Nobel Prize in 1906 for his electron discovery, but his model of the atom didn't stick around long. This was because he happened to have some pretty smart students, including a certain Ernest Rutherford, who would become known as the father of the nuclear age. While studying the effects of X-rays on gases, Rutherford decided to investigate atoms more closely by shooting small, positively charged alpha particles at a sheet of gold foil. Under Thompson's model, the atom's thinly dispersed positive charge would not be enough to deflect the particles in any one place. The effect would have been like a bunch of tennis balls punching through a thin paper screen. But while most of the particles did pass through, some bounced right back, suggesting that the foil was more like a thick net with a very large mesh. Rutherford concluded that atoms consisted largely of empty space with just a few electrons, while most of the mass was concentrated in the center, which he termed the nucleus. The alpha particles passed through the gaps but bounced back from the dense, positively charged nucleus. But the atomic theory wasn't complete just yet. In 1913, another of Thompson's students by the name of Niels Bohr expanded on Rutherford's nuclear model. Drawing on earlier work by Max Planck and Albert Einstein he stipulated that electrons orbit the nucleus at fixed energies and distances, able to jump from one level to another, but not to exist in the space between. Bohr's planetary model took center stage, but soon, it too encountered some complications. Experiments had shown that rather than simply being discrete particles, electrons simultaneously behaved like waves, not being confined to a particular point in space. And in formulating his famous uncertainty principle, Werner Heisenberg showed it was impossible to determine both the exact position and speed of electrons as they moved around an atom. The idea that electrons cannot be pinpointed but exist within a range of possible locations gave rise to the current quantum model of the atom, a fascinating theory with a whole new set of complexities whose implications have yet to be fully grasped. Even though our understanding of atoms keeps changing, the basic fact of atoms remains, so let's celebrate the triumph of atomic theory with some fireworks. As electrons circling an atom shift between energy levels, they absorb or release energy in the form of specific wavelengths of light, resulting in all the marvelous colors we see. And we can imagine Democritus watching from somewhere, satisfied that over two millennia later, he turned out to have been right all along.

**P168 2014-12-03 The 2,400-year search for the atom - Theresa Doud**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=168)

翻译人员: Zack Xue 校对人员: Helen Zhang一位古希腊哲学家一位在19世纪的教会教徒和诺贝尔奖获得者之间有什么联系呢虽然他们相隔了2400年他们都为了一个永恒的问题提供了答案那就是 事物由什么组成在公元前440年 古希腊哲学家德谟克利特第一次提出世上所有的物质都是由 微小的颗粒组成的而其周围是空的他猜测这些颗粒的大小和形状取决于它们所构成的物质他称这些物质为“atomos”，希腊语意为“不可分割”他的想法在当时遭到了其他更著名 的哲学家们的反对例如 亚里士多德就完全不同意亚里士多德声称 物质是由4种元素组成的：土地，风，水和火当时大多数的科学家也跟随他。直到1808年，原子学说一直被人们所忽视当一个贵族教会老师 约翰道尔顿开始怀疑 亚里士多德的理论然而德谟克利特的原子学说仅仅是理论道尔顿的研究显示常见的物质总是最终能分为相同的元素，以固定的比例。他总结多种化合物是原子和不同的元素的组成物，这些组成物每个有特定的大小和质量它们既不能被创造或毁灭。尽管他的研究获是他收获了很多荣誉，但是作为一名老师，道尔顿很谦虚地过了一生。现在，原子学说被科学界所接受但是下一个重大突破直到近一个世纪以后才来临是约瑟夫·汤姆孙在1897年发现电子。有时候我们也称其为“巧克力饼干”原子模型，他的研究显示，原子是由均匀 的正电荷物质所构成的球形，而内部是充满了负电荷的电子。汤姆孙对电子的发现，使他 在1906年获得了诺贝尔奖，但是他的原子模型学说并没有持续太久。这是因为他培育了一些聪明的学生，这其中就包括了欧内斯特·卢瑟福，卢瑟福后来被人们称之为原子和物理学之父。在研究X射线对气体的反应的时候，卢瑟福决定对原子进行更加彻底的研究，他将带正电荷的α微粒射向一层金箔。根据汤姆孙的原子模型，原子内部所分布的正电荷太轻薄以至于无法使α微粒在任何位置产生偏斜。这就像一个网球冲击一层薄薄的纸。但是，当大多数的α微粒都直接穿过了金箔还是有一部分被反射回来，这个现象证明金箔更像是有大洞的网一样。卢瑟福总结为原子内部其实有大量的空间而只有一小部分为电子，然而原子的大部分的质量集中在中心，卢瑟福称之为“原子核”。有些α微粒穿过原子内部的缝隙，但是有些则被带正电荷的原子核所反射回来。至此，原子学说还并不完整。在1913年，另一名汤姆孙的学生，叫尼尔斯·玻尔扩充了卢瑟福的原子核模型。根据早期马克斯·普朗克和 阿尔伯特·爱因斯坦的研究玻尔规定电子围绕原子核的轨道是有固定的能量和距离（能级）电子可以从一个能级跳到另一个能级， 但是不能存在于在两个能级之间。玻尔的“行星模型”很快被大多数人们所接受，但是不久，这个模型遭到了一些难题。实验证明，电子并不是简单的游离微粒，电子同时也像波浪似的无规则运动，而且无法被精确的定位在空间中。维尔纳·海森堡构想了著名的“不确定性原理”，他的研究显示，当电子在运动时其精确的速度和位置是无法被判断的。其主旨就是电子无法被准确定位，但是可以确定其可能位置范围，这个理论引发了现在的“量子原子模型”，这是一个让人产生无限遐想的理论，也更加复杂，这个理论至今还正在被深度研究。尽管我们对原子的理解不停的在改变，但是基本的事实没变，现在我们用烟火来庆祝一下原子理论的巨大成功。当电子围绕着原子核改变能级的时候，它们通过发出一些特殊的光线获取或丢失能量，这就是产生了我们所看到不同的颜色。我们可以想象德谟克利特如果看到两千年后的原子学说回事多么满意，历史证明他一路都是正确的。

**P169 2014-12-05 At what moment are you dead - Randall Hayes**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=169)

For as far back as we can trace our existence, humans have been fascinated with death and resurrection. Nearly every religion in the world has some interpretation of them, and from our earliest myths to the latest cinematic blockbusters, the dead keep coming back. But is resurrection really possible? And what is the actual difference between a living creature and a dead body, anyway? To understand what death is, we need to understand what life is. One ancient theory was an idea called vitalism, which claimed that living things were unique because they were filled with a special substance, or energy, that was the essence of life. Whether it was called qi, lifeblood, or humors, the belief in such an essence was common throughout the world, and still persists in the stories of creatures who can somehow drain life from others, or some form of magical sources that can replenish it. Vitalism began to fade in the Western world following the Scientific Revolution in the 17th century. René Descartes advanced the notion that the human body was essentially no different from any other machine, brought to life by a divinely created soul located in the brain's pineal gland. And in 1907, Dr. Duncan McDougall even claimed that the soul had mass, weighing patients immediately before and after death in an attempt to prove it. Though his experiments were discredited, much like the rest of vitalism, traces of his theory still come up in popular culture. But where do all these discredited theories leave us? What we now know is that life is not contained in some magical substance or spark, but within the ongoing biological processes themselves. And to understand these processes, we need to zoom down to the level of our individual cells. Inside each of these cells, chemical reactions are constantly occurring, powered by the glucose and oxygen that our bodies convert into the energy-carrying molecule known as ATP. Cells use this energy for everything from repair to growth to reproduction. Not only does it take a lot of energy to make the necessary molecules, but it takes even more to get them where they need to be. The universal phenomenon of entropy means that molecules will tend towards diffusing randomly, moving from areas of high concentration to low concentration, or even breaking apart into smaller molecules and atoms. So cells must constantly keep entropy in check by using energy to maintain their molecules in the very complicated formations necessary for biological functions to occur. The breaking down of these arrangements when the entire cell succumbs to entropy is what eventually results in death. This is the reason organisms can't be simply sparked back to life once they've already died. We can pump air into someone's lungs, but it won't do much good if the many other processes involved in the respiratory cycle are no longer functioning. Similarly, the electric shock from a defibrillator doesn't jump-start an inanimate heart, but resynchronizes the muscle cells in an abnormally beating heart so they regain their normal rhythm. This can prevent a person from dying, but it won't raise a dead body, or a monster sewn together from dead bodies. So it would seem that all our various medical miracles can delay or prevent death but not reverse it. But that's not as simple as it sounds because constant advancements in technology and medicine have resulted in diagnoses such as coma, describing potentially reversible conditions, under which people would have previously been considered dead. In the future, the point of no return may be pushed even further. Some animals are known to extend their lifespans or survive extreme conditions by slowing down their biological processes to the point where they are virtually paused. And research into cryonics hopes to achieve the same by freezing dying people and reviving them later when newer technology is able to help them. See, if the cells are frozen, there's very little molecular movement, and diffusion practically stops. Even if all of a person's cellular processes had already broken down, this could still conceivably be reversed by a swarm of nanobots, moving all the molecules back to their proper positions, and injecting all of the cells with ATP at the same time, presumably causing the body to simply pick up where it left off. So if we think of life not as some magical spark, but a state of incredibly complex, self-perpetuating organization, death is just the process of increasing entropy that destroys this fragile balance. And the point at which someone is completely dead turns out not to be a fixed constant, but simply a matter of how much of this entropy we're currently capable of reversing.

**P169 2014-12-05 At what moment are you dead - Randall Hayes**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=169)

翻译人员: Melody Tang 校对人员: Sanqiang Xiao从人类诞生开始，人类一直对死亡与复活着迷几乎每个宗教都对它们有着不同的见解从早期的神话故事到最新的电影大片中， 死者在不断的复活但是复活真的可能吗生物的生与死的区别到底在哪里要理解什么是死 我们必须先理解什么是生有一个被称为“活力论”的古老的理论它认为生物体是独特的因为生物充满特别的物质或能量这种物质就是生物的本质不管此物质被称之为气生命脉或是幽默世界各地普遍深信这种物资的存在而且不时可以听到关于它们可以从别的生物吸取生命的故事或是某种神奇的原料可以补充它们在17世纪的科学革命后“活力论”在西方世界开始失去市场瑞内‧笛卡尔（René Descartes） 让这种理念更进一步他主张人类的身体基本上 和任何机器并无两样由位于脑内的松果体内的 神所创造的灵魂而有生命在1907年当肯‧迈窦噶儿医生 甚至主张灵魂是有质量的他以病人在死亡前后的所称的重量来证明虽然他的实验，和其他活力理论一样， 没有被承认我们仍能在流行文化中找到其理论的踪迹。除了这些不被接受的理论， 那我们还有什么其他的解释吗？我们现在知道的是生命不是被包覆在某种神奇的物资 或火花内而是不断的生物过程本身要了解这些过程我们必须放大到我们的个体细胞上在每一个细胞里化学反应不断地在发生由我们身体转化葡萄糖和氧气成为携带能量的分子，也叫ATP细胞用这个能量来做修补，成长，繁殖等制造必须的分子需要消耗许多的能量把这些分子送到需要的地方消耗更多的能量宇宙中的熵（entropy）现象表明分子有随机扩散的趋势它们会从分子集中的地方 扩散到分子少的地方或者甚至分裂成更小的分子和原子所以细胞必须不断的保持着‘熵’用能量来维持它们的分子们以非常复杂的构造使生物功能得以发生当细胞屈服于‘熵’，这些机制开始瓦解最后导致生物体死亡这也是一旦生命体死亡就不能起死回生的理由我们可以将空气注入一个人的肺但如果呼吸系统中的其他过程都失效了注入再多的空气那也是无济于事同样的，除顫器的电击也无法重启一个死亡的心脏它只能使心跳异常的心脏 将肌肉细胞重新同步化让它恢复正常的律动这是可以防止一个人的死亡， 但它不会使人起死回生更不用说由死尸缝起来的怪物所以尽管我们有各种医学奇迹可以延迟或预防死亡 但不能转死为生但也不能一概而论因为科技和医药的不断进步可将如昏迷的诊断 为有反转的可能性这些在以前人们会认为已经死亡了在未来，回生乏力的关键点 可能可再向后推据我们所知，有些动物可以借由放慢他们的生物过程，甚至到停止作用而增长寿命或在极为恶劣的情况下存活人体冷冻学的研究就是 希望可以达到这个结果借由将濒死者冷冻当更新的科技可以帮助他们的时候 再将他们复活比如说，当细胞冷冻以后， 就几乎没有分子活动扩散也基本停止了即便一个人的细胞流程已经瓦解了想象中仍然可以借由一群 納米机器人而反转的将所有分子放回它们的适当位置也同时将ATP注射在细胞里这也许可以让生命体可以重新运作所以如果我们认为生命不是 某种神奇的火花而是一种无法想象的复杂， 和自我延续的组织的状态死亡只是熵增过程，破坏了这个脆弱的平衡的过程当一个人完全死亡的关键点不再是一个固定常数而是由我们现在能够逆转这个‘熵’的程度（音乐）（音乐停止）［你在哪个时刻死亡？］

**P170 2014-12-09 The benefits of a good night's sleep - Shai Marcu**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=170)

It's 4 a.m., and the big test is in eight hours, followed by a piano recital. You've been studying and playing for days, but you still don't feel ready for either. So, what can you do? Well, you can drink another cup of coffee and spend the next few hours cramming and practicing, but believe it or not, you might be better off closing the books, putting away the music, and going to sleep. Sleep occupies nearly a third of our lives, but many of us give surprisingly little attention and care to it. This neglect is often the result of a major misunderstanding. Sleep isn't lost time, or just a way to rest when all our important work is done. Instead, it's a critical function, during which your body balances and regulates its vital systems, affecting respiration and regulating everything from circulation to growth and immune response. That's great, but you can worry about all those things after this test, right? Well, not so fast. It turns out that sleep is also crucial for your brain, with a fifth of your body's circulatory blood being channeled to it as you drift off. And what goes on in your brain while you sleep is an intensely active period of restructuring that's crucial for how our memory works. At first glance, our ability to remember things doesn't seem very impressive at all. 19th century psychologist Herman Ebbinghaus demonstrated that we normally forget 40% of new material within the first twenty minutes, a phenomenon known as the forgetting curve. But this loss can be prevented through memory consolidation, the process by which information is moved from our fleeting short-term memory to our more durable long-term memory. This consolidation occurs with the help of a major part of the brain, known as the hippocampus. Its role in long-term memory formation was demonstrated in the 1950s by Brenda Milner in her research with a patient known as H.M. After having his hippocampus removed, H.M.'s ability to form new short-term memories was damaged, but he was able to learn physical tasks through repetition. Due to the removal of his hippocampus, H.M.'s ability to form long-term memories was also damaged. What this case revealed, among other things, was that the hippocampus was specifically involved in the consolidation of long-term declarative memory, such as the facts and concepts you need to remember for that test, rather than procedural memory, such as the finger movements you need to master for that recital. Milner's findings, along with work by Eric Kandel in the 90's, have given us our current model of how this consolidation process works. Sensory data is initially transcribed and temporarily recorded in the neurons as short-term memory. From there, it travels to the hippocampus, which strengthens and enhances the neurons in that cortical area. Thanks to the phenomenon of neuroplasticity, new synaptic buds are formed, allowing new connections between neurons, and strengthening the neural network where the information will be returned as long-term memory. So why do we remember some things and not others? Well, there are a few ways to influence the extent and effectiveness of memory retention. For example, memories that are formed in times of heightened feeling, or even stress, will be better recorded due to the hippocampus' link with emotion. But one of the major factors contributing to memory consolidation is, you guessed it, a good night's sleep. Sleep is composed of four stages, the deepest of which are known as slow-wave sleep and rapid eye movement. EEG machines monitoring people during these stages have shown electrical impulses moving between the brainstem, hippocampus, thalamus, and cortex, which serve as relay stations of memory formation. And the different stages of sleep have been shown to help consolidate different types of memories. During the non-REM slow-wave sleep, declarative memory is encoded into a temporary store in the anterior part of the hippocampus. Through a continuing dialogue between the cortex and hippocampus, it is then repeatedly reactivated, driving its gradual redistribution to long-term storage in the cortex. REM sleep, on the other hand, with its similarity to waking brain activity, is associated with the consolidation of procedural memory. So based on the studies, going to sleep three hours after memorizing your formulas and one hour after practicing your scales would be the most ideal. So hopefully you can see now that skimping on sleep not only harms your long-term health, but actually makes it less likely that you'll retain all that knowledge and practice from the previous night, all of which just goes to affirm the wisdom of the phrase, "Sleep on it." When you think about all the internal restructuring and forming of new connections that occurs while you slumber, you could even say that proper sleep will have you waking up every morning with a new and improved brain, ready to face the challenges ahead.

**P170 2014-12-09 The benefits of a good night's sleep - Shai Marcu**

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翻译人员: Peipei Xiang 校对人员: Jenny Yang『音乐』现在是凌晨四点，八小时之后你有一场重要的考试，接着还有一场钢琴独奏会。你已经连日学习和苦练钢琴，但你仍觉得你还未准备好。那么你能做些什么呢？你可以再喝一杯咖啡，并在仅剩的一点时间里继续奋战，但是你也许不相信，如果你关上书本，停止练习并去睡一觉， 效果会更好。睡眠几乎占据了我们生命的三分之一，可令人惊讶的是， 许多人并不关心他们的睡眠。人们对睡眠的忽视 往往是来自于一个很大的误解。睡觉并不是浪费时间，睡眠也不仅仅是工作后的休息，相反，睡眠是一个很关键的过程，睡眠期间，你的身体会对各系统进行调节，你的呼吸系统会受到影响，血液循环系统、免疫系统 与身体的成长都会受到影响。听起来很棒，但你可以等考完试以后 再来担心睡眠，对吧？先别这么快下结论。原来睡眠对你的大脑也至关重要，在你进入梦乡的时候，你身体里 五分之一的血液都会流入到你的大脑。你睡觉的时间正是你的大脑内部重新调整组合的时间，这个阶段对我们的记忆功能十分重要。乍一看，我们的记忆能力并不值得惊叹，十九世纪的心理学家，赫尔曼·艾宾浩斯发现一般在20分钟内我们会忘记40%的新事物，这个现象被称作“遗忘曲线”。可是记忆力可以通过对记忆的巩固来提高，在这个巩固的过程中，新的事物会从短期记忆移到更稳定的长期记忆。记忆巩固得益于脑部的一个重要部位，这个部位被称为海马体，海马体在长期记忆形成中扮演的角色于1950年代被布兰达·米尔内通过她对一位名为H.M.的病人的研究证实。H.M.的海马体被移除后，他形成新的短期记忆的能力遭到破坏，但他仍能够通过 不断重复学习新的体能任务。由于海马体的移除，H.M形成长期记忆的能力也被破坏了。这个例子反映出海马体在长期陈述性记忆 而非程序性记忆巩固的过程中至关重要，陈述性记忆包括你考试要记的事实、概念等，程序性记忆包括 你钢琴独奏要记住的手指动作。米尔内的发现，加上 埃里克·坎德尔在90年代的发现给我们提供了这个巩固过程的现有模型。感官数据会先被暂时 转录到短期记忆的神经元上面，再进入到海马体，而海马体再将其皮质区的神经元进行强化。多亏了这一神经可塑性，新的突触芽得以形成 并在神经元之间建立新的连接，从而强化相应神经网络并形成长期记忆。为什么我们会记住一些而忘掉另一些？那是因为有很多东西会影响记忆形成的程度和有效性。比如，那些在情感或 压力强烈的时候形成的记忆会更容易被记录下来 因为海马体和情感之间的关联。但是一个影响记忆巩固的重要因素是，你已经猜到了，就是一晚好的睡眠。睡眠有四个阶段组成，最深的就是慢波睡眠和快速眼动睡眠。脑电图监测结果显示在这些阶段电脉冲在脑干、海马体、 丘脑和大脑皮层间移动，而这些都是记忆形成的中转站。不同的睡眠阶段有助于巩固不同类型的记忆。在非快速眼动慢波睡眠阶段，陈述性记忆被暂时放在海马体的前部。通过大脑皮层和海马体的不断对话，这些记忆反复被激活，使得它们慢慢转到大脑皮层的 长期记忆存储区域。同时， 快速眼动睡眠， 跟大脑醒着的时候相似，跟程序性记忆的巩固有关。基于这些研究，在你背公式三个小时后，练习钢琴一个小时后进入睡眠是最好的。希望你现在已经明白牺牲睡眠不仅对你的长期健康有害，而且会影响你记住前晚的知识和练习的能力，这些都证明了这句话的智慧 ——先睡一觉再说。想一下你睡觉的时候，你的大脑在忙着重组、形成新连接等，你甚至可以说，好的睡眠让你第二天 有一个全新的更好的大脑，准备迎接新的挑战。

**P171 2014-12-15 The great conspiracy against Julius Caesar - Kathryn Tempest**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=171)

What would you do if you thought your country was on the path to tyranny? If you saw one man gaining too much power, would you try to stop him? Even if that man was one of your closest friends and allies? These were the questions haunting Roman Senator Marcus Junius Brutus in 44 BCE, the year Julius Caesar would be assassinated. Opposing unchecked power wasn't just a political matter for Brutus; it was a personal one. He claimed descent from Lucius Junius Brutus, who had helped overthrow the tyrannical king known as Tarquin the Proud. Instead of seizing power himself, the elder Brutus led the people in a rousing oath to never again allow a king to rule. Rome became a republic based on the principle that no one man should hold too much power. Now, four and a half centuries later, this principle was threatened. Julius Ceasar's rise to the powerful position of consul had been dramatic. Years of military triumphs had made him the wealthiest man in Rome. And after defeating his rival Pompey the Great in a bitter civil war, his power was at its peak. His victories and initiatives, such as distributing lands to the poor, had made him popular with the public, and many senators vied for his favor by showering him with honors. Statues were built, temples were dedicated, and a whole month was renamed, still called July today. More importantly, the title of dictator, meant to grant temporary emergency powers in wartime, had been bestowed upon Caesar several times in succession. And in 44 BCE, he was made dictator perpetuo, dictator for a potentially unlimited term. All of this was too much for the senators who feared a return to the monarchy their ancestors had fought to abolish, as well as those whose own power and ambition were impeded by Caesar's rule. A group of conspirators calling themselves the liberators began to secretly discuss plans for assassination. Leading them were the senator Gaius Cassius Longinus and his friend and brother-in-law, Brutus. Joining the conspiracy was not an easy choice for Brutus. Even though Brutus had sided with Pompey in the ill-fated civil war, Caesar had personally intervened to save his life, not only pardoning him but even accepting him as a close advisor and elevating him to important posts. Brutus was hesitant to conspire against the man who had treated him like a son, but in the end, Cassius's insistence and Brutus's own fear of Caesar's ambitions won out. The moment they had been waiting for came on March 15. At a senate meeting held shortly before Caesar was to depart on his next military campaign, as many as 60 conspirators surrounded him, unsheathing daggers from their togas and stabbing at him from all sides. As the story goes, Caesar struggled fiercely until he saw Brutus. Despite the famous line, "Et tu, Brute?" written by Shakespeare, we don't know Caesar's actual dying words. Some ancient sources claim he said nothing, while others record the phrase, "And you, child?", fueling speculation that Brutus may have actually been Caesar's illegitimate son. But all agree that when Caesar saw Brutus among his attackers, he covered his face and gave up the fight, falling to the ground after being stabbed 23 times. Unfortunately for Brutus, he and the other conspirators had underestimated Caesar's popularity among the Roman public, many of whom saw him as an effective leader, and the senate as a corrupt aristocracy. Within moments of Caesar's assassination, Rome was in a state of panic. Most of the other senators had fled, while the assassins barricaded themselves on the Capitoline Hill. Mark Antony, Caesar's friend and co-consul, was swift to seize the upper hand, delivering a passionate speech at Caesar's funeral days later that whipped the crowd into a frenzy of grief and anger. As a result, the liberators were forced out of Rome. The ensuing power vacuum led to a series of civil wars, during which Brutus, facing certain defeat, took his own life. Ironically, the ultimate result would be the opposite of what the conspirators had hoped to accomplish: the end of the Republic and the concentration of power under the office of Emperor. Opinions over the assassination of Caesar were divided from the start and have remained so. As for Brutus himself, few historical figures have inspired such a conflicting legacy. In Dante's "Inferno," he was placed in the very center of Hell and eternally chewed by Satan himself for his crime of betrayal. But Swift's "Gulliver's Travels" described him as one of the most virtuous and benevolent people to have lived. The interpretation of Brutus as either a selfless fighter against dictatorship or an opportunistic traitor has shifted with the tides of history and politics. But even today, over 2000 years later, questions about the price of liberty, the conflict between personal loyalties and universal ideals, and unintended consequences remain more relevant than ever.

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翻译人员: Jerry Ho 校对人员: Gabriella Hu如果你认为你的国家正在走向一条暴政的路上， 你会怎么做？如果你发现一个人手握过多的权力 你会尝试阻止他吗？哪怕那个人是你最亲密的朋友和同盟之一呢？公元前44年，罗马元老院议员 布鲁图斯就被这些问题困扰着而这一年正是凯撒被刺杀的那一年反对不受约束的权利对布鲁图斯来说 不仅是个政治问题还是个私人问题他向卢修斯·朱尼厄斯·布鲁特斯提出过异议而此人曾推翻了暴君——骄矜者塔奎因的统治但之后老布鲁图斯并没有自己手握大权而是带领人们进行了激昂地宣誓表示不再让一个国王统治整个国家根据不让任何人过度集权的原则罗马成为了共和国而现在，四个半世纪后，这一原则受到了威胁尤利西斯·凯撒升任权倾朝野的执政官是十分戏剧化的军队连年高奏凯歌 使他成为了罗马最富有的人在激烈的内战中打败他的对手庞贝后他的权力到达了顶峰他的胜利及其它举措，例如向穷人分田地让他在群众中大受欢迎许多议员为了争宠而向他致敬开始大兴土木，修建雕塑和庙宇甚至有一个月份因他而更名并且沿用至今更重要的是，独裁者的头衔本意指在战时获得暂时的紧急权力却被凯撒连年获得在公元前44年 他成为dictator perpetuo即无限期的独裁者这一切对那些议员来说显然有些过分他们害怕祖先们奋力废除的帝制卷土重来那些权利和野心被凯撒牵制的议员也十分不满一群自称解放者的谋叛者开始密谋行刺计划带头的是议员卡西乌斯和他的朋友兼妹夫，布鲁图斯加入本次密谋行动对布鲁图斯来说是个很难的抉择虽然布鲁图斯在内战中投靠的是庞培但凯撒亲自出面干预救了他一命凯撒不仅赦免了布鲁图斯 而且还让布鲁图斯成为自己的亲信并让他担当要职面对待自己如亲生儿子的凯撒，布鲁图斯犹豫不决但是最终卡西乌斯的决心和他自己对凯撒野心的恐惧 战胜了他的犹豫三月十五日，他们一直等待的那一刻终于来临了在凯撒离开前往他的下一个军事行动前的一个参议会议上，多达60位同谋者把他围得水泄不通同谋者从袖中拔出匕首从四面向凯撒刺去据说凯撒顽强地进行反抗 直到他看到了布鲁图斯除了莎翁写的那句著名的 “居然有你？布鲁图斯？”我们并不知道凯撒临终前究竟说了些什么一些古资料称他什么都没有说而其它记载了的语句是 “还有你，孩子？”为布鲁图斯是凯撒私生子这一猜测推波助澜但所有人都同意的是， 当凯撒在一群袭击者中看见布鲁图斯时他掩面放弃抵抗在被刺23次后，倒地身亡不幸的是布鲁图斯和他的同谋者低估了凯撒在罗马群众里的声望许多人把他看成有能力的领导者并认为议员则是腐败的贵族在凯撒被刺杀的瞬间，罗马陷入了恐慌大多数的议员已经出逃而刺客们则藏在了卡比托利欧山上马克安东尼，凯撒的朋友及联合行政官马上夺得先机几天后在凯撒的葬礼上发表的激情演说在群众中掀起了悲愤的狂潮结果，解放者们被迫离开罗马随之而来的权力真空带来了一系列的内战在这期间，布鲁图斯面临多次兵败而后自杀讽刺的是，最终的结局和同谋者的意愿背道而驰：罗马共和国终结且权力集中在了皇帝手上人们对刺杀凯撒的观点从一开始就有分歧并延续至今对与布鲁图斯本人少数历史人物被这一矛盾所启发在但丁的《神曲》地狱篇里， 他被放在了地狱的最中央并且因背叛罪永世被撒旦撕咬咀嚼但是在斯威夫特的《格列弗游记》中他被描写成世上最善良和仁慈的人之一布鲁图斯不是被解读为一个挑战独裁政权的无私斗士就是被描述成一个投机主义叛徒这些解读在历史与政治的潮流中不断改变但即便在2000多年后的今天自由的代价个人忠诚与普世理想之间的冲突及意料之外的结果它们之间的联系却空前的紧密

**P172 2014-12-15 The truth about bats - Amy Wray**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=172)

Flying through the night, I watch over this world, a silent guardian, a watchful protector, a dark knight, I'm... Okay, fine. So, I'm not Batman. I'm just a bat. But like Batman, I'm often misunderstood. People think I'm scary, strange and dangerous. If they only knew my story, though, I'd be cheered as a hero. When people think of bats, many think of vampires who want to suck their blood. But the truth is that out of over 1200 bat species, only three are vampire bats. Out of these three, only one prefers the blood of mammals, and even these bats mostly feed on cattle. Maybe that still doesn't seem so great, but vampire bats can be a great help to humans. A chemical known as desmoteplase found in vampire bat saliva helps break down blood clots, and is being tested by recovering stroke victims. Of the remaining 1000+ species of bats, about 70% feed on insects. These bats help control the real vampires: mosquitos, whose nasty bites are not just annoying but spread diseases, like West Nile virus. A single little brown bat can eat 1000 insects every hour, and a colony of Mexican free-tailed bats can eat several tons of moths in just one night. In the United States alone, bats provide an estimated 3.7 billion dollars worth of free pest control for farmers, which benefits everyone who eats the foods that they grow. Fruit bats, also called megabats because of their large size, are important for the role they play in plant pollination. By traveling between flowers while feeding on nectar and fruits, these bats transport the pollen and seeds that help plants reproduce. In Southeast Asia, for example, the cave nectar bat is the only pollinator of the durian fruit. Other bats pollinate peaches, bananas, and the agave plants that tequila is made from. Without them, many of our food plants would be unable to produce the tasty fruits we enjoy. As heroes of the ecosystem, bats have their own unique utility belts. Bats have been a source of inspiration for the design of flying robots and even an energy-efficient spy plane, as they are the only mammal capable of true powered flight. Echolocation, a type of biological sonar, is also used by bats as a way to navigate and find prey in the dark. Although there's a common misconception that bats are blind, in truth, all species of bats have sight. And some have even adapted large eyes to see better in dim lighting. Many people worry about getting infected by bats, and like any other animals, bats can carry diseases, like rabies. In reality, though, less than .5% of all bats carry this virus. That's about the same odds as getting the same result on a coin flip eight times in a row. The perception that bats are often diseased may come from the fact that sick bats, who may show unusual behavior, emerge during the daytime, or be unable to fly, are more likely to be encountered by people. So a good way to protect yourself is to protect bats as well, keeping them healthy, protecting their habitats, and reducing their risk of transmitting disease. In North America, bats are threatened by a devastating sickness called white-nose syndrome. This fungal infection causes bats to wake up while hibernating during a winter. Unable to find food, they expend large amounts of energy, and eventually starve to death. White-nose syndrome has wiped out entire caves full of bats, with a mortality rate that can exceed 90%. Climate change and habitat destruction also pose serious threats to bat populations. For example, in January 2014, a record heat wave in Australia caused over 100,000 bats to die from heat exhaustion. Some people just want to watch the world burn, and bats all over the world are threatened by damage to the places that we call home, including mangrove swamps, old-growth forests, and, of course, bat caves. So even though I'm the hero of the story, I do need to be saved. And now that you know the true story about us bats, you can learn how to protect such heroic animals. Install a properly designed bat box, one of the easiest ways to provide shelter for bats. Discourage the use of pesticides, which can harm bats when we try to feed on the insects you want to get rid of in the first place. Avoid going into caves where you might disturb hibernating bats, and always decontaminate your gear after visiting a cave. If you have unwanted bats living in an attic or barn, contact your local government to safely and humanely relocate us. And if you come across a bat, do not attempt to handle it, but instead, call Animal Control. Batman might want to keep his identity secret, but a great way to help real bats is by continuing to learn about them and spreading the truth that they are real heroes, even if their good deeds are often unseen.

**P172 2014-12-15 The truth about bats - Amy Wray**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=172)

翻译人员: Yolanda Zhang 校对人员: Shawnee Huang在黑夜中飞翔，我俯视脚下的世界，仿佛一个沉默的守护者，一个警惕的保护者， 一个黑夜骑士，我就是....好吧，我不是蝙蝠侠，我就是只蝙蝠。但是像蝙蝠侠一样，我常常被误解。人们认为我可怕，怪异甚至危险。但是如果他们知道我的故事的话， 他们会觉得我是个英雄的。当人们想到蝙蝠，会联想到渴望吸他们血的吸血鬼。但是实际上，在1200多种蝙蝠中，只有3种蝙蝠靠吸血维生。而这3种吸血蝙蝠 也更偏好哺乳动物的血，甚至大都也仅仅靠牛等牲口的鲜血维生。可能他们看起来还是不太友好，但是吸血蝙蝠可以在很大程度上帮助人类。我们在吸血蝙蝠的唾液里 找到的一种化学物质，去氨普酶，能够促进凝血的疏通。康复的中风病人已经证明了这确实有效。其余剩下的1000多种蝙蝠中， 70%都以捕食昆虫为生。这些蝙蝠帮忙遏制了真正的吸血鬼，例如在你身上留下烦人的叮伤，同时又传播了西尼罗河病菌的蚊子。一只棕色小蝙蝠每小时能吃1000多只昆虫，而一群墨西哥无尾蝙蝠一晚上就可以吃掉几吨的蛾子。仅在美国，蝙蝠就为农民们省下了将近37亿美元的除虫预算。这让每个食用农作物的人都受益。果蝠, 因其体型之大又被称为狐蝠，对植物授粉过程有着很大的贡献。在穿梭于花丛中吃蜜和果实的同时，这些蝙蝠传播的花粉和种子 能够帮助植物繁殖。比如在东南亚，长舌果蝠是榴莲树唯一的授粉者。其他蝙蝠也为桃子，香蕉等植物授粉，用来酿造龙舌兰酒的龙舌兰属植物 也依靠蝙蝠的帮助。如果没有它们，很多植物就不能生长出美味的果实。蝙蝠用它们自己的方式守护着自然界。蝙蝠不仅是设计飞行机器人的模本，也启发了人们设计出了节能间谍机。因为它们是唯一真正利用动力来 推动飞翔的哺乳动物。回声定位法，一种声纳系统， 也被蝙蝠用来导航和在黑暗中寻找猎物。虽然蝙蝠常被误解为瞎子，但是实际上，蝙蝠都有视力。有些蝙蝠甚至长着很大的眼睛， 用于捕捉夜晚暗淡的光线。很多人担心被蝙蝠传染疾病，认为它们像其他动物一样 也携带很多病毒，例如狂犬病。实际上，只有小于0.5%的 蝙蝠携带这种病毒。这几乎与抛8次硬币 都得到相同结果的概率一样小。蝙蝠传染疾病的这种想法也许来源于患病的蝙蝠，病蝙蝠一般行动异常，多在白天活动，或不能飞行，通常更容易被人们发现。所以保护自己最好的方式是保护蝙蝠。让它们健康，保护它们的家，并降低它们传播疾病的危险性。在北美，蝙蝠的生命被一种致命的疾病，白鼻症所威胁。这种真菌感染会让蝙蝠在冬眠的时候醒来。由于无法找到食物， 它们会消耗大量的能量，最终饿死。白鼻症曾经导致了 一整个山洞的蝙蝠死亡，并且致命率高达90%以上。气候的变化和家园遭受破坏也同样威胁着蝙蝠的数量。例如，在2014年1月， 热流袭击了澳大利亚，超过十万只蝙蝠 都死于中暑导致的衰竭。有些人就想看着世界被热浪席卷，而世界各地蝙蝠的生命会因 家园的破坏而受到威胁，包括红树沼泽，原始森林，当然，还有蝙蝠山洞。所以即使我是故事中的英雄， 我也需要被拯救。所以现在你知道我们蝙蝠真正的故事，希望你能学会如何保护我们。可以设计一个巧妙的蝙蝠盒子，一个最简单的蝙蝠避难所。当试图将蝙蝠赖以为生的昆虫杀死时，减少杀虫剂的使用也能保护蝙蝠。避免进入有蝙蝠生存的山洞，并且尽量不破坏你所参观的山洞。如果我们成为了你仓库里的不速之客，请联系地方政府并安全地迁移我们。当你发现一只蝙蝠时，不要尝试去打扰它，请叫动物保护协会的人来处理。蝙蝠侠也许可以将他的身份隐藏起来，但是真正让蝙蝠安全的 一个方式是去认识它们，并且让人们知道它们是真正的英雄，即使它们正义的本质常常被隐藏起来。

**P173 2014-12-18 What is a gift economy - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=173)

This holiday season, people around the world will give and receive presents. You might even get a knitted sweater from an aunt. But what if instead of saying "thanks" before consigning it to the closet, the polite response expected from you was to show up to her house in a week with a better gift? Or to vote for her in the town election? Or let her adopt your firstborn child? All of these things might not sound so strange if you are involved in a gift economy. This phrase might seem contradictory. After all, isn't a gift given for free? But in a gift economy, gifts given without explicit conditions are used to foster a system of social ties and obligations. While the market economies we know are formed by relationships between the things being traded, a gift economy consists of the relationships between the people doing the trading. Gift economies have existed throughout human history. The first studies of the concept came from anthropologists Bronislaw Malinowski and Marcel Mauss who describe the natives of the Trobriand islands making dangerous canoe journeys across miles of ocean to exchange shell necklaces and arm bands. The items traded through this process, known as the kula ring, have no practical use, but derive importance from their original owners and carry an obligation to continue the exchange. Other gift economies may involve useful items, such as the potlatch feast of the Pacific Northwest, where chiefs compete for prestige by giving away livestock and blankets. We might say that instead of accumulating material wealth, participants in a gift economy use it to accumulate social wealth. Though some instances of gift economies may resemble barter, the difference is that the original gift is given without any preconditions or haggling. Instead, the social norm of reciprocity obligates recipients to voluntarily return the favor. But the rules for how and when to do so vary between cultures, and the return on a gift can take many forms. A powerful chief giving livestock to a poor man may not expect goods in return, but gains social prestige at the debtor's expense. And among the Toraja people of Indonesia, the status gained from gift ceremonies even determines land ownership. The key is to keep the gift cycle going, with someone always indebted to someone else. Repaying a gift immediately, or with something of exactly equal value, may be read as ending the social relationship. So, are gift economies exclusive to small-scale societies outside the industrialized world? Not quite. For one thing, even in these cultures, gift economies function alongside a market system for other exchanges. And when we think about it, parts of our own societies work in similar ways. Communal spaces, such as Burning Man, operate as a mix of barter and a gift economy, where selling things for money is strictly taboo. In art and technology, gift economies are emerging as an alternative to intellectual property where artists, musicians, and open-source developers distribute their creative works, not for financial profit, but to raise their social profile or establish their community role. And even potluck dinners and holiday gift traditions involve some degree of reciprocity and social norms. We might wonder if a gift is truly a gift if it comes with obligations or involves some social pay off. But this is missing the point. Our idea of a free gift without social obligations prevails only if we already think of everything in market terms. And in a commericalized world, the idea of strengthening bonds through giving and reciprocity may not be such a bad thing, wherever you may live.

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翻译人员: Helen Zhang 校对人员: Ke Ding这个假期，世界各地的人们都将送出或收到礼物。你甚至可能从某个姨妈那里 得到一件针织毛衫。但如果除了把它放进衣柜 并说声“谢谢”之外，对方所期待的礼貌回应是你在一周内带着更好的礼物回访她呢？或者在镇选举中投票给她？又或者是让她收养你的长子？如果你身处于“礼物经济”中，这些事情听起来就不足为怪了。这话听起来似乎自相矛盾，毕竟，哪有礼物是白给的？但是在“礼物经济“”中，除特殊情况外，馈赠礼物是被用来促进社会关系与责任的。正如我们所知道的，市场经济基于物物交换之间的关系而形成，礼物经济则是由相互交换礼物的人之间的关系所构成的。礼物经济在人类历史中由来已久。关于此概念最初的研究来自于人类学家马林诺夫斯基以及莫斯所描述的特罗布里恩群岛的原住民驾独木舟在充满危险的海洋中穿越数里只为交换贝壳项链和臂带。在这一过程中所交易的物品被称为“库拉环”，库拉环本身没有实际用途，但从其原主人那里获得了重要价值并带有契约性，象征交易的持续进行。其它的礼物经济或许包含有用的物品，例如在太平洋西北部的冬季赠礼节盛宴上 （美洲印第安人冬季的一个节日），首领们以赠送牲口与毛毯的方式 来较量各自的威望。我们或许认为， 与其说这是物质财富的积累，不如说是礼物经济的参与者们 用这样的方式来积累社会财富。虽然在某些情况下， 礼物经济可能类似于物物交换，但和物物交换不同的是， 礼物经济中礼物的馈赠是没有任何前提条件或争议的。相反地，互惠主义的社会规范使得收礼人自愿回馈送礼人的好意。但是如何回馈和何时回馈 在不同的文化情境中又各不相同，同样，回礼也有不同的方式。一位强大的首领将牲口给予一个穷人或许不指望回馈礼物，但希望以债务人的支出来获得社会声望。印度尼西亚的托拉嘉人则会通过赠礼的仪式获得地位 甚至决定着土地所有权。（礼物经济的）关键是保持赠礼的循环继续，使得总有某个人受惠于另一个人。立即回礼，或者回完全等价的礼物，被认为是彼此间社会关系的终结。那么，礼物经济只专属于在工业化世界以外的小范围社会吗？不完全是这样。首先，即使在这些文化情境中，礼物经济与其它交换市场体系并肩而行。细想一下，我们自己社会的某些部分 也以类似的方式运行着。公共场所的活动，如火烧人狂欢节，是一个物物交换和礼物交换的综合性活动，在那里，卖东西换钱是被严格禁止的。在艺术与技术领域中，礼物经济是一种知识产权的替代。艺术家，音乐家，以及开放源码开发者免费分发他们创作的作品， 不图经济利益，只为提升他们的知名度 以及建立他们的社会角色。即便在聚餐和节日互送礼物的传统中也含有某种程度的互惠主义和社会规范。我们可能想知道一份礼物 是否真是一份礼物，还是来自债务或涉及社交回报。然而，这偏离重点了。只有我们按市场定义来思考，我们不掺杂社交债务的 免费礼物的概念才能盛行。在一个商业化的世界里，不管你身处何地， 通过赠予和互惠来加强纽带关系或许并不是一件坏事。

**P174 2014-12-19 How spontaneous brain activity keeps you alive - Nathan S. Jacobs**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=174)

You probably don't need to be told how important your brain is. After all, every single thing you experience, your thoughts and your actions, your perceptions and your memories are processed here in your body's control center. But if this already seems like a lot for a single organ to handle, it's actually only a small part of what the brain does. Most of its activities are ones you'd never be aware of, unless they suddenly stopped. The brain is made up of billions of neurons, and trillions of connections. Neurons can be activated by specific stimuli or thoughts, but they are also often spontaneously active. Some fire cyclically in a set pattern. Others fire rapidly in short bursts before switching off, or remain quiet for long periods until thousands of inputs from other neurons line up in just the right way. On a large scale, this results in elaborate rhythms of internally generated brain activity, humming quietly in the background whether we're awake, asleep, or trying not to think about anything at all. And these spontaneously occurring brain functions form the foundation upon which all other brain functions rely. The most crucial of these automatically occurring activities are the ones that keep us alive. For example, while you've been paying attention to this video spontaneous activity in your brain has been maintaining your breathing at 12 to 16 breaths a minute, making sure that you don't suffocate. Without any conscious effort, signals from parts of your brainstem are sent through the spinal cord to the muscles that inflate your lungs, making them expand and contract, whether or not you're paying attention. The neuronal circuits underlying such rhythmic spontaneous activity are called central pattern generators, and control many simple repetitive behaviors, like breathing, walking, and swallowing. Ongoing neural activity also underlies our sensory perception. It may seem that the neurons in your retina that translate light into neural signals would remain quiet in the dark, but in fact, the retinal ganglion cells that communicate with the brain are always active. And the signals they send are increases and decreases in the rate of activity, rather than separate bursts. So at every level, our nervous system is teeming with spontaneous activity that helps it interpret and respond to any signals it might receive. And our brain's autopilot isn't just limited to our basic biological functions. Have you ever been on the way home, started thinking about what's for dinner, and then realized you don't remember walking for the past five minutes? While we don't understand all the details, we do know that the ongoing activity in multiple parts of your brain is somehow able to coordinate what is actually a complex task involving both cognitive and motor functions, guiding you down the right path and moving your legs while you're getting dinner figured out. But perhaps the most interesting thing about spontaneous brain function is its involvement in one of the most mysterious and poorly understood phenomena of our bodies: sleep. You may shut down and become inactive at night, but your brain doesn't. While you sleep, ongoing spontaneous activity gradually becomes more and more synchronized, eventually developing into large, rhythmic neural oscillations that envelop your brain. This transition to the more organized rhythms of sleep starts with small clusters of neurons tucked in the hypothalamus. Despite their small number, these neurons have a huge effect in turning off brainstem regions that normally keep you awake and alert, letting other parts, like the cortex and thalamus, slowly slip into their own default rhythms. The deeper we fall into sleep, the slower and more synchronized this rhythm becomes, with the deepest stages dominated by large amplitude, low frequency delta waves. But surprisingly, in the middle of this slow wave sleep, the brain's synchronized spontaneous activity repeatedly transitions into the sort of varied bursts that occur when we're wide awake. This is the sleep stage known as REM sleep, where our eyes move rapidly back and forth as we dream. Neuroscientists are still trying to answer many fundamental questions about sleep, such as its role in rejuvenating cognitive capacity, cellular homeostasis, and strengthening memory. And more broadly, they are exploring how it is that brain can accomplish such important and complex tasks, such as driving, or even breathing, without our awareness. But for now, until we are better able to understand the inner workings of their spontaneous functioning, we need to give our brains credit for being much smarter than we ourselves are.

**P174 2014-12-19 How spontaneous brain activity keeps you alive - Nathan S. Jacobs**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=174)

翻译人员: xinfeng zhang 校对人员: 一鸣 胡关于大脑的重要性，我想你一定已经知道了。不管怎样，你经历过的任何事情，任何想法和行动，任何感知和记忆，都是在你身体的这个控制中心中被处理的。尽管看上去对于一个豆腐一样的器官来说，这已经是很多工作了。但是实际上，这只是大脑工作的一小部分。大脑真正大量的活动，实际上那些我们没有意识到的部分。除非，它突然停止工作，否则我们将永远不会意识到，大脑的这些“后台”工作的存在。大脑是由上百计脑神经元组成的，这上百亿神经元相互之间有上千亿连结。每个神经元都能被特定的刺激或者想法激活。但是，即使没有这些刺激，神经元也能"自我激活"。有些神经元根据一些模式周期性“自我激活”，有些神经元则能够在关闭前，突然快速爆发出一系列脉冲信号，或者有些，在安静了很久以后，在上千个其他神经元的信号的正确刺激下，突然就被激活了。从整个系统的大尺度来说，这导致了大脑从内部产生了非常精妙的内在旋律。这旋律，就好象一首歌曲的背景音乐一样。不管我们是醒着，睡着，或者试着放空头脑(发呆)，这个旋律始终都在。而且这些自发的大脑功能，构成了其他大脑功能赖以存在的基础。自发大脑活动中最重要的那些活动，也正是那些保持我们存活的活动。例如，虽然你现在正无比沉浸在这段美妙的视频中，但是，在你没有意识到的时候，大脑中的自发活动正在维持你每分钟12-16次的呼吸，确保你不会因为过于沉醉而窒息。即使没有任何有意识的控制，从你脑干中发出的信号仍然能够通过脊椎传递到控制肺部张驰的肌肉上去，确保即使在你没有意识到的情况下，肺部仍能正常扩张与收缩。这些控制节奏性自发活动的脑神经元环路叫做中央模式发生器。其主要作用就是控制这些简单重复性动作。比如，呼吸走路吞咽在我们每个感觉器官的背后也有神经元的活动。有可能，你会认为我们视网膜中把光信号翻译成神经元信号的神经元在一片漆黑的环境中会是完全“沉默"的。但是，实际上不是这样的，与大脑通讯的视网膜神经节细胞始终是活跃的。这些细胞只是发送不同高低强度的信号，而不是发送完全间隔的脉冲信号。所以不管何时，我们的神经系统都充满了各种自发活动，这些自发活动能够帮助我们理解接收到的各种信号并作出正确的反应。并且，我们大脑的这种“自我驾驶”功能并不仅仅限于基本的生理学功能。你有没有过这种经历，一个人默默的走回家，同时脑子里开始想象当天的晚餐，然后突然意识到，过去五分钟你压根没有意识到你其实一直在走路？虽然我们现在尚未理解所有的细节，但是我们已经知道了在这个过程中，你大脑的好几个区域都在活动。让这些区域协同工作实际上是一个非常复杂的任务。这些区域包括认知和运动功能，认知功能保持你沿着正确的路走下去，运动功能保持保持腿部的协调运动。这一切都发生在你神游天外，想着晚饭的时候。但是实际上关于这些自发脑部活动最有趣的事情是，它在我们身体一个最最神秘但是我们却几乎一无所知的阶段：睡觉中所扮演的角色。一到晚上，你看上去就好象机器断了电一样(夜猫子除外)。但你的大脑可没有断电。当时睡着了以后，各种自发活动会逐渐变得越来越同步，最终变成了一个非常巨大的，有旋律的神经元震动，包裹住你的整个大脑。这个从清醒状态转变成”睡眠协奏曲“的过程，是由下丘脑内一些小簇的神经元开始的。尽管这些神经元数量不多，但是他们在关闭脑干中一些特定区域方面有非常大的影响，这些区域通常能使你保持警醒状态。对于其他的一些区域，比如大脑皮质和丘脑这些神经元也会让他们慢慢的进入默认的旋律。我们睡的越深，这个旋律越是慢也越是同步。当到达最深的阶段以后，我们的大脑中会充斥着高强度，低频率的三角波。但是令人惊奇的是，在慢波睡眠中，大脑的自发同步活动会周期性的转变为不规律脑脉冲状态。这个状态就跟我们醒着一样。我们把这一状态叫做REM(快速眼动阶段)顾名思义，在这一阶段，我们的眼睛会随着我们的梦境不断的运动。神经科学家仍在不断探求很多关于睡眠的基本问题的答案。例如睡眠与认知能力恢复的关系，与细胞同态的关系，与增强记忆力的关系是怎样的？更广泛来说，他们正在研究大脑是如何完成一些非常重要和复杂任务的，例如开车，甚至是无意识的呼吸。但是就目前来说，在我们能够更好的理解大脑内部自发功能之前，我们必须大大的嘉奖一番大脑，他实在是比我们自己都聪明。

**P175 2014-12-19 The Atlantic slave trade - What too few textbooks told you - Anthony**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=175)

Slavery, the treatment of human beings as property, deprived of personal rights, has occurred in many forms throughout the world. But one institution stands out for both its global scale and its lasting legacy. The Atlantic slave trade, occurring from the late 15th to the mid 19th century and spanning three continents, forcibly brought more than 10 million Africans to the Americas. The impact it would leave affected not only these slaves and their descendants, but the economies and histories of large parts of the world. There had been centuries of contact between Europe and Africa via the Mediterranean. But the Atlantic slave trade began in the late 1400s with Portuguese colonies in West Africa, and Spanish settlement of the Americas shortly after. The crops grown in the new colonies, sugar cane, tobacco, and cotton, were labor intensive, and there were not enough settlers or indentured servants to cultivate all the new land. American Natives were enslaved, but many died from new diseases, while others effectively resisted. And so to meet the massive demand for labor, the Europeans looked to Africa. African slavery had existed for centuries in various forms. Some slaves were indentured servants, with a limited term and the chance to buy one's freedom. Others were more like European serfs. In some societies, slaves could be part of a master's family, own land, and even rise to positions of power. But when white captains came offering manufactured goods, weapons, and rum for slaves, African kings and merchants had little reason to hesitate. They viewed the people they sold not as fellow Africans but criminals, debtors, or prisoners of war from rival tribes. By selling them, kings enriched their own realms, and strengthened them against neighboring enemies. African kingdoms prospered from the slave trade, but meeting the European's massive demand created intense competition. Slavery replaced other criminal sentences, and capturing slaves became a motivation for war, rather than its result. To defend themselves from slave raids, neighboring kingdoms needed European firearms, which they also bought with slaves. The slave trade had become an arms race, altering societies and economies across the continent. As for the slaves themselves, they faced unimaginable brutality. After being marched to slave forts on the coast, shaved to prevent lice, and branded, they were loaded onto ships bound for the Americas. About 20% of them would never see land again. Most captains of the day were tight packers, cramming as many men as possible below deck. While the lack of sanitation caused many to die of disease, and others were thrown overboard for being sick, or as discipline, the captain's ensured their profits by cutting off slave's ears as proof of purchase. Some captives took matters into their own hands. Many inland Africans had never seen whites before, and thought them to be cannibals, constantly taking people away and returning for more. Afraid of being eaten, or just to avoid further suffering, they committed suicide or starved themselves, believing that in death, their souls would return home. Those who survived were completley dehumanized, treated as mere cargo. Women and children were kept above deck and abused by the crew, while the men were made to perform dances in order to keep them exercised and curb rebellion. What happened to those Africans who reached the New World and how the legacy of slavery still affects their descendants today is fairly well known. But what is not often discussed is the effect that the Atlantic slave trade had on Africa's future. Not only did the continent lose tens of millions of its able-bodied population, but because most of the slaves taken were men, the long-term demographic effect was even greater. When the slave trade was finally outlawed in the Americas and Europe, the African kingdoms whose economies it had come to dominate collapsed, leaving them open to conquest and colonization. And the increased competition and influx of European weapons fueled warfare and instability that continues to this day. The Atlantic slave trade also contributed to the development of racist ideology. Most African slavery had no deeper reason than legal punishment or intertribal warfare, but the Europeans who preached a universal religion, and who had long ago outlawed enslaving fellow Christians, needed justification for a practice so obviously at odds with their ideals of equality. So they claimed that Africans were biologically inferior and destined to be slaves, making great efforts to justify this theory. Thus, slavery in Europe and the Americas acquired a racial basis, making it impossible for slaves and their future descendants to attain equal status in society. In all of these ways, the Atlantic slave trade was an injustice on a massive scale whose impact has continued long after its abolition.

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翻译人员: Elvis Liu 校对人员: Tianshu Wang奴隶制度视人为私人财产，剥夺其基本人权曾以多种形式存在于世界各地但是有一条贸易路线，以其国际规模与深远影响而闻名大西洋奴隶贸易始于15世纪末，直至19世纪中期结束横跨了三个大陆板块强行将超过千万的非洲人民带去美洲因此贸易影响的不仅仅是这些奴隶以及他们的后代更是对世界大部分地区的经济与历史 造成巨大影响数百年前，欧洲和非洲 就通过地中海地区有了的交流但是大西洋奴隶贸易却是于十五世纪末通过在葡萄牙所属的西非殖民地以及西班牙稍后在美洲建立的殖民地而开始的新殖民地种植甘蔗、烟草、棉花都需要大量的劳力然而新殖民地的移民和契约佣工不足以开垦整个新大陆美洲原住民被奴役了， 但是很多人死于新型疾病也有一部分人成功反抗了奴役于是，为了满足劳作力的巨大需求欧洲人开始觊觎非洲在数世纪以前，非洲奴役 便以各种形式出现了一些奴役是契约制的有着契约期限和赎身的机会其他的则更像欧洲的农奴在一些社会体制中 奴隶能成为主人家庭的一部分可以拥有土地，甚至获得权力但是当白人船长带来工业产品武器和朗姆酒，来交换奴隶时非洲的国王与商人 毫不犹豫地出卖了人民他们不认为自己在出售同胞而是罪犯，欠债者，或者敌对部落的战犯国王通过出售奴隶来增强国力使他们有能力与邻国的敌人对抗非洲国家通过奴隶交易变得繁荣昌盛但是欧洲巨大的奴隶需求 为非洲国家带来了竞争奴役取代了其他刑罚掠夺奴隶成为了战争的原因而非后果为了保护自己不受奴隶掠夺的侵扰非洲各王国需要欧洲的武器而他们通过奴隶来交换武器因此，奴隶交易也成了一场武器竞争改变了整个大洲的社会秩序与经济但是对奴隶来说 他们面对的是无法想象的残酷奴隶抵达海岸边的交易站后为了预防跳蚤，被剃了光头 还打上了烙印被装上船送去美洲他们中约20%的人再也没能见到陆地那时的船长都希望节约空间所以将尽可能多的人塞在甲板下不卫生的环境使奴隶染病死亡其他的则由于疾病被抛入大海或者是为了杀鸡儆猴船长为了保证自己的利益 会割下奴隶的耳朵作为购买的证据一些俘虏决定自决生死许多非洲内陆居民从未见过白人认为白人是食人魔不停地带走居民，并且返回索要更多非洲居民害怕被吃掉 或者只是不想继续受折磨很多人选择了自杀 或者绝食他们相信死后能魂归故土活下来的那些则完全失去了人权被像货物一样地对待女性和孩子被留在甲板上，让船员欺凌男人则被要求表演舞蹈这样可以使奴隶活动身体 也可以抑制奴隶的反抗这些非洲居民到达新大陆以后的事以及时至今日 奴隶制如何依旧影响着他们的后代都广为人知但是鲜为人知的是大西洋奴隶交易 如何影响了非洲的未来非洲大陆不仅失去了数千万青壮年而且由于大部分被带走的奴隶为男性人口结构上的长期影响更为严重当美洲与欧洲最终禁止了奴隶交易后曾经由于奴隶交易而发达的非洲国家垮了变得易于被征服及殖民直至今日，愈演愈烈的竞争 及欧洲武器的流入依然是非洲大陆上，战争与动荡的种子大西洋奴隶交易同时促进了 种族歧视的发展在非洲，奴隶制的基础 无非是法律惩罚或者是部落战争但是鼓吹普世宗教的欧洲人早就禁止奴役同为天主教徒的人所以需要一个正当理由来奴役非洲人欧洲人喊着人人平等的口号 做出了显然很不公的事情他们声称非洲人生来就比自己低贱所以注定被奴役欧洲人竭尽全力地证明这理论这样，欧洲与美洲的奴隶制 就建立在了种族歧视的基础上使得这些奴隶，以及他们的后代都不可能在社会上获得平等的地位在以上所有方面大西洋奴隶交易是一场大规模的不公它的影响在奴隶制被废除后依然延续着

**P176 2014-12-19 The evolution of the human eye - Joshua Harvey**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=176)

The human eye is an amazing mechanism, able to detect anywhere from a few photons to direct sunlight, or switch focus from the screen in front of you to the distant horizon in a third of a second. In fact, the structures required for such incredible flexibility were once considered so complex that Charles Darwin himself acknowledged that the idea of there having evolved seemed absurd in the highest possible degree. And yet, that is exactly what happened, starting more than 500 million years ago. The story of the human eye begins with a simple light spot, such as the one found in single-celled organisms, like euglena. This is a cluster of light-sensitive proteins linked to the organism's flagellum, activating when it finds light and, therefore, food. A more complex version of this light spot can be found in the flat worm, planaria. Being cupped, rather than flat, enables it to better sense the direction of the incoming light. Among its other uses, this ability allows an organism to seek out shade and hide from predators. Over the millenia, as such light cups grew deeper in some organisms, the opening at the front grew smaller. The result was a pinhole effect, which increased resolution dramatically, reducing distortion by only allowing a thin beam of light into the eye. The nautilus, an ancestor of the octopus, uses this pinhole eye for improved resolution and directional sensing. Although the pinhole eye allows for simple images, the key step towards the eye as we know it is a lens. This is thought to have evolved through transparent cells covering the opening to prevent infection, allowing the inside of the eye to fill with fluid that optimizes light sensitivity and processing. Crystalline proteins forming at the surface created a structure that proved useful in focusing light at a single point on the retina. It is this lens that is the key to the eye's adaptability, changing its curvature to adapt to near and far vision. This structure of the pinhole camera with a lens served as the basis for what would eventually evolve into the human eye. Further refinements would include a colored ring, called the iris, that controls the amount of light entering the eye, a tough white outer layer, known as the sclera, to maintain its structure, and tear glands that secrete a protective film. But equally important was the accompanying evolution of the brain, with its expansion of the visual cortex to process the sharper and more colorful images it was receiving. We now know that far from being an ideal masterpiece of design, our eye bares traces of its step by step evolution. For example, the human retina is inverted, with light-detecting cells facing away from the eye opening. This results in a blind spot, where the optic nerve must pierce the retina to reach the photosensitive layer in the back. The similar looking eyes of cephalopods, which evolved independently, have a front-facing retina, allowing them to see without a blind spot. Other creatures' eyes display different adaptations. Anableps, the so called four-eyed fish, have eyes divided in two sections for looking above and under water, perfect for spotting both predators and prey. Cats, classically nighttime hunters, have evolved with a reflective layer maximizing the amount of light the eye can detect, granting them excellent night vision, as well as their signature glow. These are just a few examples of the huge diversity of eyes in the animal kingdom. So if you could design an eye, would you do it any differently? This question isn't as strange as it might sound. Today, doctors and scientists are looking at different eye structures to help design biomechanical implants for the vision impaired. And in the not so distant future, the machines built with the precision and flexibilty of the human eye may even enable it to surpass its own evolution.

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翻译人员: Jian Zhipeng 校对人员: Ru Zha人的眼睛是一种十分神奇的结构，它能够探查任何地方 小到几个光子，大到直射的阳光，且能在三分之一秒内，将焦点从你面前的屏幕切换到遥远的地平线。事实上，由于眼睛如此灵巧，其结构曾被认为极其复杂，以至于达尔文意识到眼睛进化的程度高得离谱。而眼睛的进化正是如此， 这早在五百万年前就开始了。有关人类眼睛的故事， 开始于一个极其简单的感光点，正如在诸如眼虫等 单细胞生物体中发现的一样。它是连接在生物体鞭毛上的一簇光敏蛋白，当感受到光亮时该蛋白被激活， 因而会使鞭毛游动来获取食物。扁形动物中的涡虫 则拥有更复杂的感光点结构。其不是扁平的而是凹陷成杯状，这使涡虫能更好的感知 入射光线的方向。除了其它用途外，此种结构使得生物体可以 寻找遮蔽处并躲避捕食者。过去几千年，在某些生物体中， 这种杯状感光体变得愈发凹陷，且前端的开口处变得越来越小。此变化的结果便是“针孔效应”， 这使得分辨率极大地提高，并只让一束细光能够射入眼睛， 以此来降低失真率。章鱼的祖先之一——鹦鹉螺用这样的针孔眼来提高 分辨率和方向感。虽然针孔眼能看到简单图像但正如我们所知， 演化成眼睛的关键是晶状体。这里认为是由透明细胞包裹住前端开口处以防感染，并使得眼球内部能够充满液体，以优化光敏感度和对光的处理。在眼睛表面形成的蛋白质结晶，形成了一个被人们证实为有用的结构此结构使得光线聚焦在视网膜上的一个点。这晶状体在眼睛视物时起到了关键的调节作用，它通过改变自身的曲率来调节近景及远景。这种针孔摄像头加以晶状体的结构，是最终进化为人眼的基础。进一步的进化改良包括：一个彩色的圆环——虹膜，它控制进入眼睛的光线数量；一个坚韧的白色的外层，也就是所谓的巩膜，用来保持眼睛的结构；以及泪腺，来分泌保护性的薄膜。而同等重要的是，伴随眼睛一同进化的大脑，用其不断扩大的视觉皮层，来加工它所接收到的更清晰更多彩的图像。现在我们知道了，眼睛并不是想象中大师级的设计，我们的眼睛拥有其一步步的进化过程。举个例子，人类的视网膜是倒置的，其上布满了背向眼睛前端的感光细胞。这形成了生理盲点，在盲点处，视神经必须穿过过视网膜来到达其背后的感光层。头足纲动物拥有相似的眼睛他们的眼睛是独立进化的，有着一个朝前的视网膜，使得他们的视野没有盲区。其他生物的眼睛也呈现出了不同的适应性。比目鱼，也就是所谓的四眼鱼，拥有分成两区的眼睛，一只用来看水上，一只用来看水下，让它们能够很好的发现捕食者以及猎物。猫——经典的夜间捕食者，进化出了反射层，大大增强了眼睛对光的捕捉能力，这赋予了猫科动物出色的夜视功能和他们标志性能发光的猫眼。这些只是动物王国里，种类繁多的眼睛中的几个范例所以，如果你能设计出一种眼睛，你会造得有所不同吗？这问题并没有听起来那么奇怪。目前，医生和科学家在研究不同的眼睛结构来帮助设计出为视障患者移植所需的仿生植入物。并且在不远的将来，机器制造出的精确又灵活的眼睛，也许甚至能超越眼睛本身的进化程度。

**P177 2014-12-23 Could a blind eye regenerate - David Davila**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=177)

Imagine that day by day, your field of vision becomes slightly smaller, narrowing or dimming until eventually you go completely blind. We tend to think of blindness as something you're born with, but in fact, with many diseases like Retinitis pigmentosa and Usher syndrome, blindness can start developing when you're a kid, or even when you're an adult. Both of these rare genetic diseases affect the retina, the screen at the back of the eye that detects light and helps us see. Now imagine if the eye could regenerate itself so that a blind person could see again. To understand if that's possible, we need to grasp how the retina works and what it has to do with a multitalented creature named the zebrafish. The human retina is made of different layers of cells, with special neurons that live in the back of the eye called rod and cone photoreceptors. Photoreceptors convert the light coming into your eye into signals that the brain uses to generate vision. People who have Usher syndrome and retinitis pigmentosa experience a steady loss of these photoreceptors until finally that screen in the eye can no longer detect light nor broadcast signals to the brain. Unlike most of your body's cells, photoreceptors don't divide and multiply. We're born with all the photoreceptors we'll ever have, which is why babies have such big eyes for their faces and part of why they're so cute. But that isn't the case for all animals. Take the zebrafish, a master regenerator. It can grow back its skin, bones, heart and retina after they've been damaged. If photoreceptors in the zebrafish retina are removed or killed by toxins, they just regenerate and rewire themselves to the brain to restore sight. Scientists have been investigating this superpower because zebrafish retina are also structured very much like human retina. Scientists can even mimic the effects of disorders like Usher syndrome or retinitis pigmentosa on the zebrafish eye. This allows them to see how zebrafish go about repairing their retinas so they might use similar tactics to fix human eyes one day, too. So what's behind the zebrafish's superpower? The main players are sets of long cells that stretch across the retina called Müller glia. When the photoreceptors are damaged, these cells transform, taking on a new character. They become less like Müller cells and more like stem cells, which can turn into any kind of cell. Then these long cells divide, producing extras that will eventually grow into new photoreceptors, travel to the back of the eye and rewire themselves into the brain. And now some researchers even think they've found the key to how this works with the help of one of two chemicals that create activity in the brain called glutamate and aminoadipate. In mouse eyes, these make the Müller glia divide and transform into photoreceptors, which then travel to the back of the retina, like they're replenishing a failing army with new soldiers. But remember, none of this has happened in our retinas yet, so the question is how do we trigger this transformation of the Müller glia in the human eye? How can we fully control this process? How do photoreceptors rewire themselves into the retina? And is it even possible to trigger this in humans? Or has this mechanism been lost over time in evolution? Until we tease apart the origins of this ability, retinal regeneration will remain a mysterious superpower of the common zebrafish.

**P177 2014-12-23 Could a blind eye regenerate - David Davila**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=177)

翻译人员: Qing Chen 校对人员: Coco Shen想象一下，每天你的视力范围变小一点，能见的范围越来越窄， 或者视线越来越模糊，渐渐地，直到你完全失明。我们总是觉得失明是与生俱来的，但实际上很多疾病-比如视网膜色素病变，以及乌谢尔综合症，失明可以从孩童时期甚至是成年时期产生。视网膜色素病变和乌谢尔综合症 都是影响视网膜的罕见疾病，位于眼球后部的这一屏幕能够感光 并帮助我们看见东西。现在你想象一下， 如果眼睛能够有自我修复的能力,那么盲人就能重新看见世界了。要明白这到底可不可行， 我们便要了解视网膜的原理以及它与一个叫做斑马鱼的多才生物有什么关系。人类的视网膜是由不同层的细胞组成，这些特殊的神经细胞分布在眼球的后部，叫做视干细胞和视锥细胞。这些感光细胞把进入眼睛里的光转化成神经信号传输给大脑以产生视觉。患乌谢尔综合症及视网膜色素病变的人逐渐丧失了这些感光细胞，最终这片眼球中的屏幕没法再感受到光,也无法传递神经信号到大脑。与大多数的身体细胞不同， 感光细胞不能分裂和繁殖。我们出生的时候都带着感光细胞，这也是为什么婴儿的脸小小的，眼睛都那么大都那么可爱。但非所有的动物都如此。比如说斑马鱼, 有着超级复原能力的一种生物，即使它的皮肤，骨骼，心脏和视网膜受损了， 它有能力让它们重生。假如斑马鱼的视网膜感光细胞 被毒素移除或者破坏，它们仍然能够重生并且自我重组 进入大脑来再造视觉。科学家一直在研究这种超能力，因为斑马鱼的视网膜 和人类的视网膜结构很相似。科学家甚至能够模拟乌谢尔综合症 或者视网膜色素病变对斑马鱼眼睛的影响。这样，科学家们便能够了解斑马鱼 是如何修复自己的视网膜的，从而使用相近的手法来修复人类的视网膜。究竟为什么斑马鱼有这种超能力呢？大功臣是一组分布在视网膜的长细胞叫做穆勒细胞。当感光细胞受损， 穆勒细胞便开始转化，赋予自己一个新的角色。他们不再是穆勒细胞， 而更像是干细胞，能够转化成任何一种细胞。随着这些长细胞的分裂，更多的细胞会渐渐生长， 变成新的感光细胞，游回到眼珠后部并重组进入大脑。现在一些研究人员甚至认为 他们已经找到这一过程发生的关键，即依靠两种化学物的帮助来创造大脑活动，这两种化学物叫做 谷氨酸和氨基乙二酸。在老鼠的眼睛里，这两种化学物促使穆勒细胞分裂 并转化为感光细胞，再游走到视网膜后部，就好像在为一支快垮的军队 扩充新的势力。但记住，这些都还没发生在人类的视网膜上因此，问题就在于我们如何能够 让穆勒细胞的这种转化发生在人类的眼睛里？我们如何才能 完全支配这一转化过程？感光细胞如何能够进行自我重组 进入视网膜？对于人类的眼睛来说， 这一切都能成为可能吗？或是这种机能随着人类的进化 已经渐渐消失了？除非我们能理清这种能力的起源，否则视网膜复原 仍将是一个神秘的超能力，只属于斑马鱼。

**P178 2014-12-23 How do vaccines work - Kelwalin Dhanasarnsombut**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=178)

In 1796, the scientist Edward Jenner injected material from a cowpox virus into an eight-year-old boy with a hunch that this would provide the protection needed to save people from deadly outbreaks of the related smallpox virus. It was a success. The eight-year-old was inoculated against the disease and this became the first ever vaccine. But why did it work? To understand how vaccines function, we need to know how the immune system defends us against contagious diseases in the first place. When foreign microbes invade us, the immune system triggers a series of responses in an attempt to identify and remove them from our bodies. The signs that this immune response is working are the coughing, sneezing, inflammation and fever we experience, which work to trap, deter and rid the body of threatening things, like bacteria. These innate immune responses also trigger our second line of defense, called adaptive immunity. Special cells called B cells and T cells are recruited to fight microbes, and also record information about them, creating a memory of what the invaders look like, and how best to fight them. This know-how becomes handy if the same pathogen invades the body again. But despite this smart response, there's still a risk involved. The body takes time to learn how to respond to pathogens and to build up these defenses. And even then, if a body is too weak or young to fight back when it's invaded, it might face very serious risk if the pathogen is particularly severe. But what if we could prepare the body's immune response, readying it before someone even got ill? This is where vaccines come in. Using the same principles that the body uses to defend itself, scientists use vaccines to trigger the body's adaptive immune system, without exposing humans to the full strength disease. This has resulted in many vaccines, which each work uniquely, separated into many different types. First, we have live attenuated vaccines. These are made of the pathogen itself but a much weaker and tamer version. Next, we have inactive vaccines, in which the pathogens have been killed. The weakening and inactivation in both types of vaccine ensures that pathogens don't develop into the full blown disease. But just like a disease, they trigger an immune response, teaching the body to recognize an attack by making a profile of pathogens in preparation. The downside is that live attenuated vaccines can be difficult to make, and because they're live and quite powerful, people with weaker immune systems can't have them, while inactive vaccines don't create long-lasting immunity. Another type, the subunit vaccine, is only made from one part of the pathogen, called an antigen, the ingredient that actually triggers the immune response. By even further isolating specific components of antigens, like proteins or polysaccharides, these vaccines can prompt specific responses. Scientists are now building a whole new range of vaccines called DNA vaccines. For this variety, they isolate the very genes that make the specific antigens the body needs to trigger its immune response to specific pathogens. When injected into the human body, those genes instruct cells in the body to make the antigens. This causes a stronger immune response, and prepares the body for any future threats, and because the vaccine only includes specific genetic material, it doesn't contain any other ingredients from the rest of the pathogen that could develop into the disease and harm the patient. If these vaccines become a success, we might be able to build more effective treatments for invasive pathogens in years to come. Just like Edward Jenner's amazing discovery spurred on modern medicine all those decades ago, continuing the development of vaccines might even allow us to treat diseases like HIV, malaria, or Ebola, one day.

**P178 2014-12-23 How do vaccines work - Kelwalin Dhanasarnsombut**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=178)

翻译人员: Peipei Xiang 校对人员: Emily(Hongyu) Chen1796年，科学家爱德华·詹纳把牛痘病毒 注入到了一个八岁男孩的体内，他直觉这可以保护人们免受天花病毒爆发的致命威胁。他成功了！这个八岁男孩没有感染天花，这成了历史上的第一支疫苗。但是它是怎么发挥作用的呢？要了解疫苗的作用原理，我们必须先了解我们的免疫系统是如何帮助我们打败传染病的。当外界微生物入侵我们的身体时，免疫系统会做出一系列反应试图识别并将异物赶出去。免疫系统正常的表现包括咳嗽、打喷嚏、发炎、发烧等等，这些都是为了把体内的威胁物，如细菌， 困住、吓跑。这些先天的免疫反应 还会诱发我们的第二道防线，叫做适应性免疫。特殊的细胞，B细胞和T细胞 会被召集起来对抗微生物并记录有关它们的信息，记录下这些入侵者的样子以及如何最有效地打败他们。这些信息在同样的病原体 再次入侵的时候就非常有用。不过尽管如此，这还是有风险的。身体需要一定的时间才能学会 如何对一病原体做出反应并建立相应的防御。即便如此，如果一个人的身体太虚弱或太年轻， 在身体被入侵的时候不能反抗，这个人可能会有很严重的生命威胁， 特别是如果这个病原体很厉害的话。但是，如果我们可以提前 给我们的身体免疫系统做好准备，甚至在我们生病以前就准备好呢？这里就是疫苗发挥作用的地方了。运用跟身体自身防御一样的原理，科学家们用疫苗诱发身体的 适应性免疫系统，但人们不需要遭受疾病之苦。现在我们已经有了很多疫苗， 每种疫苗都有各自独特的工作原理，可以分成许多不同的种类。首先，我们有减毒疫苗，它们由病原体本身制成， 但是是比较弱的病原体。接着，我们有失活疫苗， 这些疫苗中的病原体已经失去活性。这两种疫苗的弱化和失活保证病原体没有机会完全发病。但是就跟疾病一样， 它们会诱发免疫系统反应，让身体识别来自外部的袭击，这都是通过提前建立病原体档案做到的。不过，减毒疫苗的缺点是它很难生产，因为它们是活的而且很强大，那些免疫系统较弱的人不能够接种它们；而失活疫苗则不能产生长期的免疫性。另一种是亚单位疫苗，它是由病原体的一个部分制成，即抗原，抗原是诱发免疫系统反应的部分。通过进一步分离抗原的具体成分，比如蛋白质或多糖，这些疫苗可以诱发相应的反应。科学家们现在正在打造一系列的DNA疫苗。这种疫苗是将组成某种抗原的身体需要的用来诱发免疫系统反应的 特定基因分离出来。当这种疫苗被注入体内的时候，这些基因会告知体内的细胞制造抗原，这可以产生更强的免疫反应，为以后任何可能的威胁做好准备。并且因为这种疫苗 只包含了特定的基因成分，它不包含任何其他来自病原体的可能会导致病人发病而受苦的成分。如果这些疫苗获得成功，我们也许能够在不久的将来打造 更加有效的针对强大病原体的治疗方案。就跟爱德华·詹纳的伟大发现推动了现代医学的发展一样，继续致力于疫苗的研究也许有一天会让我们能够治疗艾滋病、疟疾、埃博拉等。

**P179 2014-12-24 Einstein's miracle year - Larry Lagerstrom**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=179)

As 1905 dawned, the soon-to-be 26-year-old Albert Einstein faced life as a failed academic. Most physicists of the time would have scoffed at the idea that this minor civil servant could have much to contribute to science. Yet within the following year, Einstein would publish not one, not two, not three, but four extraordinary papers, each on a different topic, that were destined to radically transform our understanding of the universe. The myth that Einstein had failed math is just that. He had mastered calculus on his own by the age of 15 and done well at both his Munich secondary school and at the Swiss Polytechnic, where he studied for a math and physics teaching diploma. But skipping classes to spend more time in the lab and neglecting to show proper deference to his professors had derailed his intended career path. Passed over even for a lab assistant position, he had to settle for a job at the Swiss patent office, obtained with the help of a friend's father. Working six days a week as a patent clerk, Einstein still managed to make some time for physics, discussing the latest work with a few close friends, and publishing a couple of minor papers. It came as a major surprise when in March 1905 he submitted a paper with a shocking hypothesis. Despite decades of evidence that light was a wave, Einstein proposed that it could, in fact, be a particle, showing that mysterious phenomena, such as the photoelectric effect, could be explained by his hypothesis. The idea was derided for years to come, but Einstein was simply twenty years ahead of his time. Wave-particle duality was slated to become a cornerstone of the quantum revolution. Two months later in May, Einstein submitted a second paper, this time tackling the centuries old question of whether atoms actually exist. Though certain theories were built on the idea of invisible atoms, some prominent scientists still believed them to be a useful fiction, rather than actual physical objects. But Einstein used an ingenious argument, showing that the behavior of small particles randomly moving around in a liquid, known as Brownian motion, could be precisely predicted by the collisions of millions of invisible atoms. Experiments soon confirmed Einstein's model, and atomic skeptics threw in the towel. The third paper came in June. For a long time, Einstein had been troubled by an inconsistency between two fundamental principles of physics. The well established principle of relativity, going all the way back to Galileo, stated that absolute motion could not be defined. Yet electromagnetic theory, also well established, asserted that absolute motion did exist. The discrepancy, and his inability to resolve it, left Einstein in what he described as a state of psychic tension. But one day in May, after he had mulled over the puzzle with his friend Michele Besso, the clouds parted. Einstein realized that the contradiction could be resolved if it was the speed of light that remained constant, regardless of reference frame, while both time and space were relative to the observer. It took Einstein only a few weeks to work out the details and formulate what came to be known as special relativity. The theory not only shattered our previous understanding of reality but would also pave the way for technologies, ranging from particle accelerators, to the global positioning system. One might think that this was enough, but in September, a fourth paper arrived as a "by the way" follow-up to the special relativity paper. Einstein had thought a little bit more about his theory, and realized it also implied that mass and energy, one apparently solid and the other supposedly ethereal, were actually equivalent. And their relationship could be expressed in what was to become the most famous and consequential equation in history: E=mc^2. Einstein would not become a world famous icon for nearly another fifteen years. It was only after his later general theory of relativity was confirmed in 1919 by measuring the bending of starlight during a solar eclipse that the press would turn him into a celebrity. But even if he had disappeared back into the patent office and accomplished nothing else after 1905, those four papers of his miracle year would have remained the gold standard of startling unexpected genius.

**P179 2014-12-24 Einstein's miracle year - Larry Lagerstrom**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=179)

翻译人员: Zongzhen Yang 校对人员: Ying Wang随着1905年的到来，即将26岁的阿尔伯特爱因斯坦是以一个挂科的大学生的身份面对生活的。如果说这个不起眼的公务员将对科学做出巨大贡献.当时的大多数物理学家一定会加以嘲笑。然而在接下来的一年里，爱因斯坦发表了不止一篇，不止两篇，不止三篇，而是四篇课题各不相同却都非同凡响的论文，它们注定将彻底改变我们对宇宙的认识。这也就是为什么爱因斯坦数学挂科了。他15岁时已经自己掌握了微积分，并且在慕尼黑中学和瑞士理工学院，都有不错的表现。他在这两所学校获得了数学和物理教学学位但是为了更多地待在实验室里而翘课，并忽视了对教授表示应有的尊重，这让他偏离了预期的职业道路。连一个实验室助理的职位都不被考虑，他只好在一位朋友的父亲的帮助下，在瑞士专利局谋了一份工作。尽管作为一个专利审查员一周要工作六天，爱因斯坦仍然能给物理学留出一些时间，与几个好友讨论最新的著作，并发表一些不怎么重要的论文。令人大吃一惊的是，他在1905年三月发表了一篇有着惊人假设的论文。不顾几十年来可以证明光是波的证据，爱因斯坦提出，光，实际上可以是粒子，并表明一些神秘的现象，比如光电效应，可以用他的假说来解释。这个观点在接下来的几年里一直被嘲笑，但爱因斯坦只是领先了他的时代二十年。波粒二象性被载入史册成为量子革命的奠基石。两个月之后，爱因斯坦提交了第二篇论文，这次他研究的是延续了几个世纪的古老命题－原子是否存在。尽管某些理论是建立在不可见的原子概念上的，一些杰出的科学家还是认为比起真实的物理对象，原子更像是一个有用的假设。但是爱因斯坦用了一个独创的论点，展示了微小粒子的运动，小分子在液体中的不规则运动，也就是布朗运动。布朗运动可以被准确的预测因为它是通过数以百万计的不可见的原子互相撞击而形成的。不久，实验就证明了爱因斯坦的模型，原子论的怀疑者也拱手认输。第三篇论文发表于六月。在很长一段时间里，爱因斯坦一直被物理学中两个基础原理的不一致所困扰。在两个基础的物理原理间，被广泛接受的相对性原理，在伽里略时期就已经被确立它阐明绝对的运动是无法定义的。然而同样被广泛接受的电磁理论，则声称绝对的运动是存在的。这个矛盾和自己的无能为力使爱因斯坦陷入了被他称作"精神紧张"的状态。但是五月的一天，在和他的朋友米榭贝索探讨这个谜题后，爱因斯坦感到云开雾散。爱因斯坦意识到，这个矛盾是可以化解的，即如果光速是恒定的，不论它处于何种参考系中。而时间和空间对于观测者都是相对的。爱因斯坦只用的几周时间就完成了细节，并用公式表达出了后来被称作狭义相对论的内容。这个理论不仅粉碎了我们之前对现实的认识，还为技术发展铺平了道路，从粒子加速器，到全球定位系统。你也许认为这已经足够了，但是在九月，第四篇论文以狭义相对论论文的后续的方式诞生了。爱因斯坦进一步思考了他的理论，然后意识到它还暗示了质量和能量，一个是明显实体的，另一个被认为是飘渺的，实际上是等价的。它们的关系可以用一个很著名的方程式来表达这个方程式而后也成为了历史上最重要的方程式之一：E=mc^2.爱因斯坦在接下来的近15年里都没有成为举世闻名的偶像。直到1919年测量星光在日全食中的弯曲确认了他后来的广义相对论，媒体才把他变成了一个名人。但是尽管他随后就回到专利局里销声匿迹，并在1905年之后一无所成，他在他那奇迹般的一年里写出的4篇论文使他成为令人震惊的天才。

**P180 2015-01-07 How I responded to sexism in gaming with empathy - Lilian Chen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=180)

Peking House is my family-owned Chinese restaurant in Willimantic, Connecticut, where I spent nearly 20 years growing up, before we sold it. My brother and I spent most of our time in the room in the back called "the office." "The office" was really just a storage room, but it had our gaming systems, and the game that we played the most was called Super Smash Brothers Melee. For those who don't know, Super Smash Brothers Melee is an older fighting game made for the Nintendo GameCube. My brother and I spent hours playing this game, so much that we even challenged restaurant customers to matches. Eventually, my friends dragged me out to a local tournament, where I ended up placing 13th out of 33. Not bad, but definitely far from the best. After training with higher level players, and taking notes on matches I found online, I started to travel to national tournaments, and before I knew it, I was being whisked around the United States at the age of 17, all because of a video game. Totally living the dream life, right? This is how I ran head first into the competitive Super Smash Brothers Melee community, a scene that I've been a part of for nearly ten years. I'm sure that when I say competitive gaming, you guys are imagining a room of people hunched over their laptops. Sometimes it can look like that, but more often it looks something like this. (Laughter) Because Smash Brothers Melee is such an old game, it requires those big, boxy TVs to be played on. Our players are so dedicated, that they will actually lug these things onto their flights as carry-ons. (Laughter) The community is also absurdly diverse. This is a photo of Apex, an annual tournament held in New Jersey. In 2013, over 1500 people showed up from 16 different countries. I feel like if 16 countries are flying out to New Jersey, that's saying something. Sorry, New Jersey. (Laughter) In the gaming community, I was known by my gamer tag "\_milktea," but in real life, I was still very much just Lilian. When I was 17, I was shy and quiet, and I was often bullied by my classmates for being different, for being Asian. Some of them made fun of the clothes I wore. Others asked me out on dates as a joke. Another called me a Chinese prostitute. But when I was "\_milktea," I was part of a community that welcomed and accepted me. Except what's missing from this picture? Do you see any women? When the gender imbalance is this large, social dynamics can become a bit skewed. You get a lot more attention than you normally would. [milktea is an angel] At the time, I didn't understand why I was getting this attention. I just knew that it was so much better than what I was dealing with at school. [I love Milktea.] Here's one of my favorites. [Milktea chan you are really attractive.] [If I had to rate you for beauty I give you a 8 out of 10] [Only because I've been crushing on another girl for a long time] (Laughter) But then, things took a turn for the worse. [Why is everyone blaming milktea lol?] [She is a harlot.] [She doesn't like Smash, she just wants attention.] And then you started to see comments like this. [coz you're only known in the scene for being the subject of nerdy fantasies] [suck a \*\*\*\* in crappy smasher's dreams] Over years, I began internalizing all of this, and then I took these attitudes and projected them onto other women. "Ew, why is she so girly? Is she even a real gamer?" I felt my voice shrinking and the resent growing inside of me, and eventually, I distanced myself from the Smash community altogether. Fast forward a few years. I landed my first job in New York City. There, I realized that sexist behavior didn't have to be the norm. But nevertheless, I stayed quiet and withdrawn. Public speaking? Never going to happen. (Laughter) But then, this Facebook comment appeared in my feed. [Stop chalking up the terror of the internet to the Smash community.] [In general, we're very accepting of females] I swear, at that very moment, my inner wallflower spontaneously combusted. I started writing blog posts that talked about my experiences and issues I had faced within the community, and to my surprise, they went viral within our scene. A well-known fighting game website picked up one of my posts and later on, Polygon, a gaming site, covered my future work. All of this led to the creation of The New Meta, a panel that I cofounded and moderated with the NYU Game Center. We roped in tons of women from different gaming communities to talk about issues of sexism within gaming. But the entire panel's point was to raise awareness in a way that did not shame male gamers. As a woman, I was sexist, and even misogynistic, against my own gender. Sometimes, when you've been immersed in an environment for long enough, it can be hard to differentiate between harmful behaviors and normal ones. While some gamers are intentionally malicious, some may not even realize that they're perpetuating sexist behaviors in the first place. Empathizing with these gamers is more productive than outright dismissing them. Initiate a conversation. Deconstruct these behaviors, no matter how obvious they might seem to you. And please, leave the accusatory tone behind. If I had been dismissed as a sexist neckbeard, I wouldn't be on this stage talking to you right now. And to my surprise, I found that people were willing to change, and they wanted to help. [As a guy, how to treat girls in eSports equally?] [Trying my hardest, but advice would help.] And whenever I had any doubts, I started to receive feedback like this. [I got a few female Smashers into the scene because of you.] This entire experience has shown me that my silence only further enabled sexism within gaming. Nobody is perfect. Internalizing biases and becoming lost in them is deceptively easy. By being vocal, you force yourself and those around you to reevaluate their actions and their perceptions. Everyone in this room has a voice. You have to use it, and you have to use it responsibly. Not only can you provoke change, but you can empower others to do so, too. Thank you. (Applause)

**P180 2015-01-07 How I responded to sexism in gaming with empathy - Lilian Chen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=180)

翻译人员: Emma Gao 校对人员: Shawnee Huang“北京屋”是我家在康涅狄格州的威廉姆斯拥有的餐馆在卖掉餐馆之前，我在那儿待了20年我和我的兄弟花了很多时间呆在最后面一个叫“办公室”的房间“办公室”其实只是一个储藏室但是里面有我们的电子游戏我们最常玩儿的叫作“任天堂明星大乱斗”如果你不知道的话它是一个很经典的动作搏击游戏它是为了任天堂的一款游戏机做的我兄弟和我在这个游戏上花了很多时间玩得太尽兴了以至于顾客都成为了 我们的挑战对象终于，我的朋友把我拉到当地的 一个游戏锦标赛中我在三十三个人里面排名第十三还不错啦，但是离第一名还是有很远的距离我开始开始与高级别玩家一起训练开始对在线的一些比赛视频认真做笔记之后我参加了国家的锦标赛在我不知情的情况下17岁的我，名声已经因为这个游戏传遍了美国我是不是过上了梦一般的生活？这就是我一腔热血加入“任天堂明星大乱斗”这个小社会的开始，我在这个群体里呆了近十年。我知道当我在说电子竞技时，你们在想一屋子的人驼着背，抱着电脑。有时候它的确看起来这样但是更多的时候是像这样的（笑声）因为“任天堂明星大乱斗”是个老游戏了必须在那些很大的老台电视机上玩玩家们太喜欢这个游戏了他们真的会把这种电视机打包带上飞机（笑声）这个游戏团体也非常的多元化这是Apex锦标赛的照片，在新泽西州在2013年，有1500人到场， 他们分别来自16个不同的国家我觉得从这16国的玩家飞到新泽西这件事可以看出这个游戏的火热程度了新泽西，抱歉啦（笑声）在这个玩家社区中，我的名称是“\_奶茶“但是在真实生活中，我就是平凡的Lilian在我17岁时，我很害羞也很安静作为一个亚洲人， 我的不同让我被同学欺负有的人取笑我的穿着有的人把约我出去约会当做玩笑有个人更是称呼我为中国的妓女但是，当我是“\_奶茶“时我在玩家社区是完全地被接受并且受欢迎的除了这图片少了什么呢你看得见女性玩家吗？当性别平衡被大幅打破时， 社会秩序就会有所出轨你会得到非同一般的注意［奶茶是个天使］当时，我并不明白我为什么会得到这样的注意力我只是觉得这比我在学校里得到的好多了 ［我爱奶茶］接下来是我最爱的几条［奶茶陈，你真实太有魅力了］［如果10分是完美外貌的话，我给你8分］［只是因为我暗恋另外一个女生太久了］（笑声）但是，事情也可以因为我是个女生而变得很糟［哈哈，为什么大家都在责怪奶茶？］［因为她是个婊子］［她并不喜欢这个游戏，只是想得到注意］之后，你开始看到像下面这些评论，［你这么有名只是因为在这屏幕中， 你成为了这帮呆子的性幻想对象］［在他们的梦里做着淫荡的事情］这么多年来，我开始接受他们的想法我自己看别的女人时也是这些态度“天呐！她怎么这么娇气？她真的是个玩家吗？”我感觉到在我自己的声音开始消失的同时， 厌恶也在我心中成长最终，我完全的离开了这个游戏社区让我们快进到几年后我在纽约找到了我第一份工作在那儿，我认识到性别歧视不总是常态但是，我依然保持安静和疏离的态度公众面前讲话？绝不可以发生。（笑声）但是，这个评论在我的Facebook主页上出现［停止把网络的恐怖联系到Smash社区］［大多数情况下，我们非常接受女性］我发誓，在那一刻，我内心的壁垒自动被烧掉了我开始在博客上写下我的经历以及我在这个群体里经历的事情让我吃惊的是，它们居然被迅速传播出去一个著名的拳击游戏在网站上 放上了我的一个推送后来，Polygon， 一个游戏网站， 给了我之后的工作这一切让The New Meta产生了一个我亲自建立，由纽约大学的 游戏中心进行维护的平台我们从不同游戏社区拉拢进来 很多女性玩家和她们一起讨论游戏中的性别歧视实际上，这个平台的目的是让社会 注意到这个问题以一种并不羞辱男性玩家的方式作为一个女性，我曾经是性别歧视主义甚至我歧视的是女性，我自己的性别群体有时，当你陷入一个环境很久时它会让你很难去区分哪些行为是有害的， 哪些行为是无害的当一些玩家故意地变得非常恶毒时一些人可能都没有意识到他们从一开始已经将性别歧视当成一种常态了比起和别的玩家想法背道而驰和他们想法一致在游戏中更有效让我们发起一场讨论解析这些行为不过他们对于你来说有多么显而易见并且，请摒弃掉那些指责如果我是一个被忽略掉的，有着络腮胡的 性别歧视主义的男人我不会站在这里，和你们交流想法令我惊讶的是我发现很多人想要改变，并且他们渴求帮助［我是个男生，怎么能在 eSport (运动游戏) 中平等的对待女孩子呢？］［我尽力了，但还是需要一些建议］每当我对自己产生质疑的时候， 我都会收到这样的反馈。［我看到很多女孩因为你加入了 Smash 社区］这个经历告诉了我我在游戏中保持沉默是在纵容性别歧视。没有人是完美的。被这些歧视同化并且在人群中丧失自己 是非常容易的但是发出声音后你就逼着自己和你身边的人去重新考量他们的做法和态度每个人都有他们自己的声音你要学会使用它，并且负责任的使用它。只有你做出改变你才会影响别人做出同样的改变谢谢大家（掌声）

**P181 2015-01-12 Why the Arctic is climate change's canary in the coal mine - William**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=181)

The area surrounding the North Pole may seem like a frozen and desolate environment where nothing ever changes. But it is actually a complex and finely balanced natural system, and its extreme location makes it vulnerable to feedback processes that can magnify even tiny changes in the atmosphere. In fact, scientists often describe the Arctic as the canary in the coal mine when it comes to predicting the impact of climate change. One major type of climate feedback involves reflectivity. White surfaces, like snow and ice, are very effective at reflecting the sun's energy back into space, while darker land and water surfaces absorb much more incoming sunlight. When the Arctic warms just a little, some of the snow and ice melts, exposing the ground and ocean underneath. The increased heat absorbed by these surfaces causes even more melting, and so on. And although the current situation in the Arctic follows the warming pattern, the opposite is also possible. A small drop in temperatures would cause more freezing, increasing the amount of reflective snow and ice. This would result in less sunlight being absorbed, and lead to a cycle of cooling, as in previous ice ages. Arctic sea ice is also responsible for another feedback mechanism through insulation. By forming a layer on the ocean's surface, the ice acts as a buffer between the frigid arctic air and the relatively warmer water underneath. But when it thins, breaks, or melts in any spot, heat escapes from the ocean, warming the atmosphere and causing more ice to melt in turn. Both of these are examples of positive feedback loops, not because they do something good, but because the initial change is amplified in the same direction. A negative feedback loop, on the other hand, is when the initial change leads to effects that work in the opposite direction. Melting ice also causes a type of negative feedback by releasing moisture into the atmosphere. This increases the amount and thickness of clouds present, which can cool the atmosphere by blocking more sunlight. But this negative feedback loop is short-lived, due to the brief Arctic summers. For the rest of the year, when sunlight is scarce, the increased moisture and clouds actually warm the surface by trapping the Earth's heat, turning the feedback loop positive for all but a couple of months. While negative feedback loops encourage stability by pushing a system towards equilibrium, positive feedback loops destabilize it by enabling larger and larger deviations. And the recently increased impact of positive feedbacks may have consequences far beyond the Arctic. On a warming planet, these feedbacks ensure that the North Pole warms at a faster rate than the equator. The reduced temperature differences between the two regions may lead to slower jet stream winds and less linear atmospheric circulation in the middle latitudes, where most of the world's population lives. Many scientists are concerned that shifts in weather patterns will last longer and be more extreme, with short term fluctuations becoming persistent cold snaps, heat waves, droughts and floods. So the Arctic sensitivity doesn't just serve as an early warning alarm for climate change for the rest of the planet. Its feedback loops can affect us in much more direct and immediate ways. As climate scientists often warn, what happens in the Arctic doesn't always stay in the Arctic.

**P181 2015-01-12 Why the Arctic is climate change's canary in the coal mine - William**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=181)

翻译人员: Aili Liang 校对人员: Sherry Chen北极圈附近的冰封世界似乎是一成不变的荒凉之地但其实那里的自然系统， 复杂、精妙，而又平衡它特殊的位置使得它对气候非常敏感微小的气候变化都可能被放大事实上，科学家常把北冰洋 形容为“矿井中的金丝雀”(金丝雀对瓦斯非常敏感, 曾被矿工用于预警)因为北冰洋对气候变化也非常敏感气候反馈的一项重要指标是反射性像冰雪这样的浅色地表会有效地把大部分阳光 反射回宇宙空间之中而土地、海洋这样的深色区域 则更擅于吸收阳光当北冰洋稍稍变暖，少量冰雪消融暴露出下面的泥土或者海洋吸收更多阳光热量， 导致更多冰雪消融循环往复现在的北冰洋正处于这样的变暖模式但变冷的模式亦有可能温度稍稍降低，会使海水更多结冰冰雪增加了，就会反射更多阳光吸收的阳光则会变少从而持续的变冷，冰河时代就是如此北冰海冰对另一种对气候的反馈与冰雪的隔离作用有关通过在北冰洋表面形成一层冰层冰在寒冷的空气 和相对温暖的海水中间形成了一个缓冲区如果冰层变薄、破裂、融化海水中的热量散发到空气中使空气变热，从而更多冰层融化这两个都是正反馈循环”正反馈“并非意味着这是好事而是指变化会往相同的方向 不断强化自身而负反馈则相反是指初始的改变会导致后续的改变向相反方向进行冰雪的融化也会导致负反馈融化后的冰雪会释放 更多水汽到大气中这使得云层变厚云层遮挡住阳光，大气就会变凉但这种负反馈循环非常短暂因为北冰洋的夏天很短在一年中其他的日子里，缺少阳光增加的云量通过吸收地球的热量， 反而使地表变暖这几个月的负反馈又变成了正反馈负反馈导致稳定性会把系统的变化推回原来的平衡点正反馈则会导致更大的变化， 破坏稳定性最近，正反馈的影响越来越大可能波及北冰洋之外的世界在变暖的星球上正反馈使极地变热的速度快于赤道两个区域之间的温差减小会使喷射气流的速度减弱中纬度上的线性大气环流亦会减弱而世界上大部分人口 正居住于中纬度地区许多科学家在关注 这种气候模式的变化会持续更长时间， 变造成更极端影响短期的气候波动会变成持续的寒流热浪、干旱、洪水北冰洋对气候的敏感性 并非仅是一种警告提醒我们注意地球上 其它地方的气候变化它的反馈作用，会以更直接 更迅速的方式影响到我们正如气候学家们所警告的北冰洋的变化将波及全球

**P182 2015-01-16 What triggers a chemical reaction - Kareem Jarrah**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=182)

You know how sometimes you go to bake a cake but your bananas have all gone rotten, your utensils have rusted, you trip and pour all of your baking soda into the vinegar jug, and then your oven explodes? My friend, you and your chemical reactions have fallen victim to enthalpy and entropy and, boy, are they forces to be reckoned with. Now, your reactants are all products. So, what are these "E" words, and what's their big idea? Let's start with enthalpy, an increase or decrease of energy during a chemical reaction. Every molecule has a certain amount of chemical potential energy stored within the bonds between its atoms. Chemicals with more energy are less stable, and thus, more likely to react. Let's visualize the energy flow in a reaction, the combustion of hydrogen and oxygen, by playing a round of crazy golf. Our goal is to get a ball, the reactant, up a small rise and down the other much steeper slope. Where the hill goes up, we need to add energy to the ball, and where it goes down, the ball releases energy into its surroundings. The hole represents the product, or result of the reaction. When the reaction period ends, the ball is inside the hole, and we have our product: water. This, like when our oven exploded, is an exothermic reaction, meaning that the chemical's final energy is less than its starting energy, and the difference has been added to the surrounding environment as light and heat. We can also play out the opposite type of reaction, an endothermic reaction, where the final energy is greater than the starting energy. That's what we were trying to achieve by baking our cake. The added heat from the oven would change the chemical structure of the proteins in the eggs and various compounds in the butter. So that's enthalpy. As you might suspect, exothermic reactions are more likely to happen than endothermic ones because they require less energy to occur. But there's another independent factor that can make reactions happen: entropy. Entropy measures a chemical's randomness. Here's an enormous pyramid of golf balls. Its ordered structure means it has low entropy. However, when it collapses, we have chaos everywhere, balls bouncing high and wide. So much so that some even go over the hill. This shift to instability, or higher entropy, can allow reactions to happen. As with the golf balls, in actual chemicals this transition from structure to disorder gets some reactants past the hump and lets them start a reaction. You can see both enthalpy and entropy at play when you go to light a campfire to cook dinner. Your match adds enough energy to activate the exothermic reaction of combustion, converting the high-energy combustible material in the wood to lower energy carbon dioxide and water. Entropy also increases and helps the reaction along because the neat, organized log of wood is now converted into randomly moving water vapor and carbon dioxide. The energy shed by this exothermic reaction powers the endothermic reaction of cooking your dinner. Bon appétit!

**P182 2015-01-16 What triggers a chemical reaction - Kareem Jarrah**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=182)

翻译人员: Claire Zhang 校对人员: Luyao Zou你想去烘培一个蛋糕但是发现香蕉都腐烂掉了餐具也都生锈了你不小心摔了一跤 把所有的烘焙粉都倒在了醋瓶子里面然后你的烤箱就爆炸了！朋友们， 你和你的化学反应都成为了焓和熵的受害者孩子，这是可以预料到的吗？现在，你的反应物都成了产物所以，这些“E”是什么，他们又代表了什么让我们先从焓开始它是在化学反应过程中 能量的增加或者减少每一个分子都有一定的化学势能存储在它原子之间的化学键中能量越高的化学物质越不稳定因此就越有可能发生反应让我们通过一轮疯狂的高尔夫来看看在氢氧燃烧反应中 能量是怎么流动的吧我们的目标是将这个球， 反应物，上升一些然后向另一个陡峭的斜坡下滚在上坡的时候，我们需要给球输入能量当它下滚时， 它会向周围释放能量而洞则代表了产物， 或者说反应的结果当反应周期结束时， 球会掉入洞中然后我们将得到产物——水这，像刚才说的微波炉爆炸一样， 是放热反应指的是化学反应后的能量会比开始前的少而这些差量会以光或者热量的形式释放到周围的环境中当然，还有另一种相反的反应吸热反应指的是最后的能量比反应开始前要多在烘焙蛋糕时产生的就是这种反应烤箱中升高的温度会改变鸡蛋中蛋白质和黄油中各种物质的化学结构这便是焓你可能会想放热反应比吸热反应更容易发生因为相比之下，它需要的能量更少但还有另一个独立的因素， 也可以让化学反应发生：熵熵衡量了化学物质的混乱程度这里有一个用高尔夫球堆成的巨大金字塔它结构规整， 意味着较低的熵然而，当它倒塌时，就会混乱一片球弹跳的到处都是。多到有些球直接翻过了山坡这种转向不稳定状态 或者说较高的熵的趋势能让反应发生和高尔夫球一样， 真实的化学物质中这种从有次序到无次序的转变 会使某些反应物越过能垒使它们产生反应可以看到，在你点燃营火准备煮晚餐时， 焓和熵同时起了作用你的火柴提供了足够的能量启动放热的燃烧反应进而转化木头中的 高能量可燃物质成能量低的二氧化碳和水。熵也会增加以及帮助反应持续进行这是因为排列整齐，有条理的木头现在转化为自由移动的 水蒸汽和二氧化碳这些放热反应放出的能量正好提供煮晚餐的吸热反应的热能祝你好胃口!

**P183 2015-01-20 Why do buildings fall in earthquakes - Vicki V. May**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=183)

Earthquakes have always been a terrifying phenomenon, and they've become more deadly as our cities have grown, with collapsing buildings posing one of the largest risks. Why do buildings collapse in an earthquake, and how can it be prevented? If you've watched a lot of disaster films, you might have the idea that building collapse is caused directly by the ground beneath them shaking violently, or even splitting apart. But that's not really how it works. For one thing, most buildings are not located right on a fault line, and the shifting tectonic plates go much deeper than building foundations. So what's actually going on? In fact, the reality of earthquakes and their effect on buildings is a bit more complicated. To make sense of it, architects and engineers use models, like a two-dimensional array of lines representing columns and beams, or a single line lollipop with circles representing the building's mass. Even when simplified to this degree, these models can be quite useful, as predicting a building's response to an earthquake is primarily a matter of physics. Most collapses that occur during earthquakes aren't actually caused by the earthquake itself. Instead, when the ground moves beneath a building, it displaces the foundation and lower levels, sending shock waves through the rest of the structure and causing it to vibrate back and forth. The strength of this oscillation depends on two main factors: the building's mass, which is concentrated at the bottom, and its stiffness, which is the force required to cause a certain amount of displacement. Along with the building's material type and the shape of its columns, stiffness is largely a matter of height. Shorter buildings tend to be stiffer and shift less, while taller buildings are more flexible. You might think that the solution is to build shorter buildlings so that they shift as little as possible. But the 1985 Mexico City earthquake is a good example of why that's not the case. During the quake, many buildings between six and fifteen stories tall collapsed. What's strange is that while shorter buildings nearby did keep standing, buildings taller than fifteen stories were also less damaged, and the midsized buildings that collapsed were observed shaking far more violently than the earthquake itself. How is that possible? The answer has to do with something known as natural frequency. In an oscillating system, the frequency is how many back and forth movement cycles occur within a second. This is the inverse of the period, which is how many seconds it takes to complete one cycle. And a building's natural frequency, determined by its mass and stiffness, is the frequency that its vibrations will tend to cluster around. Increasing a building's mass slows down the rate at which it naturally vibrates, while increasing stiffness makes it vibrate faster. So in the equation representing their relationship, stiffness and natural frequency are proportional to one another, while mass and natural frequency are inversely proportional. What happened in Mexico City was an effect called resonance, where the frequency of the earthquake's seismic waves happen to match the natural frequency of the midsized buildings. Like a well-timed push on a swingset, each additional seismic wave amplified the building's vibration in its current direction, causing it to swing even further back, and so on, eventually reaching a far greater extent than the initial displacement. Today, engineers work with geologists and seismologists to predict the frequency of earthquake motions at building sites in order to prevent resonance-induced collapses, taking into account factors such as soil type and fault type, as well as data from previous quakes. Low frequencies of motion will cause more damage to taller and more flexible buildings, while high frequencies of motion pose more threat to structures that are shorter and stiffer. Engineers have also devised ways to abosrb shocks and limit deformation using innovative systems. Base isolation uses flexible layers to isolate the foundation's displacement from the rest of the building, while tuned mass damper systems cancel out resonance by oscillating out of phase with the natural frequency to reduce vibrations. In the end, it's not the sturdiest buildings that will remain standing but the smartest ones.

**P183 2015-01-20 Why do buildings fall in earthquakes - Vicki V. May**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=183)

翻译人员: Melody Tang 校对人员: Geoff Chen地震一直是个很恐怖的现象当我们城市越成长 地震也造成更多人死亡因为最大的危险之一 就是倒塌的建筑物为什麽建筑物会在地震时倒塌呢?如何可以预防建筑物倒塌呢?如果你看過許多災難片你就可能知道建筑物倒塌是因为它们下面的地层剧烈摇动或甚至裂开所造成但是其实不是这样的首先，大多数的建筑物不是在断层线上而且，移动的板块比建筑物的地基深很多所以到底是怎么回事呢？事实上，地震的真相和地震对建筑物造成的结果有一点複杂为了要搞清楚 建筑师和工程师们使用模型例如以二维线条代表柱子和梁或用一条上面有圆形物如棒棒糖的东西 代表一个建筑物的质量即便如此简单的模型用来作为预测建筑物在地震时的反应 是很有用的它主要就是一个物理作用多数地震时的倒塌其实并不是因为地震本身所引起的而是，当建筑物下的地层移动时它使地基和低楼层移位然后震波传导至整个结构造成结构前后震动震荡的力道主要有两个因素：集中在建筑物底部的质量和它的坚硬度后者是造成某种程度的移位的力量加上建筑物的建材和柱子的形状坚硬度主要与高度有关较低的建筑物比较坚硬 移动程度较小较高的建筑物移动性就比较高你可能想那解决的方法就是 盖低一点的建筑物它们的摇动会比较小但是在1985年墨西哥市地震 就是一个证明并非如此的例子在那个地震许多6到15楼的建筑物倒塌奇怪的是附近的较低的建筑物没倒塌15楼以上的建筑物也损害较少那些倒塌的中型建筑物摇摆的程度比地震的震幅还大为什么呢？答案是［自然频率］在一个摆动的系统里面周波数是一秒内来回摆动的次数这是和一次来回摆动的秒数的周期是相反的建筑物的［自然频率］－ 由它的质量和坚硬度所决定－是它的震動集中的頻率当建築物的质量增加 自然頻率降低堅硬度增加 震動也會加快以一個公式來表現這些之間的關係堅硬度和自然頻率是成正比質量和自然頻率則是成反比在墨西哥市的地震是 共振的结果地震波的频率正好与中型建筑物的自然频率相同正如在秋千的最适合点推一下接下来的每一个地震波扩大了建筑物往同一方向的震动造成它更加往那方向的摆动最后达到比原来更大幅的移位今天，工程师与 地质学家和地震学家共同合作在建筑物现场预测地震移动的频率以预防共振引起的倒塌他们考量土壤类型和断层的类型以及参考以往地震的数据低频率的震动对比较高和有弹性的建筑物造成更多的损害反之，高频率的震动威胁到比较低和高坚硬性的建筑物的结构工程师同时想办法吸收震动的方法以及用创新的系统防止建筑物变形地基的隔离是以有弹性的层次来将建筑物的其他部分从 地基的移动隔离开来让调整好的阻尼器系統取消共振以自然频率消除振盪来降低震动結論是：不是最坚固的 而是最聪明的建筑物可以屹立不搖

**P184 2015-01-23 Why Shakespeare loved iambic pentameter - David T. Freeman and Gregor**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=184)

To someone first encountering the works of William Shakespeare, the language may seem strange. But there is a secret to appreciating it. Although he was famous for his plays, Shakespeare was first and foremost a poet. One of the most important things in Shakespeare's language is his use of stress. Not that kind of stress, but the way we emphasize certain syllables in words more than others. We're so used to doing this that we may not notice it at first. But if you say the word slowly, you can easily identify them. Playwright, computer, telephone. Poets are very aware of these stresses, having long experimented with the number and order of stressed and unstressed syllables, and combined them in different ways to create rhythm in their poems. Like songwriters, poets often express their ideas through a recognizable repetition of these rhythms or poetic meter. And like music, poetry has its own set of terms for describing this. In a line of verse, a foot is a certain number of stressed and unstressed syllables forming a distinct unit, just as a musical measure consists of a certain number of beats. One line of verse is usually made up of several feet. For example, a dactyl is a metrical foot of three syllables with the first stressed, and the second and third unstressed. Dactyls can create lines that move swiftly and gather force, as in Robert Browning's poem, "The Lost Leader." "Just for a handful of silver he left us. Just for a rib and to stick in his coat." Another kind of foot is the two-syllable long trochee, a stressed syllable followed by an unstressed one. The trochees in these lines from Shakespeare's "Macbeth" lend an ominous and spooky tone to the witches' chant. "Double, double, toil and trouble; fire burn and cauldron bubble." But with Shakespeare, it's all about the iamb. This two-syllable foot is like a reverse trochee, so the first syllable is unstressed and the second is stressed, as in, "To be, or not to be." Shakespeare's favorite meter, in particular, was iambic pentameter, where each line of verse is made up of five two-syllable iambs, for a total of ten syllables. And it's used for many of Shakespeare's most famous lines: "Shall I compare thee to a summer's day?" "Arise fair sun, and kill the envious moon." Notice how the iambs cut across both punctuation and word separation. Meter is all about sound, not spelling. Iambic pentameter may sound technical, but there's an easy way to remember what it means. The word iamb is pronounced just like the phrase, "I am." Now, let's expand that to a sentence that just happens to be in iambic pentameter. "I am a pirate with a wooden leg." The pirate can only walk in iambs, a living reminder of Shakespeare's favorite meter. Iambic pentameter is when he takes ten steps. Our pirate friend can even help us remember how to properly mark it if we image the footprints he leaves walking along a deserted island beach: A curve for unstressed syllables, and a shoe outline for stressed ones. "If music be the food of love, play on." Of course, most lines of Shakespeare's plays are written in regular prose. But if you read carefully, you'll notice that Shakespeare's characters turn to poetry, and iambic pentameter in particular, for many of the same reasons that we look to poetry in our own lives. Feeling passionate, introspective, or momentous. Whether it's Hamlet pondering his existence, or Romeo professing his love, the characters switch to iambic pentameter when speaking about their emotions and their place in the world. Which leaves just one last question. Why did Shakespeare choose iambic pentameter for these moments, rather than, say, trochaic hexameter or dactylic tetrameter? It's been said that iambic pentameter was easy for his actors to memorize and for the audience to understand because it's naturally suited to the English language. But there might be another reason. The next time you're in a heightened emotional situation, like the ones that make Shakespeare's characters burst into verse, put your hand over the left side of your chest. What do you feel? That's your heart beating in iambs. Da duhm, da duhm, da duhm, da duhm, da duhm. Shakespeare's most poetic lines don't just talk about matters of the heart. They follow its rhythm.

**P184 2015-01-23 Why Shakespeare loved iambic pentameter - David T. Freeman and Gregor**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=184)

翻译人员: Gabriella Hu 校对人员: Geoff Chen对于第一次阅读莎士比亚的作品的人他的用语可能有些奇怪但是欣赏他的作品有一个秘诀虽然他以戏剧闻名 莎士比亚首先是一位诗人莎士比亚的语言中最重要的一点是他的强调音不是那种强调是强调单词中的某些音节我们已经习惯这样做了 以至于我们察觉不出来但是如果你慢慢地读一个单词，你能听得出来剧作家，计算机，电话诗人很注重这些重音，他们长期实验各种重音节和轻音节的个数和顺序，用不同的组合方式去产生诗歌中的韵律像曲作家一样，诗人通过重复一个可识别的节奏 来表达它们的想法这就叫韵律也像音乐一样诗歌有特殊的术语描述这些韵律在一行诗中音步是一定量的重音节和轻音节组成了一个独立的单位就像音乐中不同的节拍 含有不同数量的拍子一行诗通常有好几个音步比如，一个长短格是一个带三个音节的音步第一个音节是重音节，后两个是轻音节长短格可以创造出流畅有力的诗句，就像罗伯特·布朗宁的诗歌，“失落的领袖”“只为了一把银钱他离开了我们， 只为了一条缎带綴在他的衣裳。”另一种音步是长达两音节的扬抑格第一个重音节，接着一个轻音节莎士比亚的“麦克白”中的扬抑格赋予了女巫的咒语一种不祥和怪异的感觉“不惮辛劳不惮烦， 釜中沸沫已成澜”但是莎士比亚使用的是抑扬格这个长达两个音节的音步和扬抑格恰好相反，所以第一个是轻音节，第二个是重音节，比如“生存还是毁灭。”莎士比亚尤其喜欢的音步是五步抑扬格每行诗是由五个两音节抑扬格组成的总共十个音节许多莎士比亚的名句都是使用这个音步的：“我能否把你比作夏日璀璨？”“升起吧，美丽的太阳！赶走那嫉妒的月亮。”我们可以看到抑扬格 不论标点符号或单词长短音步是看音，而不是拼写五步抑扬格可能听上去很专业但是有一个很简单的方法能记住它的含义“抑扬“ 的发音很像 “我是”（谐音）现在，把它扩展成一个正好是五步抑扬格的句子“我是一个有木腿的海盗”这个海盗只能一步一步地走可以联想到莎士比亚最喜欢的音步五步抑扬格是他走完了十步这个海盗还可以帮我记住里面的轻重音节如果我们想象他在沙滩上留下的脚印：曲线代表轻音节，鞋印代表重音节“如果音乐是爱情的食量，那就继续演奏吧”当然，莎士比亚戏剧里大多数的台词都是普通的散文但是如果你仔细阅读你会发现莎士比亚的文字变成了诗歌尤其是五步抑扬格就像我们欣赏我们生活中的诗歌一样感觉到激情、内省，或峥嵘无论是哈姆雷特思索他存在的意义或是罗密欧表述他的爱意这些人物都运用五步抑扬格 来表述他们的情感和他们的境地现在就剩下一个问题了为什么莎士比亚 在这些时刻使用五步抑扬格而不是用六步扬抑格或四音长短格？据说五步抑扬格方便演员记忆观众也更容易理解因为五步抑扬格与英语十分切合但是可能有另一个原因下次你情绪高涨的时候就像使莎士比亚的角色高歌的情景一样把你的手放在你的胸部左侧你能感觉到什么？你的心脏跳动的韵律，也是抑扬的咚哒，咚哒，咚哒，咚哒，咚哒莎士比亚最有诗意的台词 不只谈论内心的想法它们跟着心跳的节奏

**P185 2015-01-26 How does your smartphone know your location - Wilton L. Virgo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=185)

How does your smartphone know exactly where you are? The answer lies 12,000 miles over your head in an orbiting satellite that keeps time to the beat of an atomic clock powered by quantum mechanics. Phew. Let's break that down. First of all, why is it so important to know what time it is on a satellite when location is what we're concerned about? The first thing your phone needs to determine is how far it is from a satellite. Each satellite constantly broadcasts radio signals that travel from space to your phone at the speed of light. Your phone records the signal arrival time and uses it to calculate the distance to the satellite using the simple formula, distance = c x time, where c is the speed of light and time is how long the signal traveled. But there's a problem. Light is incredibly fast. If we were only able to calculate time to the nearest second, every location on Earth, and far beyond, would seem to be the same distance from the satellite. So in order to calculate that distance to within a few dozen feet, we need the best clock ever invented. Enter atomic clocks, some of which are so precise that they would not gain or lose a second even if they ran for the next 300 million years. Atomic clocks work because of quantum physics. All clocks must have a constant frequency. In other words, a clock must carry out some repetitive action to mark off equivalent increments of time. Just as a grandfather clock relies on the constant swinging back and forth of a pendulum under gravity, the tick tock of an atomic clock is maintained by the transition between two energy levels of an atom. This is where quantum physics comes into play. Quantum mechanics says that atoms carry energy, but they can't take on just any arbitrary amount. Instead, atomic energy is constrained to a precise set of levels. We call these quanta. As a simple analogy, think about driving a car onto a freeway. As you increase your speed, you would normally continuously go from, say, 20 miles/hour up to 70 miles/hour. Now, if you had a quantum atomic car, you wouldn't accelerate in a linear fashion. Instead, you would instantaneously jump, or transition, from one speed to the next. For an atom, when a transition occurs from one energy level to another, quantum mechanics says that the energy difference is equal to a characteristic frequency, multiplied by a constant, where the change in energy is equal to a number, called Planck's constant, times the frequency. That characteristic frequency is what we need to make our clock. GPS satellites rely on cesium and rubidium atoms as frequency standards. In the case of cesium 133, the characteristic clock frequency is 9,192,631,770 Hz. That's 9 billion cycles per second. That's a really fast clock. No matter how skilled a clockmaker may be, every pendulum, wind-up mechanism and quartz crystal resonates at a slightly different frequency. However, every cesium 133 atom in the universe oscillates at the same exact frequency. So thanks to the atomic clock, we get a time reading accurate to within 1 billionth of a second, and a very precise measurement of the distance from that satellite. Let's ignore the fact that you're almost definitely on Earth. We now know that you're at a fixed distance from the satellite. In other words, you're somewhere on the surface of a sphere centered around the satellite. Measure your distance from a second satellite and you get another overlapping sphere. Keep doing that, and with just four measurements, and a little correction using Einstein's theory of relativity, you can pinpoint your location to exactly one point in space. So that's all it takes: a multibillion-dollar network of satellites, oscillating cesium atoms, quantum mechanics, relativity, a smartphone, and you. No problem.

**P185 2015-01-26 How does your smartphone know your location - Wilton L. Virgo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=185)

翻译人员: Vivi Fu 校对人员: KuaiKuai Gong你的智能手机是怎么定位你的位置的？答案藏在你头顶 19000多公里高空中的卫星上，卫星利用基于量子力学的原子钟来运行。呼...来分解一下这句话。首先，为什么知道 卫星上的时间很重要？尤其当我们关心的是 定位位置，而不是时间。首先，你的手机要计算出你离卫星有多远。每个卫星都会间歇性地 发射出无线电波信号，信号以光速从卫星传递到你的手机。手机会记录接受信号的时间间隔，然后计算出与卫星之间的距离，用这个简单的公式：距离=c\*时间，c就是光速，时间就是 信号传递的时间间隔。但是，有一个问题。光速是极快的。如果我们只能粗略估计 信号传递时间的长短，地球上的每一个地点， 即便彼此相距很远，看起来也都会和卫星相隔同样的距离。所以为了计算出相隔只有几米远的距离，我们需要一个最精准的“钟”。原子钟，是非常精准的钟，它们不会多走或者少走一秒钟，即使走上3亿年也是这样。原子钟走的如此精准， 是基于量子力学原理。所有的钟都遵循固定的频率工作。换句话说，也就是钟在固定时间内 会重复同样的动作来标记相等时段的时间。就好像老式钟表依靠重力控制的钟摆会以固定频率的摆动来工作一样，原子钟的走动依靠的是一个原子的 两个能级间的跃迁。这就是量子物理的实际应用。量子力学认为每个原子都带有能量，但不是带有任意数值的能量。实际上，原子的能量 由一系列确定的等级决定。这些等级我们称之为量子。打个比方，有一辆车在高速上行驶。当你加速时，正常情况下你会从每小时 32公里逐渐加速到110公里。现在，如果你有一辆原子车，你就不会一码一码地线性加速。而是瞬间从低速跳变到高速， 不需要任何过渡。对于一个原子在两个能级之间 发生一次跃迁，量子力学认为，能级之间的能量差是 根据跃迁时的特征频率乘以一个常数得出的，也就是说能量的变化， 等于一个常数，也就是普朗克常量，乘以跃迁时的特征频率。利用这个特征频率， 我们可以制造原子钟。GPS卫星以铯(Cs)和铷(Rb)原子的 共振频率为频率标准。铯133(中子数为133的铯元素)，它的特征频率为 91亿9263万1770 赫兹。也就是每秒走90亿圈。这个钟真是超级无敌快。无论多么出色的钟表匠 都造不出来这样的钟，每一组钟摆、齿轮和 石英晶体三者之间的共振频率总会有细微的差别。但是，宇宙中的每一个铯133原子都遵循着同样精准的共振频率。幸亏有了原子钟，我们可以精确到一秒的十亿分之一，由此就可以得出 与卫星之间的准确距离。我们假设你正好位于地球表面。已知你与卫星之间的距离不变。换句话说， 你就在以卫星为中心的一个球体表面的某个地方。再根据第二个卫星来测量距离，就可以得到另外一个有重叠的球体。不断累加，四个卫星测量得到的 四个球体重叠于一点后，再根据爱因斯坦的 相对论进行细微的修正，你就可以精准地知道自己的位置。精确定位就是这么实现的：一个用数十亿美元 构建起来的卫星网络，振动的铯原子，量子力学，相对论，一部智能手机，还有你。小菜一碟！

**P186 2015-01-28 How do dogs 'see' with their noses - Alexandra Horowitz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=186)

"Hi, Bob." "Morning, Kelly. The tulips looks great." Have you ever wondered how your dog experiences the world? Here's what she sees. Not terribly interesting. But what she smells, that's a totally different story. And it begins at her wonderfully developed nose. As your dog catches the first hints of fresh air, her nose's moist, spongy outside helps capture any scents the breeze carries. The ability to smell separately with each nostril, smelling in stereo, helps to determine the direction of the smell's source so that within the first few moments of sniffing, the dog starts to become aware of not just what kind of things are out there but also where they're located. As air enters the nose, a small fold of tissue divides it into two separate folds, one for breathing and one just for smelling. This second airflow enters a region filled with highly specialized olfactory receptor cells, several hundred millions of them, compaired to our five million. And unlike our clumsy way of breathing in and out through the same passage, dogs exhale through slits at the side of their nose, creating swirls of air that help draw in new odor molecules and allow odor concentration to build up over mulitple sniffs. But all that impressive nasal architecture wouldn't be much help without something to process the loads of information the nose scoops up. And it turns out that the olfactory system dedicated to proessing smells takes up many times more relative brain area in dogs than in humans. All of this allows dogs to distinguish and remember a staggering variety of specific scents at concentrations up to 100 million times less than what our noses can detect. If you can smell a spritz of perfume in a small room, a dog would have no trouble smelling it in an enclosed stadium and distinguishing its ingredients, to boot. And everything in the street, every passing person or car, any contents of the neighbor's trash, each type of tree, and all the birds and insects in it has a distinct odor profile telling your dog what it is, where it is, and which direction it's moving in. Besides being much more powerful than ours, a dog's sense of smell can pick up things that can't even be seen at all. A whole separate olfactory system, called the vomeronasal organ, above the roof of the mouth, detects the hormones all animals, Including humans, naturally release. It lets dogs identify potential mates, or distinguish between friendly and hostile animals. It alerts them to our various emotional states, and it can even tell them when someone is pregnant or sick. Because olfaction is more primal than other senses, bypassing the thalamus to connect directly to the brain structures involving emotion and instinct, we might even say a dog's perception is more immediate and visceral than ours. But the most amazing thing about your dog's nose is that it can traverse time. The past appears in tracks left by passersby, and by the warmth of a recently parked car where the residue of where you've been and what you've done recently. Landmarks like fire hydrants and trees are aromatic bulletin boards carrying messages of who's been by, what they've been eating, and how they're feeling. And the future is in the breeze, alerting them to something or someone approaching long before you see them. Where we see and hear something at a single moment, a dog smells an entire story from start to finish. In some of the best examples of canine-human collaboration, dogs help us by sharing and reacting to those stories. They can respond with kindness to people in distress, or with aggression to threats because stress and anger manifest as a cloud of hormones recognizable to the dog's nose. With the proper training, they can even alert us to invisible threats ranging from bombs to cancer. As it turns out, humanity's best friend is not one who experiences the same things we do, but one whose incredible nose reveals a whole other world beyond our eyes.

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翻译人员: Joanna Zhou 校对人员: Rongxin Liu“嗨，鲍勃。”“早上好，凯利。这株郁金香看起来好美。”你曾经为你的狗狗如何感受这个世界产生过质疑吗？这是她看到的世界。不是特别的有趣。但是，当她利用嗅觉感知的，缺是另一个世界。这都是取决于她发达的鼻子。当你的狗狗捕捉到第一缕新鲜空气，她鼻子潮湿像海绵一样的外部帮助她捕捉风中每一丝香气。两个鼻孔在嗅觉上分别有不同的功能，立体的嗅觉，可以帮助狗狗来判断气味源的方向，因此，在刚开始嗅的几分钟里，狗狗就开始意识到的有什么在附近，而且还能判断出他们的位置在哪里。当空气进入到狗狗的鼻子里，小部分褶皱组织把空气分成两缕，一缕用来维持呼吸，另一缕为嗅觉。第二缕空气进入一个充满高度特殊化嗅觉接受细胞的区域；狗狗有数亿个嗅觉细胞，人类却只有五百万个。不同于人类笨拙地呼吸进出同一丝气息，狗狗透过鼻旁的细缝呼气，形成空气漩涡帮助吸纳新的气味分子，并且透过多次嗅闻建立起味道浓度。但如此精妙的鼻子架构，缺乏一个信息处理组织是难以实现的。事实证明，狗狗用于处理气味的嗅觉系统占用了比人类更多的脑空间。这些都帮助了狗狗去用分辨和记忆各种人类无法检测的，浓缩亿万倍的特殊气味。如果你能闻到一个小房间里的香水味，狗狗就能在封闭的体育馆里闻到且分辨出它的成分，街上任何事物，每一个经过的行人和车辆，邻居的垃圾，每种树，还有栖息在树上的鸟儿都有独特的气味信息，似乎在告诉你的狗狗，他们是什么，在哪里，和朝着那个方向移动。除了比我们人类厉害百倍，狗的嗅觉还能感知到一些无法看见的事物。一个完全分离的嗅觉系统，叫做犁鼻器，位于口腔上方，检测所有动物自然释放的荷尔蒙，包括人类。它让狗狗能辨识潜在的伴侣，或是区分友好和带敌意的动物。它也提醒狗狗留意我们不同的情绪，或者当有人怀孕或生病的时候告诉它们。因为嗅觉比其他感官更原始，绕过丘脑直接连接大脑，涉及情感和本能，我们甚至可以说狗狗的感知比我们的 更直接和发自肺腑。但狗鼻子最神奇的地方在于它可以跨越时间。旁人留下的印记，短暂停留车辆留下的些许暖气，或你最近去过的地方，做过的事的残留。地标如消防栓和树木，是带有气味的告示板， 记录着曾留下足迹的人们，他们曾吃过什么，他们曾感觉到了什么。未来也蕴藏在风的气息里，告知狗狗即将靠近的人事物，在它们还未看到之前。我们看到或听到的一瞬，狗狗就能闻到整个故事的开头到结尾。一些人犬合作的例子里，狗狗透过对故事的分享，和反馈来帮助我们。用友善回应悲伤，或用进攻抵御威胁，因为压力和愤怒都能释放能被狗狗嗅到的荷尔蒙。透过正规的训练，狗狗能告知我们潜在的危险从炸弹到癌症。所以，人类最好的朋友，并不是与我们同经历共患难的谁，而是透过灵敏的鼻子，带给我们视线以外新世界的他们。

**P187 2015-01-30 Why are some people left-handed - Daniel M. Abrams**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=187)

If you know an older left-handed person, chances are they had to learn to write or eat with their right hand. And in many parts of the world, it's still common practice to force children to use their "proper" hand. Even the word for right also means correct or good, not just in English, but many other languages, too. But if being left-handed is so wrong, then why does it happen in the first place? Today, about 1/10 of the world's population are left-handed. Archeological evidence shows that it's been that way for as long as 500,000 years, with about 10% of human remains showing the associated differences in arm length and bone density, and some ancient tools and artifacts showing evidence of left-hand use. And despite what many may think, handedness is not a choice. It can be predicted even before birth based on the fetus' position in the womb. So, if handedness is inborn, does that mean it's genetic? Well, yes and no. Identical twins, who have the same genes, can have different dominant hands. In fact, this happens as often as it does with any other sibling pair. But the chances of being right or left-handed are determined by the handedness of your parents in surprisingly consistent ratios. If your father was left-handed but your mother was right-handed, you have a 17% chance of being born left-handed, while two righties will have a left-handed child only 10% of the time. Handedness seems to be determined by a roll of the dice, but the odds are set by your genes. All of this implies there's a reason that evolution has produced this small proportion of lefties, and maintained it over the course of millennia. And while there have been several theories attempting to explain why handedness exists in the first place, or why most people are right-handed, a recent mathematical model suggests that the actual ratio reflects a balance between competitive and cooperative pressures on human evolution. The benefits of being left-handed are clearest in activities involving an opponent, like combat or competitive sports. For example, about 50% of top hitters in baseball have been left-handed. Why? Think of it as a surprise advantage. Because lefties are a minority to begin with, both right-handed and left-handed competitors will spend most of their time encountering and practicing against righties. So when the two face each other, the left-hander will be better prepared against this right-handed opponent, while the righty will be thrown off. This fighting hypothesis, where an imbalance in the population results in an advantage for left-handed fighters or athletes, is an example of negative frequency-dependent selection. But according to the principles of evolution, groups that have a relative advantage tend to grow until that advantage disappears. If people were only fighting and competing throughout human evolution, natural selection would lead to more lefties being the ones that made it until there were so many of them, that it was no longer a rare asset. So in a purely competitive world, 50% of the population would be left-handed. But human evolution has been shaped by cooperation, as well as competition. And cooperative pressure pushes handedness distribution in the opposite direction. In golf, where performance doesn't depend on the opponent, only 4% of top players are left-handed, an example of the wider phenomenon of tool sharing. Just as young potential golfers can more easily find a set of right-handed clubs, many of the important instruments that have shaped society were designed for the right-handed majority. Because lefties are worse at using these tools, and suffer from higher accident rates, they would be less successful in a purely cooperative world, eventually disappearing from the population. So by correctly predicting the distribution of left-handed people in the general population, as well as matching data from various sports, the model indicates that the persistence of lefties as a small but stable minority reflects an equilibrium that comes from competitive and cooperative effects playing out simultaneously over time. And the most intriguing thing is what the numbers can tell us about various populations. From the skewed distribution of pawedness in cooperative animals, to the slightly larger percentage of lefties in competitive hunter-gatherer societies, we may even find that the answers to some puzzles of early human evolution are already in our hands.

**P187 2015-01-30 Why are some people left-handed - Daniel M. Abrams**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=187)

翻译人员: Yixuan Zhu 校对人员: Cissy Yun如果你认识一个比你大的左撇子，他们都有可能曾经被迫学习过用右手写字和吃饭在世界上很多地方，依旧有惯例强迫孩子使用“合适”的手就连“右”字，在英语里也代表着正确和好不仅在英语中，其他很多语言也是但是如果左撇子是不对的，那为什么会有左撇子出现呢？现今，大约1/10的世界人口是左撇子考古证据显示，这种比例已经存在有50万年了约有10%的人显现出差异区别在手臂长度和骨密度上古代一些工具和手工艺品也证明有左撇子的存在尽管很多人认为用手习惯不是一种选择但在出生前根据胎儿在子宫里的位置就可以预测因此，如果习惯是天生 是否就意味着这是基因定的吗？是 又 不是同卵双胞胎拥有相同的基因也会产生不同的主导手事实上，这与其他同胞对的发生概率一样你是左撇子还是右撇子取决于父母的用手习惯这有惊人的统一数据如果爸爸是左撇子，而妈妈是右撇子你有17%的机会是左撇子而两位都是右撇子，孩子是左撇子的几率只有10%看起来用手习惯像掷骰子一样但几率是由基因决定的这一切的原由是进化产生了这小部分的左撇子并保持了上千年有几种理论试图去解释为什么一开始有用手习惯存在或者为什么大多数人习惯用右手最近一个数学模型提出现实比例反应了人类进化中竞争和合作压力造成的人数平衡左撇子的好处很明显是在活动中处对立面像拳击或竞技运动比如，有50%顶尖棒球击球手都是左撇子为什么？那会是很特殊的优势左撇子很小众左撇子和右撇子的选手都会花大量的时间练习对抗右撇子所以当他们面对面对抗时左撇子会更熟练地对抗右撇子对手然而右撇子的就无力对抗了这斗争的假设因人数上的不平均造成左撇子的战士或者运动员有优势是一个很好的负频率相关选择的例子但根据进化法则有相关优势的组群会发展至优势消失如果在人类进化中只有战斗和竞争自然选择会导致左撇子的数量从很少变为很多直到他们不再是稀有资源因此在一个完全竞争环境会有50%的人口是左撇子但人类进化史上有合作和竞争由于合作的压力造成用手习惯往相反的方向当在高尔夫比赛中，选手的表现不用依赖对手所以只有4%的选手是左撇子这是个更广泛现象的工具共享像年轻有潜力的高尔夫手们更容易找到右手为主的俱乐部很多重要的装备都是为大众的右手选手设计的因为左撇子都用不惯这些装备而且高失误率会使他们在纯合作环境里吃亏最终造成人数上锐减为了能正确预测左撇子在人群中的分布以及与各项运动中的数据配对模型指出左撇子群体小而且数量稳定反应了人类合作和竞争的平衡影响他们同时进行着最有趣的是数据可以告诉我们很多关于人群数量变化中包含的信息从有爪动物合作的倾斜分布到合作狩猎社会里比重稍大的左撇子我们会发现有关早期人类进化的某些难题的答案就在我们手中

**P188 2015-02-04 Why do we have museums - J. V. Maranto**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=188)

Hello, everyone. Let's begin our guided tour. Welcome to the Museum of Museums. Museums have been a part of human history for over 2000 years. But they weren't always like the ones we visit today. The history of museums is far older and much stranger than you might imagine. We'll start over here in the Greek wing. Our word museum comes from the Greek mouseion, temples built for the Muses, the goddesses of the arts and the sciences. Supplicants asked the Muses to keep watch over academics and grant ingenuity to those they deemed worthy. The temples were filled with offerings of sculptures, mosaics, complex scientific apparatuses, poetic and literary inscriptions, and any other tribute that would demonstrate a mortal's worthiness for divine inspiration. We have arrived at the Mesopotamian wing. The first museum was created in 530 B.C. in what is now Iraq. And the first curator was actually a princess. Ennigaldi-Nanna started to collect and house Mesopotamian antiquities in E-Gig-Par, her house. When archeologists excavated the area, they discovered dozens of artifacts neatly arranged in rows, with clay labels written in three languages. She must have had interesting parties. The tradition of collecting and displaying intriguing items began to be mimicked, as you can see here in the Roman Empire wing. Treasure houses of politicians and generals were filled with the spoils of war, and royal menageries displayed exotic animals to the public on special occasions, like gladiator tournaments. As you can see, we have a lion here and a gladiator, and, well, the janitor ought to be in this wing clearly. Moving on, hurry along. The next step in the evolution of museums occurred in the Renaissance, when the study of the natural world was once again encouraged after almost a millennium of Western ignorance. Curiosity cabinets, also referred to as Wunderkammers, were collections of objects that acted as a kind of physical encyclopedia, showcasing artifacts. Just step into the wardrobe here. There you go. Mind the coats. And we'll tour Ole Worm's cabinet, One of the most notable Wunderkammers belonged to a wealthy 17th-century naturalist, antiquarian, and physician Ole Worm. Ole Worm collected natural specimens, human skeletons, ancient runic texts, and artifacts from the New World. In other curiosity cabinets, you could find genetic anomalies, precious stones, works of art, and religious and historic relics. Oh my. You might not want to touch that. These cabinets were private, again, often in residencies, curated by their owners, rulers and aristocrats, as well as merchants and early scientists. Now, who hears a circus organ? In the 1840s, an enterprising young showman named Phineas T. Barnum purchased some of the more famous cabinets of curiosity from Europe and started Barnum's American Museum in New York City. A spectacular hodgepodge of zoo, lecture hall, wax museum, theater, and freak show that was known for its eclectic residents, such as bears, elephants, acrobats, giants, Siamese twins, a Fiji mermaid, and a bearded lady, along with a host of modern machinery and scientific instruments. Museums open to the public are a relatively new phenomenon. Before Barnum, the first public museums were only accessible by the upper and middle classes, and only on certain days. Visitors would have to apply to visit the museum in writing prior to admision, and only small groups could visit the museum each day. The Louvre famously allowed all members of the public into the museum but only three days a week. In the 19th century, the museum as we know it began to take shape. Institutions like the Smithsonian were started so that objects could be seen and studied, not just locked away. American museums, in particular, commissioned experiments and hired explorers to seek out and retrieve natural samples. Museums became centers for scholarship and artistic and scientific discovery. This is often called the Museum Age. Nowadays, museums are open to everybody, are centers of learning and research, and are turning into more hands-on institutions. But the question of who gets to go is still relevant as ticket prices can sometimes bar admission to those future scholars, artists and targets of divine inspiration who can't afford to satisfy their curiosity. Thank you all for coming, and please, feel free to stop by the gift shop of gift shops on your way out.

**P188 2015-02-04 Why do we have museums - J. V. Maranto**

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翻译人员: Ning Du 校对人员: Ruoxin Zheng大家好，让我作为导游带大家开始一场旅行。欢迎来到讲述博物馆的博物馆。博物馆已在人类历史中 有超过两千年的历史。但它们以前并不像我们如今参观的这样。博物馆的历史说起来 可能比我们想象的更久远，更陌生让我们从希腊厅这里开始。博物馆的英文“Museum” 来源于希腊词“Mouseion”。它是为艺术和科学之神——缪斯女神 建造的寺庙。信徒们祈求缪斯保护学识，以及他们认为值得珍藏的别具匠心的艺术品。庙宇里被各类贡品挤满了， 其中包括雕塑、马赛克艺术、精密的科学仪器、诗歌和文学作品，以及其他任何能体现神之启示的凡人之作。我们现在来到了美索不达米亚厅。第一座博物馆于公元前530年 建立在今日的伊拉克。第一任馆长其实是一位公主。英尼高迪·娜娜开始收藏 美索不达米亚的古董，将它们放在她的行宫E-Gig-Par里。当考古学家挖掘这个区域时，他们发现数十件手工品径直摆成了一排，上面贴有由三种语言写成的黏土标签。她一定办过不少有趣的聚会。这种收藏和展示迷人藏品的传统 开始被各方模仿，正如你在这个罗马帝国厅所见的。官员和将军的藏宝屋被从战争搜刮来的战利品填满。皇家动物园会在一些特殊场合，向公众展出各类珍禽异兽，如角斗士比赛。如你所见，下面有一只狮子和一位角斗士。嗯，管理员也肯定在这个厅里咯。让我们继续参观，抓紧啦！博物馆发展的下个阶段 发生在文艺复兴时期，在经历了西方世界对知识近千年的无视后，人们对自然世界的探究再次开启。藏品展室，抑或称为珍品陈列室，这些展品简直组成了 一本“鲜活”的百科全书，一种陈列式手工艺品。让我们走进这个衣橱看看， 小心外套哦。下面我们将参观奥利·沃姆藏品室。最引人注目的珍品陈列室之一，属于一位17世纪富有的博物学家、古文物研究学者以及物理学家 奥利·沃姆。奥利·沃姆收集各类自然标本、人类骨架、古代北欧文字记录、以及来自西半球的手工品。在另外一间珍品陈列柜中，你可以看到畸形的标本、珍贵的宝石、各类艺术品，以及宗教和历史遗物。小心！ 你可不想就这样把它摸坏了吧？这些藏品柜也都是私人的， 经常藏于私人住所中。由他们的所有者、当时的统治者和贵族们，以及商人和早期的科学家们自行看管。有谁听说过器官马戏团吗？在19世纪40年代，一个叫做菲尼亚斯·T·巴纳姆的 雄心勃勃的青年演出经纪人……收购了当时欧洲很多著名的珍奇藏品柜，并在纽约建立了巴纳姆美国博物馆。这是一个“超级大杂烩”，包括了动物园、讲堂、蜡像馆、剧场，和因其五花八门的表演者们 而闻名的畸形秀，表演者包括：熊、大象、杂技演员、巨人、连体双胞胎、斐济美人鱼，和长胡子的女人，同时还有很多当代机械和科学仪器。博物馆对公众开放是近代才开始出现的。在巴纳姆之前，第一所公共博物馆 只对上层和中产阶级开放，而且只在特定日期开放。参观者需向管理者提前进行书面申请， 方可参观，而且博物馆每天只能接待小型团体。卢浮宫因向所有公众开放参观而出名，但是一周也只开放3天而已。在19世纪，我们今日所熟悉的博物馆开始逐渐成型。像史密森尼博物院这样的机构开始出现，这样展品开始被展出和研究， 而不是单纯的锁起来。特别是美国的博物馆，它们委托了一些实验，同时雇佣了很多探险家去寻找并带回自然标本。博物馆逐渐成为了 学术、艺术和科学发现的中心。这个阶段常被称为博物馆时代。现在，博物馆对所有人都开放，是学习和研究的集中地，同时也在变成更具实践性的机构。但何人有权参观博物馆仍是问题，因为门票的价格有时可能成为门槛。未来的学者、艺术家 以及会受神之启示影响的人们……因买不起门票， 而无法满足他们的好奇心。感谢大家的光临，大家可以随意在出口的礼品商店停留和参观。

**P189 2015-02-05 How do your kidneys work - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=189)

It's a hot day, and you've just downed several glasses of water, one after the other. Behind the sudden urge that follows are two bean-shaped organs that work as fine-tuned internal sensors. They balance the amount of fluid in your body, detect waste in your blood, and know when to release the vitamins, minerals, and hormones you need to stay alive. Say hello to your kidneys. The main role of these organs is to dispose of waste products and to turn them into urine. The body's eight liters of blood pass through the kidneys between 20 and 25 times each day, meaning that, together, these organs filter about 180 liters every 24 hours. The ingredients in your blood are constantly changing as you ingest food and drink, which explains why the kidneys need to be on permanent duty. Blood enters each kidney through arteries that branch and branch, until they form tiny vessels that entwine with special internal modules, called nephrons. In each kidney, 1 million of these nephrons form a powerful array of filters and sensors that carefully sift through the blood. This is where we see just how refined and accurate this internal sensing system is. To filter the blood, each nephron uses two powerful pieces of equipment: a blob-like structure called a glomerulus, and a long, stringy, straw-like tubule. The glomerulus works like a sieve, allowing only certain ingredients, such as vitamins and minerals, to pass into the tubule. Then, this vessel's job is to detect whether any of those ingredients are needed in the body. If so, they're reabsorbed in amounts that the body needs, so they can circulate in the blood again. But the blood doesn't only carry useful ingredients. It contains waste products, too. And the nephrons have to figure out what to do with them. The tubules sense compounds the body doesn't need, like urea, left over from the breakdown of proteins, and redirects them as urine out of the kidneys and through two long sewers called ureters. The tubes empty their contents into the bladder to be discharged, ridding your body of that waste once and for all. There's water in that urine, too. If the kidney detects too much of it in your blood, for instance, when you've chugged several glasses at once, it sends the extra liquid to the bladder to be removed. On the other hand, low water levels in the blood prompt the kidney to release some back into the blood stream, meaning that less water makes it into the urine. This is why urine appears yellower when you're less hydrated. By controlling water, your kidneys stabilize the body's fluid levels. But this fine balancing act isn't the kidney's only skill. These organs have the power to activate vitamin D to secrete a hormone called renin that raises blood pressure, and another hormone called erythropoietin, which increases red blood cell production. Without the kidneys, our bodily fluids would spiral out of control. Every time we ate, our blood would receive another load of unsifted ingredients. Soon, the buildup of waste would overload our systems and we'd expire. So each kidney not only keeps things running smoothly. It also keeps us alive. Lucky then that we have two of these magical beans.

**P189 2015-02-05 How do your kidneys work - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=189)

翻译人员: Jingyao Xue 校对人员: Jenny Yang这是炎热的一天你刚一口气 喝几杯水一杯接一杯跟随突然强烈欲望背后， 是两个豆状的器官在体内工作, 作为微调内部传感器他们平衡流体 数量在体内检测废物在血液中并知道什么情况下 释放维生素，矿物质和激素，你需要这些 来维持生命向你肾脏问好肾脏主要的作用 是清除废物并把它们变成尿液人体的8升血液 要通过肾脏每天20和25次之间这意味双肾脏透析约 180升血液每24小时你血液的成分 是不断变化的当你摄取食物和饮料时这解释了为什么 肾脏必须永久工作血液进入每个肾脏通过 分支又分叉的动脉直到他们形成微小血管， 紧紧交织一起的特殊内部组件称为肾元在每一个肾脏这一百万个肾元形成 强有力过滤和感应器队列通过血液仔细筛选这是我们看到的 情况，只是如何净化而准确定义这个 内部传感系统是过滤血液，每个肾元单位 使用两件强大装备肾小球（斑点状结构）和 和细长微小管肾小球工作如筛子， 只允许某些成分如维生素和矿物质， 经过微小管该小管任务是查明是否体内需要 任何这些成分如果身体需要，他们再 吸收，身体所需数量这样他们可以 在血液中再循环但血液中不仅 携带有用的成分它也包含了废物肾元要搞清楚 如何处理它们肾小管检测出身体 不需要这些化合物如尿素，蛋白质分解 遗留下来的物质并重新安排它们 成为尿液排出肾脏并通过两个长的 下水道，叫输尿管输尿管清空尿液 进入膀胱，尿液被排出最后摆脱那些 体内的废物也有水分在尿液如果肾脏检测太多 废物在你血液中例如，当你同时 突然喝几杯水这会使膀胱有额外 的液体，要被排出另一方面，水分 含量低在血液中导致肾脏释放一些 水分回到血液这意味着较少水分， 使它形成尿液这是尿液出现较黄的原因， 当你体内缺少水合物通过控制水分，你的肾脏 稳定身体的流体水平这种好的调节平衡表现， 不是肾脏唯一能力肾脏还有能力 激活维生素D分泌称为肾素的激素， 这会提高血压和另一种激素 称为促红细胞生成素提高红细胞产生如果没有肾脏， 我们的体液会失控每次吃东西，我们血液承受 没有经筛选成分的负担不久，废物堆积使我们 系统负担过重，我们会死所以，每个肾脏不仅 让事情顺利运行它也使我们活着我们幸运有两个 这些神奇的豆子

**P190 2015-02-09 How we think complex cells evolved - Adam Jacobson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=190)

What if you could absorb another organism and take on its abilities? Imagine you swallowed a small bird and suddenly gained the ability to fly. Or if you engulfed a cobra and were then able to spit poisonous venom from your teeth. Throughout the history of life, specifically during the evolution of complex eukaryotic cells, things like this happened all the time. One organism absorbed another, and they united to become a new organism with the combined abilities of both. We think that around 2 billion years ago, the only living organisms on Earth were prokaryotes, single-celled organisms lacking membrane-bound organelles. Let's look closely at just three of them. One was a big, simple blob-like cell with the ability to absorb things by wrapping its cell membrane around them. Another was a bacterial cell that converted solar energy into sugar molecules through photosynthesis. A third used oxygen gas to break down materials like sugar and release its energy into a form useful for life activities. The blob cells would occasionally absorb the little photosynthetic bacteria. These bacteria then lived inside the blob and divided like they always had, but their existence became linked. If you stumbled upon this living arrangement, you might just think that the whole thing was one organism, that the green photosynthetic bacteria were just a part of the blob that performed one of its life functions, just like your heart is a part of you that performs the function of pumping your blood. This process of cells living together is called endosymbiosis, one organism living inside another. But the endosymbiosis didn't stop there. What would happen if the other bacteria moved in, too? Now the cells of this species started becoming highly complex. They were big and full of intricate structures that we call chloroplasts and mitochondria. These structures work together to harness sunlight, make sugar, and break down that sugar using the oxygen that right around this time started to appear in the Earth's atmosphere. Organisms absorbing other organisms was one way species adapted to the changing environmental conditions of their surroundings. This little story highlights what biologists call the endosymbiotic theory, the current best explanation of how complex cells evolved. There's a lot of evidence that supports this theory, but let's look at three main pieces. First, the chloroplasts and mitochondria in our cells multiply the very same way as those ancient bacteria, which are still around, by the way. In fact, if you destroy these structures in a cell, no new ones will appear. The cell can't make them. They can only make more of themselves. Second piece of evidence. Chloroplasts and mitochondria both contain their own DNA and ribosomes. Their DNA has a circular structure that is strikingly similar to the DNA of the ancient bacteria, and it also contains many similar genes. The ribosomes, or protein assembly machines of chloroplasts and mitochondria, also have the same structure as ribosomes of ancient bacteria, but are different from the ribosomes hanging around the rest of eukaryotic cell. Lastly, think about the membranes involved in the engulfing process. Chloroplasts and mitochondria both have two membranes surrounding them, an inner and outer membrane. Their inner membrane contains some particular lipids and proteins that are not present in the outer membrane. Why is that significant? Because their outer membrane used to belong to the blob cell. When they were engulfed in the endosymbiosis process, they got wrapped up in that membrane and kept their own as their inner one. Surely enough, those same lipids and proteins are found on the membranes of the ancient bacteria. Biologists now use this theory to explain the origin of the vast variety of eukaryotic organisms. Take the green algae that grow on the walls of swimming pools. A larger eukaryotic cell with spinning tail structures, or flagella, at some point absorbed algae like these to form what we now call euglena. Euglena can perform photosynthesis, break down sugar using oxygen, and swim around pond water. And as the theory would predict, the chloroplasts in these euglena have three membranes since they had two before being engulfed. The absorbing process of endosymbiotic theory allowed organisms to combine powerful abilities to become better adapted to life on Earth. The results were species capable of much more than when they were separate organisms, and this was an evolutionary leap that lead to the microorganisms, plants, and animals we observe on the planet today.

**P190 2015-02-09 How we think complex cells evolved - Adam Jacobson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=190)

翻译人员: Claire Zhang 校对人员: YUCHEN QIN如果你能吸收吞并其他生物然后因此得到它所具有的能力，这听起来怎么样？想像你吞下一只小鸟，并突然得到飞的能力。或者你吞下一条眼镜蛇就能够吐出毒液。在生命的历史中，特别是复杂真核细胞的演化像这样的事情是经常发生的。一个有机体吞没另一个它们合而为一，成为一个全新并有组合能力的新有机体想想20亿年前地球上唯一存在的有机体是原核生物这是一种没有膜结合细胞器的单细胞生物。让我们仔细看看其中三种一种是巨大,简单的点状细胞它们能够把其他有机体包在其细胞膜内另一种是细菌。它能透过光合作用将太阳能转化为糖类第三种则是利用氧气将糖类等物质分解并将一些有助生物活动的能量释放出去这些细胞有时也会吞噬小的光合细菌这些细菌在细胞内不断分裂然而它们的存在被连结在一起如果你碰巧遇到它，你可能以为它只是一个有机体以为这些绿色的光合细菌只是这巨大细胞的一部分以为它要执行生命机能就好像你的心脏也是你的一部分它将血液运送到全身这种细胞共存的过程，我们称之为内共生也就是一个有机体住在另一个有机体内但共生一事不仅于此如果其他细胞也搬进来了会怎样呢?那么，这样的细胞开始变得极为复杂它们变大，且变得充满复杂的结构我们称这些为叶绿体和线粒体这些结构能一起利用阳光制造出糖分并且利用氧气分解糖分这时也是氧气开始出现在大气层的时候有机体吸收其他有机体是一种生物进行适应周遭环境变化的方式这个小故事总结了生物学家的内共生理论此为目前针对复杂细胞如何演化最好的解释有很多证据支持此理论但是让我们先看三个主要部分首先, 在我们的细胞内，叶绿体和线粒体 以非常相同的方式繁殖就像古代的细菌。顺道一提它们现在依然存在。事实上，你若把一个细胞内的这些结构破坏了，细胞并不会产生新的结构。它们并不能制造这些结构这些细胞只能繁殖。第二个证据是叶绿体和线粒体都有自己的DNA和核糖体它们的DNA都有环状结构。这些结构和古老细菌的DNA有着明显的相似并且也包含很多相似的基因核糖体，叶绿体和线粒体的蛋白质组成机器，也和古代细菌的核糖体有类似的结构但是它们和在细胞的其他地方的核糖体不同。最后,想想在这吞噬过程中的细胞膜。叶绿体和粒线体两者都有两个细胞膜包围一个是内部细胞膜,一个是外部细胞膜内部细胞膜含有特别的脂质和蛋白质这些并不存在外部细胞膜中为什么那么重要呢?因为它们的外部细胞膜曾经属于巨大细胞当它们在共生过程中被吞没时它们被包在系统膜内，并被保留在它们内部能够确定的是,相同的脂质和蛋白质也在古代的细菌细胞膜中被找到生物学家用这个理论去解释了很多真核有机体的起源比如说长在游泳池墙上的绿藻有旋转尾部结构或鞭毛的巨大有核系统吸收了绿藻，形成我们现在所谓的绿虫藻绿虫藻可以进行光合作用利用氧气分解糖并能在池塘上游泳用这理论推测，这个绿虫藻中的叶绿体有三个细胞膜因为在它们被吞没前已经有两个这个共生的吸收过程让有机体组合有用的能力使它们能更加适应地球生活结果是生物的种类能够比它们是独立个体时还要多这是演化的大跃进所以现今，我们现在地球上能够看到微生物、植物以及动物。

**P191 2015-02-09 The sonic boom problem - Katerina Kaouri**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=191)

Humans have been fascinated with speed for ages. The history of human progress is one of ever-increasing velocity, and one of the most important achievements in this historical race was the breaking of the sound barrier. Not long after the first successful airplane flights, pilots were eager to push their planes to go faster and faster. But as they did so, increased turbulence and large forces on the plane prevented them from accelerating further. Some tried to circumvent the problem through risky dives, often with tragic results. Finally, in 1947, design improvements, such as a movable horizontal stabilizer, the all-moving tail, allowed an American military pilot named Chuck Yeager to fly the Bell X-1 aircraft at 1127 km/h, becoming the first person to break the sound barrier and travel faster than the speed of sound. The Bell X-1 was the first of many supersonic aircraft to follow, with later designs reaching speeds over Mach 3. Aircraft traveling at supersonic speed create a shock wave with a thunder-like noise known as a sonic boom, which can cause distress to people and animals below or even damage buildings. For this reason, scientists around the world have been looking at sonic booms, trying to predict their path in the atmosphere, where they will land, and how loud they will be. To better understand how scientists study sonic booms, let's start with some basics of sound. Imagine throwing a small stone in a still pond. What do you see? The stone causes waves to travel in the water at the same speed in every direction. These circles that keep growing in radius are called wave fronts. Similarly, even though we cannot see it, a stationary sound source, like a home stereo, creates sound waves traveling outward. The speed of the waves depends on factors like the altitude and temperature of the air they move through. At sea level, sound travels at about 1225 km/h. But instead of circles on a two-dimensional surface, the wave fronts are now concentric spheres, with the sound traveling along rays perpendicular to these waves. Now imagine a moving sound source, such as a train whistle. As the source keeps moving in a certain direction, the successive waves in front of it will become bunched closer together. This greater wave frequency is the cause of the famous Doppler effect, where approaching objects sound higher pitched. But as long as the source is moving slower than the sound waves themselves, they will remain nested within each other. It's when an object goes supersonic, moving faster than the sound it makes, that the picture changes dramatically. As it overtakes sound waves it has emitted, while generating new ones from its current position, the waves are forced together, forming a Mach cone. No sound is heard as it approaches an observer because the object is traveling faster than the sound it produces. Only after the object has passed will the observer hear the sonic boom. Where the Mach cone meets the ground, it forms a hyperbola, leaving a trail known as the boom carpet as it travels forward. This makes it possible to determine the area affected by a sonic boom. What about figuring out how strong a sonic boom will be? This involves solving the famous Navier-Stokes equations to find the variation of pressure in the air due to the supersonic aircraft flying through it. This results in the pressure signature known as the N-wave. What does this shape mean? Well, the sonic boom occurs when there is a sudden change in pressure, and the N-wave involves two booms: one for the initial pressure rise at the aircraft's nose, and another for when the tail passes, and the pressure suddenly returns to normal. This causes a double boom, but it is usually heard as a single boom by human ears. In practice, computer models using these principles can often predict the location and intensity of sonic booms for given atmospheric conditions and flight trajectories, and there is ongoing research to mitigate their effects. In the meantime, supersonic flight over land remains prohibited. So, are sonic booms a recent creation? Not exactly. While we try to find ways to silence them, a few other animals have been using sonic booms to their advantage. The gigantic Diplodocus may have been capable of cracking its tail faster than sound, at over 1200 km/h, possibly to deter predators. Some types of shrimp can also create a similar shock wave underwater, stunning or even killing pray at a distance with just a snap of their oversized claw. So while we humans have made great progress in our relentless pursuit of speed, it turns out that nature was there first.

**P191 2015-02-09 The sonic boom problem - Katerina Kaouri**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=191)

翻译人员: Jian Zhipeng 校对人员: Cissy Yun人类已经痴迷于速度很多年了人类的进步史就是一部不断加速的速度史而其中最重要的成就之一就是突破音障飞机成功试飞后不久飞行员们越来越追求高度然而，剧烈的颠簸和巨大的阻力阻止了他们前行的脚步其中一些飞行员尝试规避高速飞行的风险但结果常常是悲剧性的1947年，飞行器设计水准得到了提高可调水平尾翼，又叫全动尾翼的出现使一名名叫查克·叶格的美国空军飞行员驾驶X-1试验机飞行度速度达到1127千米/秒成为第一个突破音速飞得比声音还快的人X-1试验机是许多超音速飞机模仿的对象之后有些飞机的航速甚至能突破3马赫飞机在超音速飞行时会产生冲击波像雷鸣一样的声音，就是我们熟知的音爆音爆会危害附近的人畜甚至伤及周边建筑物因此全世界的科学家们开始研究音爆试图阻止其在大气中传播研究它的响度，以及何时停止为了更好的理解科学家研究音爆我们拿一些最基本的声音举例子想象往平静的池塘扔小石子看到了什么？小石子引发的波浪在水中传播所有方向的速度都一样这些半径持续扩大的圆圈叫做波阵面同样，虽然我们看不见一个像家庭音响那样的固定声源在制造向外的声波波向外传播的速度取决于海拔、气温等因素在海平面高度，音速约为1225千米/秒与二维位表面上的圆圈不同波阵面是同心球面声音沿射线传播，垂直于波阵面想象一个移动声源，比如火车汽笛持续朝同一方向移动声源前方的波会聚拢增大的波频便引发了著名的多普勒效应——接近观测者的物体声调会变高但只要声源移动的速度比声波传播的速度慢他们就会保持相互嵌套的状态不变只有当物体以超音速移动，比它自己发出的声音还快的时候波的图像才会发生巨大变化当它超越了自己先前发射的声波同时又生成了新的声波波们就被迫挤在一起了，形成了马赫锥当它靠近时，观测者听不到任何声音因为物体比它自己制造的声音还快只有物体超越观测者之后，观测者才能听见音爆马赫锥接触地面形成一条双曲线当它前行时留下一条轨迹叫做超音速爆音区这可以用来划分受音爆影响的区域如何计算音爆的强度？可以通过求解著名的纳维-斯托克斯方程来找寻空气中气压的变化因为超音速飞机是在空气中飞行的由此导致了名叫N波的压力场特征这个形状表示什么？音爆的出现是由于气压骤变N波包括两个爆炸：一个在机头气压骤升时另一个在机尾越过马赫锥时气压瞬间恢复正常这导致了两次爆炸但人类通常只听到一声爆炸飞行中，电脑模型利用这个原理以及提供的航行轨道和空气数据常能预测音爆的位置和强度关于减弱音爆的研究也正在进行与此同时，超音速飞机仍不允许飞越土地上空所以，音爆是近期的发明吗？不是。当我们还在找寻降噪的途径时很多动物们已经在利用音爆了梁龙似乎能让它的尾巴通过敲击达到1200千米/秒的速度来威慑捕食者某些种类的虾也能在水下制造相似的冲击波只需弹一下它巨大的钳子就能远距离惊吓甚至杀死被食者所以当人类在对速度不懈的追求中取得了重大进步时却发现大自然早已先行一步

**P192 2015-02-10 The law of conservation of mass - Todd Ramsey**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=192)

Where does all this stuff come from? This rock? That cow? Your heart? Not the things themselves, mind you, but what they're made of: the atoms that are the fabric of all things. To answer that question, we look to the law of conservation of mass. This law says take an isolated system defined by a boundary that matter and energy cannot cross. Inside this system, mass, a.k.a. matter and energy, can neither be created nor destroyed. The universe, to the best of our knowledge, is an isolated system. But before we get to that, let's look at a much smaller and simpler one. Here we have six carbon atoms, 12 hydrogen atoms, and 18 oxygen atoms. With a little energy, our molecules can really get moving. These atoms can bond together to form familiar molecules. Here's water, and here's carbon dioxide. We can't create or destroy mass. We're stuck with what we've got, so what can we do? Ah, they have a mind of their own. Let's see. They've formed more carbon dioxide and water, six of each. Add a little energy, and we can get them to reshuffle themselves to a simple sugar, and some oxygen gas. Our atoms are all accounted for: 6 carbon, 12 hydrogen, and 18 oxygen. The energy we applied is now stored in the bonds between atoms. We can rerelease that energy by breaking that sugar back into water and carbon dioxide, and still, same atoms. Let's put a few of our atoms aside and try something a little more explosive. This here is methane, most commonly associated with cow flatulence, but also used for rocket fuel. If we add some oxygen and a little bit of energy, like you might get from a lit match, it combusts into carbon dioxide, water and even more energy. Notice our methane started with four hydrogen, and at the end we still have four hydrogen captured in two water molecules. For a grand finale, here's propane, another combustible gas. We add oxygen, light it up, and boom. More water and carbon dioxide. This time we get three CO2s because the propane molecule started with three carbon atoms, and they have nowhere else to go. There are many other reactions we can model with this small set of atoms, and the law of conservation of mass always holds true. Whatever matter and energy go into a chemical reaction are present and accounted for when it's complete. So if mass can't be created or destroyed, where did these atoms come from in the first place? Let's turn back the clock and see. Further, further, further, too far. Okay, there it is. The Big Bang. Our hydrogen formed from a high-energy soup of particles in the three minutes that followed the birth of our universe. Eventually, clusters of atoms accumulated and formed stars. Within these stars, nuclear reactions fused light elements, such as hydrogen and helium, to form heavier elements, such as carbon and oxygen. At first glance, these reactions may look like they're breaking the law because they release an astounding amount of energy, seemingly out of nowhere. However, thanks to Einstein's famous equation, we know that energy is equivalent to mass. It turns out that the total mass of the starting atoms is very slightly more than the mass of the products, and that loss of mass perfectly corresponds to the gain in energy, which radiates out from the star as light, heat and energetic particles. Eventually, this star went supernova and scattered its elements across space. Long story short, they found each other and atoms from other supernovas, formed the Earth, and 4.6 billion years later got scooped up to play their parts in our little isolated system. But they're not nearly as interesting as the atoms that came together to form you, or that cow, or this rock. And that is why, as Carl Sagan famously told us, we are all made of star stuff.

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翻译人员: Doris Swiftie 校对人员: Tingting Zhao所有这些东西都是从哪来的？这块石头？那只牛？你的心脏？提醒一下，不是这些东西本身 而是它们的构成：原子组成了所有的物质要回答那个问题 我们得指望质量守恒定律了这个定律说的是一个孤立系统被物质与能量都无法穿越的边界所定义在这个系统中，质量 也叫做物质和能量既不能被产生，也无法被摧毁这个宇宙， 尽我们所知就是这样一个孤立系统但是在分析它之前 我们先来看一个更小和更简单的系统在这，我们有六个碳原子 十二个氢原子还有十八个氧原子只要有一点能量 我们的分子就可以开始移动了这些原子可以结合在一起 组成我们所熟悉的分子这是水这是二氧化碳我们无法创造或是摧毁质量我们受限于我们所拥有的 应该怎么做呢？啊， 它们有自己的想法我们来看 它们组成了更多的二氧化碳和水 各有六个加一点能量 我们就可以让它们重新组成一个简单的糖还有一些氧气所用到的所有原子就是那 6个碳，12个氢，还有18个氧我们所用的能量现在 被储存于原子间的化学键中了我们可以通过将那糖还原为水与二氧化碳来释放能量而原子依然是同样的现在 让我们先撇开一些原子 尝试一些更加有趣的事情这个是甲烷，一般与牛的胃肠气胀有关但同时也用作火箭燃料如果我们加一些氧和一点能量就像你从一根点亮的火柴上获得的那样它燃烧变成了二氧化碳，水 甚至还有能量注意我们的甲烷刚开始有四个氢到了最后我们仍旧还有四个氢 被两个水分子所携带最后来一个厉害的 这是丙烷，另一种可燃气体我们加入氧气，点燃，然后 嘣！再加更多的水和二氧化碳这次我们得到了三个CO2因为丙烷分子开始就有三个碳原子它们无处可走还有很多其他的反应 我们可以用这一小组原子来模拟而质量守恒定律永远成立任何物质和能量经过一个化学反应依然还会存在并呈现所以，如果质量既不能被创造也无法被毁灭那么这些原子最初都是从哪来的呢？让我们回调时钟来看远一点，再远一点，再远一点，太远了好了，就是这了宇宙大爆炸在宇宙出生后的三分钟内我们的氢从一组高能量的微粒中生成最终，一团团的原子积累并构成了星体在这些星体内，核反应会融合轻的元素像是氢和氦去组成更重的元素，像是碳和氧乍看一眼 这些反应似乎像是违反了质量守恒定律因为它们释放一堆似乎不知道从哪里来的惊人的能量不过，幸好有了爱因斯坦著名的公式我们知道了能量是等同于质量的结果就使得原始原子的总质量比生成物的质量稍稍多一点失去的质量与获得的能量完美吻合以光，热，还有能量粒子的形式传播出去最终，这个星体变成了超新星将自己的元素散布到宇宙空间长话短说 它们找到了彼此 并和来自其他超新星的原子一起组成了地球46亿年后，在我们这个小小的孤立系统中扮演起自己的角色但是它们一点都不如一起组成你或那只牛或这块石头的原子们那般有趣这也就是为什么 就像卡尔·萨根那句名言所述“我们都是由星际物质组成的”

**P193 2015-02-11 History vs. Richard Nixon - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=193)

The presidency of the United States of America is often said to be one of the most powerful positions in the world. But of all the U.S. presidents accused of misusing that power, only one has left office as a result. Does Richard Nixon deserve to be remembered for more than the scandal that ended his presidency? Find out as we put this disgraced president's legacy on trial in History vs. Richard Nixon. "Order, order. Now, who's the defendant today, some kind of crook?" "Cough. No, your Honor. This is Richard Milhous Nixon, the 37th president of the United States, who served from 1969 to 1974." "Hold on. That's a weird number of years for a president to serve." "Well, you see, President Nixon resigned for the good of the nation and was pardoned by President Ford, who took over after him." "He resigned because he was about to be impeached, and he didn't want the full extent of his crimes exposed." "And what were these crimes?" "Your Honor, the Watergate scandal was one of the grossest abuses of presidential power in history. Nixon's men broke into the Democratic National Committee headquarters to wiretap the offices and dig up dirt on opponents for the reelection campaign." "Cough It was established that the President did not order this burglary." "But as soon as he learned of it, he did everything to cover it up, while lying about it for months." "Uh, yes, but it was for the good of the country. He did so much during his time in office and could have done so much more without a scandal jeopardizing his accomplishments." "Uh, accomplishments?" "Yes, your Honor. Did you know it was President Nixon who proposed the creation of the Environmental Protection Agency, and signed the National Environmental Policy Act into law? Not to mention the Endangered Species Act, Marine Mammal Protection Act, expansion of the Clean Air Act." "Sounds pretty progressive of him." "Progressive? Hardly. Nixon's presidential campaign courted Southern voters through fear and resentment of the civil rights movement." "Speaking of civil rights, the prosecution may be surprised to learn that he signed the Title IX amendment, banning gender-based discrimination in education, and ensured that desegregation of schools occurred peacefully, and he lowered the voting age to 18, so that students could vote." "He didn't have much concern for students after four were shot by the National Guard at Kent State. Instead, he called them bums for protesting the Vietnam War, a war he had campaigned on ending." "But he did end it." "He ended it two years after taking office. Meanwhile, his campaign had sabotaged the previous president's peace talks, urging the South Vietnamese government to hold out for supposedly better terms, which, I might add, didn't materialize. So, he protracted the war for four years, in which 20,000 more U.S. troops, and over a million more Vietnamese, died for nothing." "Hmm, a presidential candidate interfering in foreign negotiations -- isn't that treason?" "It is, your Honor, a clear violation of the Logan Act of 1799." "Uh, I think we're forgetting President Nixon's many foreign policy achievements. It was he who normalized ties with China, forging economic ties that continue today." "Are we so sure that's a good thing? And don't forget his support of the coup in Chile that replaced the democratically-elected President Allende with a brutal military dictator." "It was part of the fight against communism." "Weren't tyranny and violence the reasons we opposed communism to begin with? Or was it just fear of the lower class rising up against the rich?" "President Nixon couldn't have predicted the violence of Pinochet's regime, and being anti-communist didn't mean neglecting the poor. He proposed a guaranteed basic income for all American families, still a radical concept today. And he even pushed for comprehensive healthcare reform, just the kind that passed 40 years later." "I'm still confused about this burglary business. Was he a crook or not?" "Your Honor, President Nixon may have violated a law or two, but what was the real harm compared to all he accomplished while in office?" "The harm was to democracy itself. The whole point of the ideals Nixon claimed to promote abroad is that leaders are accountable to the people, and when they hold themselves above the law for whatever reason, those ideals are undermined." "And if you don't hold people accountable to the law, I'll be out of a job." Many politicians have compromised some principles to achieve results, but law-breaking and cover-ups threaten the very fabric the nation is built on. Those who do so may find their entire legacy tainted when history is put on trial.

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翻译人员: Claire Zhang 校对人员: Tianji (Homer) Li美国的总统职位被认为是全世界 最有权力的职位之一。但是在所有被指责 滥用职权的美国总统中，只有一个因此离职。理查德·尼克松，除了使他 下台的丑闻，是不是有更多更值得被我们记住呢？要查明真相，我们需要重审这位 名誉扫地的总统的政治遗产。即“历史对尼克松案”。“肃静，肃静。现在，谁是今天的被告人， 某个流氓罪犯吗？”“咳，不，法官阁下。这是理查德·米尔豪斯·尼克松， 美国第三十七任总统，任期从1969年到1974年。”“等一下。这对于一个总统的任期来说 是一个很奇怪的数字。”“是的，正如你所看到的 尼克松总统为了国家的利益辞职了，并且被接任他的福特总统赦免了。”“他辞职是因为他就要被弹劾了，而且他不想他的 罪行全部被抖出。”“那么都有哪些罪行呢?”“法官阁下，水门事件是 历史上对总统职权滥用最为严重的一次。为了连任竞选，尼克松的手下擅自 闯入了民主党全国委员会的总部，并在对手办公室内进行窃听，试图挖掘对手的丑闻。”“咳……已经确认总统 没有下达窃听命令。”“但是当他听说这件事的时候 他做尽一切去掩藏真相，并且在这件事上说谎达几个月。”“呃，是的，但是这是为了国家利益。他的任期成就显著， 如果没有丑闻引发的不良影响他可以取得更多的成就。”“嗯，成就？”“是的，法官阁下。“您知道是尼克松总统提出并建立了“美国环保署”的方案，并签署了《美国国家环境政策法案》吗？更不必说《濒危物种法》，《海洋哺乳动物保护条例》，《清洁空气法案》的推广。”“听起来他有些左倾激进。”“左倾？算不上。尼克松在总统竞选中冒着 对民权运动的恐惧和愤怒向南部的选民献殷勤。”“说到民权运动，检方可能会很惊讶 他签署了第九条修正案，禁止在教育中的性别歧视，并且在学校中和平地 废止种族隔离，他将选民年龄限制降至18岁 这使得学生们有资格进行投票。”“他没有对肯特州立大学那些 在四年级后被国民警卫队射杀的学生表示关心。相反的，他把他们称作是 为了抗议越南战争的暴民，而越南战争则是他致力于结束的。”“但是他确实结束了越南战争。”“他在接任之后两年 结束了越南战争。同时， 他的运动破坏了 前总统的和平演说，并且督促南越政府坚持 所谓可能更好的条件，但是，我必须指出那些 条件并没有实现。所以他把战争又延续了四年，导致了两万多美军和 一百多万越南人的无谓死亡。”“嗯，一位美国总统 候选人干涉外交谈判……这不是犯了叛国罪吗？”“是的，尊敬的法官。这完全 违反了1799年的《罗根法案》。”“啊，我觉得我们忘记了 尼克松总统的许多外交政策上的成就。是他促成和中国的关系正常化 建立了迄今为止仍在继续的经济关系。”“我们确定那些事是好事吗？别忘了是他支持智利的政变，用一个残忍的军事独裁者取代了民主选举的总统阿兰德。”“那是和共产主义斗争的一部分。”“难道专制和暴乱不正是我们 反对共产主义的原因吗？或者我们反对共产主义只是因为 害怕底层的人民起来反对富人们？”“尼克松总统不可能预见 皮诺切特政府的残暴，反共也不意味着忽视穷人。他提出要保证所有 美国家庭基本收入，在今天也算是一种激进的观点。他甚至提出完整的医保改革，和40年后通过的方案完全相似。”“我仍然对这个入室行窃 的行为感到困惑。他到底是不是个罪犯？”“法官阁下，尼克松总统或许 做了一两件违法的事，但是和他任期的成就相比 这些又算什么呢？”“民主体制受到了伤害。尼克松自称向海外推进的 这些理念的整个重点就是领导人要向人民负责，当他们不管出于什么原因把 自己置于法律之上的时候，那些理念就被逐渐削弱了。”“如果人民不坚持依法办事, 我的工作就没有意义了。”很多政客为了达到目的而 放弃了一些原则。但是，违法以及知情不举 威胁着柱国之基。当历史的审判来临时，犯法者和知情不举者的 政治遗产会污点斑斑。

**P194 2015-02-17 Did Shakespeare write his plays - Natalya St. Clair and Aaron William**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=194)

"Some are born great, some achieve greatness, and others have greatness thrust upon them", quoth William Shakespeare. Or did he? Some people question whether Shakespeare really wrote the works that bear his name, or whether he even existed at all. They speculate that Shakespeare was a pseudonym for another writer, or a group of writers. Proposed candidates for the real Shakespeare include other famous playwrights, politicians and even some prominent women. Could it be true that the greatest writer in the English language was as fictional as his plays? Most Shakespeare scholars dismiss these theories based on historical and biographical evidence. But there is another way to test whether Shakespeare's famous lines were actually written by someone else. Linguistics, the study of language, can tell us a great deal about the way we speak and write by examining syntax, grammar, semantics and vocabulary. And in the late 1800s, a Polish philosopher named Wincenty Lutosławski formalized a method known as stylometry, applying this knowledge to investigate questions of literary authorship. So how does stylometry work? The idea is that each writer's style has certain characteristics that remain fairly uniform among individual works. Examples of characteristics include average sentence length, the arrangement of words, and even the number of occurrences of a particular word. Let's look at use of the word thee and visualize it as a dimension, or axis. Each of Shakespeare's works can be placed on that axis, like a data point, based on the number of occurrences of that word. In statistics, the tightness of these points gives us what is known as the variance, an expected range for our data. But, this is only a single characteristic in a very high-dimensional space. With a clustering tool called Principal Component Analysis, we can reduce the multidimensional space into simple principal components that collectively measure the variance in Shakespeare's works. We can then test the works of our candidates against those principal components. For example, if enough works of Francis Bacon fall within the Shakespearean variance, that would be pretty strong evidence that Francis Bacon and Shakespeare are actually the same person. What did the results show? Well, the stylometrists who carried this out have concluded that Shakespeare is none other than Shakespeare. The Bard is the Bard. The pretender's works just don't match up with Shakespeare's signature style. However, our intrepid statisticians did find some compelling evidence of collaborations. For instance, one recent study concluded that Shakespeare worked with playwright Christopher Marlowe on "Henry VI," parts one and two. Shakespeare's identity is only one of the many problems stylometry can resolve. It can help us determine when a work was written, whether an ancient text is a forgery, whether a student has committed plagiarism, or if that email you just received is of a high priority or spam. And does the timeless poetry of Shakespeare's lines just boil down to numbers and statistics? Not quite. Stylometric analysis may reveal what makes Shakespeare's works structurally distinct, but it cannot capture the beauty of the sentiments and emotions they express, or why they affect us the way they do. At least, not yet.

**P194 2015-02-17 Did Shakespeare write his plays - Natalya St. Clair and Aaron William**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=194)

翻译人员: Clara Li 校对人员: Gabriella Hu"有些人的伟大是天生的有些人成就伟大而有些人的伟大则是强加给他们的” ——威廉姆斯莎士比亚这句话真的是他写的吗？有些人质疑莎士比亚著作署名的真实性甚至质疑他是否真的存在过他们认为莎士比亚只是某个作者的化名或者是一组作者的化名而已可能用这个化名的人选包括其他戏剧名人，政治家， 甚至是有影响力的女人难道英国文学史上最著名的作家和他的作品一样，是凭空创造出来的吗？很多莎士比亚的研究人员反对“无莎论”因为他的生平有迹可循但有另外一种方法能论证他的名句， 是否是其他作家的成果语言学，顾名思义能通过句法，语法，语义，用词解析我们说话写作的程式和习惯在19世纪后期一位名叫Wincenty Lutoslawski的波兰哲学家完善了文体学这一方法并用此方法排查文学作者的真实性文体学怎么用呢？理论上，每一个作者的风格都有自己的独特性与其他作家大不相同独特性包括句长，排字甚至是某个单词出现的频率让我们以“thee” 【古英文的 “you”】为例， 把它当成一个纵轴每篇作品，都可以根据这个词出现的数量在此纵轴上找到位置在统计学上，这些数据点出现的密度表现了阈值。让我们对这组数据有了一个预期但是这只是极其多元化的特征中的一项通过运用“主成分分析”这一用于数据集群的方法我们可以将多元化的数据简化为较为单一的成分群此成分群便表现了莎士比亚作品的特征现在我们可以通过对照成分来分析我们的目标人物啦例如如果弗朗西斯.培根的大量作品 与莎士比亚的成分群相符我们就有证据表明弗朗西斯. 培根和莎士比亚是一个人那么，研究结果是怎样的呢？进行研究的文体学家们总结莎士比亚就是莎士比亚独此一家，别无二号其他“李鬼”的风格和莎士比亚的文笔并不相符但是， 我们强悍的数据表明确实有合笔的有力证据比如，一项近期研究表明莎士比亚与戏剧家Christopher Marlowe 合写了《亨利六世》的第一幕和第二幕莎士比亚的身份只是文体学 能帮助解决的大量疑案之一它还能判断作品的创作时期一篇古文的真伪学生有没有抄袭甚至收到的email是重要邮件还是垃圾邮件那么莎士比亚的经典诗句如此一来竟已意境全消，只剩下一堆数据而已吗？不是的文体学也许能让我们明白， 是什么让莎翁的遣词造句鹤立鸡群但是它不能抓住文字中流淌的情怀也无法理解我们为何长吁短叹，黯然神伤起码现在不行译者：Ruoqi Hu

**P195 2015-02-26 Rhythm in a box - The story of the cajon drum - Paul Jennings**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=195)

Many modern musical instruments are cumbersome or have a lot of parts. Some need a stand or a stool. But the cajon is a drum, a stand and a seat all in one convenient box. And this simplicity may be key to its journey across continents and cultures to become one of the most popular percussion instruments in the world today. The cajon's story begins in West Africa, whose indigenousness people had rich musical traditions centered on drumming and dancing. When many of them were captured and brought to the Americas as slaves, they brought this culture with them, but without their native instruments, they had to improvise. African slaves in coastal Peru didn't have the materials or the opportunity to craft one of their traditional drums such as a djembe or a djun djun. But what they did have were plenty of shipping crates. Not only were these readily accessible, but their inconspicuous appearance may have helped get around laws prohibiting slaves from playing music. Early Peruvian cajons consisted of a simple box with five thick wooden sides. The sixth side, made of a thinner sheet of wood, would be used as the striking surface, or more commonly known as the tapa. A sound hole was also cut into the back to allow the sound to escape. As an Afro-Peruvian culture developed, and new forms of music and dance, such as Zamacueca, Festejo and Landó were born, the cajon became a dedicated musical instrument in its own right. Early modifications involved simply bending the planks of the box to tweak the sound, and when abolition of slavery introduced the cajon to a broader population, more improvisation and experimentation soon followed. Perhaps the person most responsible for introducing the cajon to European audiences was Spanish Flamenco guitarist Paco de Lucía. When touring in Peru in 1977, he and his percussionist Rubem Dantas discovered the cajon and brought it back to Spain, recognizing its potential for use in Flamenco music. By stretching guitar strings along the inside of the tapa, the flamenco musicians were able to create a buzz-like snare sound. Combined with the regular base tone, this gave the cajon a sound close to a basic drum set. The cajon quickly caught on, not only becoming standard in Flamenco, but being used in genres like folk, jazz, blues and rock. Today, many specialized cajons are manufactured, some with adjustable strings, some with multiple playing surfaces, and some with a snare mechansim. But the basic concept remains the same, and the story of the cajon shows that the simplest things can have the most amazing potential when you think outside and inside the box.

**P195 2015-02-26 Rhythm in a box - The story of the cajon drum - Paul Jennings**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=195)

翻译人员: XINHUI WANG 校对人员: Cissy Yun许多现代乐器都很笨重，或由很多部件组成有一些需要支架或者凳子来支撑然而康加鼓的所有支架跟鼓身都在一个便携的盒子中这样简单的构造使得它遍布各大洲和各种文化也让它成为了当今全球最流行的打击乐器康加鼓起源于西非那里的土著有着丰富的音乐传统尤其擅长打鼓和跳舞当他们当中的许多人被俘虏并且运送往美洲成为奴隶时他们的音乐文化也与他们随行由于他们失去了原本的乐器他们必须重新改造新的乐器在秘鲁沿海地区的非洲奴隶没有材料他们也没有机会来制造传统的鼓如非洲手鼓，或吉姆鼓他们能获取的材料是大量的海运运输箱这些箱子不仅很容易得到它们不起眼的外表也绕过了禁止黑奴演奏音乐的法律早期的秘鲁康加鼓由一个简单的盒子构成这个盒子由厚木板构成的五面盒子的第六面，选用较薄的木板做成打击面也被熟知为塔帕面箱子的背面有一个音孔，让声音可以释放出去随着这种非洲-秘鲁文化的发展以及次新的音乐跟舞蹈，如桑马古维卡舞庆典舞跟兰多舞的产生康加鼓成为了这些音乐的专用乐器早期对其的改造 包括将盒子的木板变弯来调整声音当奴隶制被废除，康加鼓变得广为流传人们开始尝试更多的改进跟实验把康加鼓带到欧洲观众眼前的是一个西班牙弗拉明戈吉他手Paco de Lucía.1977年，他在秘鲁巡演的时他和他的鼓手Rubem Dantas发现了康加鼓，并把它带回了西班牙因为他们发现了康加鼓演奏弗兰明哥的潜质通过拉伸塔帕里面的吉他弦弗兰明哥音乐家们演奏出了如蜂鸣般的声音结合常规的基础音这让康加鼓与基本的组合鼓很相近康加鼓很快被应用于各种音乐它不单单成为弗拉明戈的标准演奏乐器并被用于演奏民俗，爵士，蓝调和摇滚今天，人们生产了很多特殊的康加鼓有些鼓有可调试的弦有些鼓有多面可以用于演奏有一些有爵士鼓的特质但是康加鼓最基本的理念没有变康加鼓的故事告诉我们最简单的东西往往会有最令人意想不到的潜质只要你用不同的方式去思考

**P196 2015-02-27 Why sitting is bad for you - Murat Dalkilinç**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=196)

Right now, you're probably sitting down to watch this video and staying seated for a few minutes to view it is probably okay. But the longer you stay put, the more agitated your body becomes. It sits there counting down the moments until you stand up again and take it for a walk. That may sound ridiculous. Our bodies love to sit, right? Not really. Sure, sitting for brief periods can help us recover from stress or recuperate from exercise. But nowadays, our lifestyles make us sit much more than we move around, and our bodies simply aren't built for such a sedentary existence. In fact, just the opposite is true. The human body is built to move, and you can see evidence of that in the way it's structured. Inside us are over 360 joints, and about 700 skeletal muscles that enable easy, fluid motion. The body's unique physical structure gives us the ability to stand up straight against the pull of gravity. Our blood depends on us moving around to be able to circulate properly. Our nerve cells benefit from movement, and our skin is elastic, meaning it molds to our motions. So if every inch of the body is ready and waiting for you to move, what happens when you just don't? Let's start with the backbone of the problem, literally. Your spine is a long structure made of bones and the cartilage discs that sit between them. Joints, muscles and ligaments that are attached to the bones hold it all together. A common way of sitting is with a curved back and slumped shoulders, a position that puts uneven pressure on your spine. Over time, this causes wear and tear in your spinal discs, overworks certain ligaments and joints, and puts strain on muscles that stretch to accommodate your back's curved position. This hunched shape also shrinks your chest cavity while you sit, meaning your lungs have less space to expand into when you breath. That's a problem because it temporarily limits the amount of oxygen that fills your lungs and filters into your blood. Around the skeleton are the muscles, nerves, arteries and veins that form the body's soft tissue layers. The very act of sitting squashes, pressurizes and compresses, and these more delicate tissues really feel the brunt. Have you ever experienced numbness and swelling in your limbs when you sit? In areas that are the most compressed, your nerves, arteries and veins can become blocked, which limits nerve signaling, causing the numbness, and reduces blood flow in your limbs, causing them to swell. Sitting for long periods also temporarily deactivates lipoprotein lipase, a special enzyme in the walls of blood capillaries that breaks down fats in the blood, so when you sit, you're not burning fat nearly as well as when you move around. What effect does all of this stasis have on the brain? Most of the time, you probably sit down to use your brain, but ironically, lengthy periods of sitting actually run counter to this goal. Being stationary reduces blood flow and the amount of oxygen entering your blood stream through your lungs. Your brain requires both of those things to remain alert, so your concentration levels will most likely dip as your brain activity slows. Unfortunately, the ill effects of being seated don't only exist in the short term. Recent studies have found that sitting for long periods is linked with some types of cancers and heart disease and can contribute to diabetes, kidney and liver problems. In fact, researchers have worked out that, worldwide, inactivity causes about 9% of premature deaths a year. That's over 5 million people. So what seems like such a harmless habit actually has the power to change our health. But luckily, the solutions to this mounting threat are simple and intuitive. When you have no choice but to sit, try switching the slouch for a straighter spine, and when you don't have to be bound to your seat, aim to move around much more, perhaps by setting a reminder to yourself to get up every half hour. But mostly, just appreciate that bodies are built for motion, not for stillness. In fact, since the video's almost over, why not stand up and stretch right now? Treat your body to a walk. It'll thank you later.

**P196 2015-02-27 Why sitting is bad for you - Murat Dalkilinç**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=196)

翻译人员: ECHO CHOU 校对人员: Sijin Liu现在，你可能坐着看这个视频花上几分钟 坐着看完这个视频好像没什么问题。但是你坐得越久， 你的身体就越焦躁不安。你的身体坐着数倒计时， 直到你重新站起来带着你的身体走两步。这听起来可能很荒谬。我们的身体喜欢坐着，不是吗？不是的。的确，短时间地坐一会 能帮我们从紧张的情绪中中恢复过来或在运动后恢复体力。但是如今，我们的生活方式 使我们坐的时间远远大于我们活动的时间，然而我们的身体并不仅是为了久坐而构建的。事实恰好相反。人类的身体生来是为了运动。并且你能从人类的身体构造的方式中找到证据。我们全身有超过360个关节， 还有大约700块骨骼肌这让我们能够轻松流畅地做各种动作。人类身体独特的构造使我们能够对抗地心引力，笔直地立在天地之间。我们的血液需要我们活动 才能合理地循环。身体活动同时也会给神经细胞带来好处。而且我们的皮肤是有弹性的， 它会随着我们的动作而变化。所以，我们身体的每一寸都 准备好了并期待着你去多活动但如果你偏偏不动， 我们身体到底会发生什么事？让我们先来看看脊椎部分。你的脊椎是一个长形的结构，骨骼和软骨交错其中。附着在骨骼上的关节，肌肉和韧带把它们紧紧地连结在一起。最常见的坐姿是弯着的背和下榻的肩膀这个姿势往往给你的脊椎施加了不平均的压力日积月累，它会磨损你的腰间盘，使一些关节和肌肉过度劳损，肌肉也紧绷着去迎合弯曲的背部。驼背坐着同时也缩小了你胸腔的空间，这意味着，呼吸时肺部舒张没有足够的空间这样就形成了一个问题， 因为它暂时性地限制了填充肺部的， 和滤进血液里的氧气容量。骨架的周围都是肌肉，神经，和动静脉，形成了人体的软组织层。这种坐姿，无时无刻不在向身体施加压力，而这些更为精细的组织真实地感受到了这种冲击。当你久坐的时候， 你有过四肢肿胀或者肢体麻木的感觉吗？这是因为在那些被挤压的最厉害的部位，你的神经，动脉和血管会慢慢堵塞，这阻断了神经信号的传导，引起麻木；并且这种堵塞减缓了你肢体中血液流动的速度，使你四肢肿胀。同时，长时间的坐着会导致脂蛋白脂肪酶暂时性失效，这是一种存在于毛细血管壁中 降低血液中脂肪含量的一种特殊酵素。所以当你坐着的时候，你的体内 几乎没有像你活动时那样分解脂肪。这种停滞和郁积对人的大脑又有什么影响呢？在很多时候，你大概都是坐着去思考问题，但是讽刺的是，长时间的坐着却让你和你的初衷背道而驰。坐着不动使血液流动放缓，使通过肺部进入血液中的氧气减少。你的大脑需要所有这些东西去保持灵敏，随着你的大脑活动减慢，你的注意力集中程度有很大的可能性会降低偏巧的是，这种不良影响在短期内并不会发生。近期研究发现，长期坐着 与某些癌症和心脏病存在特殊的联系，并且可能促成糖尿病， 引起肾脏和肝脏的病变。事实上，研究者已经发现，每年世界上过早死亡的案例中， 不活动占据了9%的死因，总数超过500,000人。这个看起来并没有多大害处的习惯，实际上却有影响我们健康的能力。幸好，解决这个威胁的方法非常简单。当你只能坐着的时候，试着去抬头挺胸，当你不需要被绑在座椅上时就更不用说了，试着去到处走走活动活动。或者你可以给自己设一个提示， 每隔半个小时起来一下。更多的时候，我们要感激 人类的身体是为运动而生，而不是寂静。其实，这个视频也快到尾声了， 为什么不趁现在起来走走？把走一走当作对你身体的小奖赏，它会在日后感谢你的。

**P197 2015-03-02 How does the thyroid manage your metabolism - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=197)

Nestled in the tissues of your neck is a small unassuming organ that wields enormous power over your body. It's called the thyroid. Like the operations manager in a company, its role is to make sure that the cells in your body are working properly. It does that by using hormones to deliver messages to every single one of them. This high-ranking organ is made up of lobules that each contains smaller cells called follicles, which store the hormones the thyroid sends out into your blood. Two of the most important hormones it produces are thyroxine and triiodothyronine, or T3 and T4. As messengers, the hormone's job is to instruct every cell in the body when to consume oxygen and nutrients. That maintains the body's metabolism, the series of reactions our cells perform to provide us with energy. This hormonal notification from the thyroid gets the heart pumping more efficiently, and makes our cells break down nutrients faster. When you need more energy, the thyroid helps by sending out hormones to increase metabolism. Ultimately, the thyroid allows our cells to use energy, grow and reproduce. The thyroid is controlled by the pituitary gland, a hormonal gland deep in the brain that oversees the thyroid's tasks, making sure it knows when to send out its messengers. The pituitary's role is to sense if hormone levels in the blood are too low or too high, in which case it sends out instructions in the form of the thyroid- stimulating hormone. Even in this tightly controlled system, however, management sometimes slips up. Certain diseases, growths in the thryoid or chemical imbalances in the body can confuse the organ and make it deaf to the pituitary's guiding commands. The first problem this causes is hyperthyroidism, which happens when the organ sends out too many hormones. That means the cells are overloaded with instructions to consume nutrients and oxygen. They become overactive as a result, meaning a person with hyperthyroidism experiences a higher metabolism signaled by a faster heartbeat, constant hunger, and rapid weight loss. They also feel hot, sweaty, anxious, and find it difficult to sleep. The opposite problem is hypothyroidism, which happens when the thyroid sends out too few hormones, meaning the body's cells don't have as many messengers to guide them. In response, cells grow listless and metabolism slows. People with hypothyroidism see symptoms in weight gain, sluggishness, sensitivity to cold, swollen joints and feeling low. Luckily, there are medical treatments that can help trigger the thyroid's activities again, and bring the body back to a steady metabolic rate. For such a little organ, the thyroid wields an awful lot of power. But a healthy thyroid manages our cells so effectively that it can keep us running smoothly without us even noticing it's there.

**P197 2015-03-02 How does the thyroid manage your metabolism - Emma Bryce**

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翻译人员: Limin Wang 校对人员: Yankun Hu在你颈脖处有一个小器官管辖着你体内很大的力量。它被称为甲状腺。就像公司的运营经理，它的角色是确保你体内的细胞正常工作。它通过激素来发送信息到每一个细胞。这个高级器官是由小叶组成，每个小叶包含更小的细胞， 称为卵泡，它们储存着甲状腺 发送到你血液里的激素。它生产的两个最重要的激素是甲状腺素和碘甲状腺原氨酸， 或称为T3和T4。作为信使，激素的工作是指导每个在体内的细胞 何时消耗氧气和养分。这个过程维持了身体的新陈代谢，也就是我们的细胞通过 一系列的反应来供给我们能量的过程。这个来自甲状腺的激素提示使心脏更有效率的工作，也使我们的细胞更快的分解养分。如果你需要更多的能量，甲状腺会发送激素来加快新陈代谢。最终，甲状腺能让我们的细胞 使用能量，生长和繁殖。甲状腺被脑下垂体控制，它是在脑部深处监控甲状腺的腺体，确保甲状腺知道何时送出信使。脑下垂体的作用是 感知血液中激素含量，是太高还是太低，在此情况下它会以促甲状腺激素的形式发出指示。即使在这强有力的控制系统之中，管理有时仍旧会出问题。一些疾病，甲状腺肿大，或是体内化学物质不平衡 可能扰乱器官，使器官无视脑下垂体的指示。首先它会引起甲状腺功能亢进症，是指器官发送出了太多的激素。意味着细胞超载太多指示来消耗养分和氧气。结果是它们变的过度活跃，也就是说一个有甲亢的人新陈代谢更快。症状是高心率， 持续的饥饿和快速的体重下降。他们也会感觉热，发汗， 焦虑和难以入睡。与此相反的问题是甲状腺功能减退症，也就是甲状腺送出的激素太少。意味着体内细胞没有 足够的信使来指导它们。结果是细胞生长缓慢和新陈代谢变缓。有甲减的人表现出的症状包括体重增加，低迷，易冷，关节肿大和感觉忧郁。幸运的是，通过医学治疗可以再次激发甲状腺的活动，把身体带回到稳定的新陈代谢速率。对一个这么小的器官而言， 甲状腺执掌着惊人的力量。但是健康的甲状腺如此有效的 管理着我们的细胞，我们的身体在正常运行时 却感觉不到它的存在。

**P198 2015-03-02 Learning from smallpox - How to eradicate a disease - Julie Garon and**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=198)

For most of human history, medical workers sought to treat diseases or cure them. The rise of vaccination in the 19th century enhanced the potential to prevent people from contracting illnesses in the first place. But only in recent decades did it become possible to ensure that a particular disease never threatens humanity again. The story of smallpox, the first and, so far, the only disease to be permanently eradicated from the world, shows how disease eradication can happen and why it is so difficult to achieve. Smallpox emerged in human populations thousands of years ago as a contagious virus that spread rapidly, primarily through close, face to face contact, causing fever, aches and rashes. It killed up to 30% of its victims and often left survivors with life-long disfiguring scars. The devastating impact of smallpox was so great that several cultures had religious deities specifically dedicated to it. In the 20th century alone, it is estimated to have killed more than 300 million people worldwide. With the effective deployment of vaccination, the number of cases began to decrease. By seeking out infected individuals, isolating them, and vaccinating their contacts to prevent further transmission, scientists realized that the spread of the disease could be haulted. In fact, because smallpox could only survive in human hosts, vaccinating all of an infected persons' potential contacts would stop the virus dead in its tracks and eliminate it from that region. Once this strategy had succeeded in ridding most industrialized countries from disease, health officials realized that eradicating it worldwide was within reach. But this was not an easy process, proving especially difficult in places suffering from poor infrastructure or civil wars. The eradication effort took decades and involved millions of people working together, from world leaders and international organizations to rural doctors and community workers. In India, one of the last strongholds of the disease, health workers visited every one of the country's 100 million households to search for cases. Through this unprecedented worldwide effort, in which even rival superpowers cooperated, smallpox was finally declared eradicated in 1980, saving approximately 40 million lives over the following two decades. There were several factors that made smallpox an ideal candidate for eradication. First, humans are essential to the smallpox lifecycle, so breaking the chain of human to human transmission causes the virus to die out. In contrast, many other pathogens, like ebola or the bubonic plague, can survive in animal carriers, while the bacteria that cause tetanus can even live in the soil. Secondly, individuals infected with smallpox displayed a characteristic rash, making them easy to identify, even without a lab test. The lack of such practical diagnostic tools for diseases with non-specific symptoms, or that have long incubation periods, such as AIDS, makes their eradication more difficult. Third, the availability of a smallpox vaccine that provided immunity for five to ten years in a single dose meant that there was an effective intervention to stop the virus from spreading. And finally, the initial success of several countries in eliminating the disease within their borders served as a proof of principle for its eradication worldwide. Today, the same criteria are applied to determine whether other diseases can be similarly eliminated. And even though smallpox remains the only success story thus far, several other pathogens may be next in line. Great progress has been made towards eradicating guinea worm disease simply by use of water filters. And vaccination for polio, which previously disabled hundreds of thousands of people each year is estimated to have prevented 13 million cases of paralysis, and 650,000 deaths since 1988. With a 99% drop in infections since the eradication effort began, one final push is all that is needed to ensure that polio will never paralyze another child. Disease eradication is one public health effort that benefits all of humanity and challenges us to work together as a global community. Beyond eliminating specific diseases, eradication programs benefit local populations by improving health infrastructure. For example, Nigeria recently used facilities and personnel from their polio eradication program to effectively control an ebola outbreak. Further more, globalization and international travel means that even a single infection anywhere in the world can potentially spread to other regions. By helping to protect others, we help to protect ourselves. Disease eradication is the ultimate gift we can give to everyone alive today, as well as all future generations of humanity.

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翻译人员: Peng Chen 校对人员: Scarlett Huang人类史中大多数时候医疗工作者在努力治疗或治愈疾病19世纪疫苗接种的普及显著地增强了人们对于疾病的预防但也仅仅也是在最近几十年确保某种疾病不再对人类构成威胁才成为可能天花这个截至目前唯一一个在世界上被永久根除的疾病它的故事表明了根除疾病是怎样实施的， 以及为什么如此困难天花数千年前已经侵入人类作为一种传染性疾病，它传播很快主要通过近距离的互相接触引起发烧，疼痛，皮疹患者中的30%因此死亡而且通常幸存者也不得不忍受长达一生丑陋的伤疤天花灾难性的影响如此之大以至于数种文化中都有专门的神诋来负责它仅在20世纪据估计全世界就有3亿人因此死亡随着疫苗接种的有效应用疫情人数开始减少通过寻找被感染的人隔离他们阻止他们与他人的接触来防止进一步传播科学家发现疾病的传播可以得到中止实际上，因为天花只能通过人类宿主生存对受感染者所有可能接触的人群都进行疫苗接种可以切断病毒的传播渠道将它从特定区域消灭一旦这种策略成功地在大多数工业国家消除了病毒卫生人员就意识到了在全球范围内根除病毒是可能的但路漫漫其修远兮特别是在卫生基建设施匮乏的地区尤为困难另外也受阻于人类间的内战根除病毒的努力持续了几十年数百万人民团结一心，奋发努力不论是世界领袖和国际组织，还是乡下郎中和社区工作人员在印度，病毒最后一个据点之一卫生工作者走访了这个国家一亿家庭中的每一个来搜寻受感染案例通过这次史无前例的全球动员包括对立的超级大国也互相合作最终在1980年天花被宣告根除在接下来的二十年里挽救了大约四千万人口这里面有几个因素让天花成为能够被根除的病毒中的一个理想案例第一，人类是天花存在的基础所以切断人与人之间的传播链会让病毒逐渐灭亡相反，许多其它病原体，比如埃博拉或腺鼠疫能够在动物宿主中存活破伤风细菌甚至能在土壤中存活第二，天花的受感染者会出现特征性皮疹，这让他们很容易被区分即使不用实验测试也可以辨别但如果缺乏实用诊断工具对于非特异性症状或者长期潜伏的疾病，比如艾滋病，会增加根除它们的难度第三，天花疫苗的出现单次剂量就能提供5到10年的免疫这意味着有效地控制了病毒的传播最后，最初几个成功的国家在自己的国家内消灭了疾病成为了在全世界根除该疾病的样例现在，同样的标准被用来判定其它的疾病是否能够一样被消除尽管目前天花是唯一一个成功的案例其它几个病原体将会成为接下来几个成功的例子根除麦地那龙线虫病已经取得了巨大的成果靠得只是使用净水过滤器以及针对小儿麻痹症的疫苗这种疾病之前每年都伤害成百上千人据估计自1988年起， 大家的努力已让一千三百万人口免于瘫痪让六十五万人口免于疾病死亡自从消灭疾病活动开展以来，受感染率下降了99%最后一击就是确保将来不会有脊髓灰质炎导致任何一个孩子瘫痪消灭疾病是一项公众卫生运动，全人类皆受益也挑战着我们能否携手前行，一起抗击病毒在消灭特定病毒之外，该项目也能够通过提高卫生基础设施水平让当地人民受益比如，尼日利亚最近使用的设施和人员就来自小儿麻痹症根除项目 有效地控制了埃博拉的爆发更进一步，全球化和国际旅行意味着在任何地方的唯一一次感染就有可能扩散给其它区域帮助他人，也是在帮助我们自己消灭疾病是给现在活着的人，和我们的子孙后代最好的礼物。

**P199 2015-03-03 How parasites change their host's behavior - Jaap de Roode**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=199)

Which of these entities has evolved the ability to manipulate an animal many times its size? The answer is all of them. These are all parasites, organisms that live on or inside another host organism, which they harm and sometimes even kill. Parasite survival depends on transmitting from one host to the next, sometimes through an intermediate species. Our parasites elegantly achieve this by manipulating their host's behavior, sometimes through direct brain hijacking. For example, this is the Gordian worm. One of its hosts, this cricket. The Gordian worm needs water to mate, but the cricket prefers dry land. So once it's big enough to reproduce, the worm produces proteins that garble the cricket's navigational system. The confused cricket jumps around erratically, moves closer to water, and eventually leaps in, often drowning in the process. The worm then wriggles out to mate and its eggs get eaten by little water insects that mature, colonize land, and are, in turn, eaten by new crickets. And thus, the Gordian worm lives on. And here's the rabies virus, another mind-altering parasite. This virus infects mammals, often dogs, and travels up the animal's nerves to its brain where it causes inflammation that eventually kills the host. But before it does, it often increases its host's aggressiveness and ramps up the production of rabies-transmitting saliva, while making it hard to swallow. These factors make the host more likely to bite another animal and more likely to pass the virus on when it does. And now, meet Ophiocordyceps, also known as the zombie fungus. Its host of choice is tropical ants that normally live in treetops. After Ophiocordyceps spores pierce the ant's exoskeleton, they set off convulsions that make the ant fall from the tree. The fungus changes the ant's behavior, compelling it to wander mindlessly until it stumbles onto a plant leaf with the perfect fungal breeding conditions, which it latches onto. The ant then dies, and the fungus parasitizes its body to build a tall, thin stalk from its neck. Within several weeks, the stalk shoots off spores, which turn more ants into six-legged leaf-seeking zombies. One of humanity's most deadly assailants is a behavior-altering parasite, though if it's any consolation, it's not our brains that are being hijacked. I'm talking about Plasmodium, which causes malaria. This parasite needs mosquitoes to shuttle it between hosts, so it makes them bite more frequently and for longer. There's also evidence that humans infected with malaria are more attractive to mosquitoes, which will bite them and transfer the parasite further. This multi-species system is so effective, that there are hundreds of millions of malaria cases every year. And finally, there are cats. Don't worry, there probably aren't any cats living in your body and controlling your thoughts. I mean, probably. But there is a microorganism called Toxoplasma that needs both cats and rodents to complete its life cycle. When a rat gets infected by eating cat feces, the parasite changes chemical levels in the rat's brain, making it less cautious around the hungry felines, maybe even attracted to them. This makes them easy prey, so these infected rodents get eaten and pass the parasite on. Mind control successful. There's even evidence that the parasite affects human behavior. In most cases, we don't completely understand how these parasites manage their feats of behavior modification. But from what we do know, we can tell that they have a pretty diverse toolbox. Gordian worms seem to affect crickets' brains directly. The malaria parasite, on the other hand, blocks an enzyme that helps the mosquitoes feed, forcing them to bite over and over and over again. The rabies virus may cause that snarling, slobbering behavior by putting the immune system into overdrive. But whatever the method, when you think about how effectively these parasites control the behavior of their hosts, you may wonder how much of human behavior is actually parasites doing the talking. Since more than half of the species on Earth are parasites, it could be more than we think.

**P199 2015-03-03 How parasites change their host's behavior - Jaap de Roode**

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翻译人员: Ruohan Lu 校对人员: Cissy Yun这些家伙中有哪些进化出了控制体积是他们好多倍的动物的能力呢？答案就是他们都能这些家伙就是寄生生物一种依赖或者寄生于宿主内部的有机生物他们会伤害甚至有时杀死他们的宿主寄生生物的存活依赖于在不同宿主间转移，有时还需要通过一个中间物种我们的寄生生物微妙 通过控制他们宿主来达到目的有时会直接向大脑发起进攻例如，这是一个线形虫这是它的宿主，一只蟋蟀线形虫需要水分来交配 但蟋蟀喜欢干燥的陆地所以一旦线形虫长成可以繁殖的大小它就会产生某种蛋白质 以干扰蟋蟀的导航系统这只被迷惑的蟋蟀就稀里糊涂地跳来跳去向水域移动最终跳进水里，溺死之后，线形虫向外蠕动并进行交配它的卵又被小型水生生物吃掉这些小型水生生物逐渐成熟聚居于陆地然后又被新的蟋蟀吃掉这样，线形虫就活下来了这是狂犬病毒 又一个干扰思维的寄生生物这种病毒会感染哺乳动物，通常是狗并且顺着动物的神经抵达它们的大脑引起大脑里发炎， 最终会杀死宿主的炎症但在这之前，它通常会增强宿主的攻击性产生更多会传播狂犬病的唾液并使得宿主很难吞咽这些因素提高了宿主撕咬其他动物的可能性也更有可能在此过程中传播病毒现在，来见见侧偏蛇虫草菌，又称僵尸真菌它的宿主是住在树梢上的热带蚂蚁侧偏蛇虫草菌的孢子们会 在蚂蚁的外骨骼上穿孔然后，它们引起蚂蚁痉挛，使蚂蚁从树上掉下来真菌改变了蚂蚁的行为，强迫蚂蚁无意识地闲逛直到蚂蚁碰到一片有着完美真菌孕育条件的树叶并牢牢揪住这个树叶然后这只蚂蚁就死了寄生于其身的真菌 会从它的颈部伸出细长柄状物几周之内，这个柄状物射出孢子这些孢子把更多蚂蚁变成“六腿寻叶僵尸”其中一个对人类最致命的攻击者 是改变行为的寄生生物算得上安慰的是被攻击的并不是我们的大脑我说的是疟原虫，它会导致疟疾这种寄生生物需要蚊子将其传播于宿主之间所以它使得蚊子叮咬得更频繁，时间更长也有证据说感染了疟疾人对于蚊子的吸引力更大蚊子会叮咬他们，并将寄生虫传播得更远这个多物种体系是如此有效率以至于每年有数千万疟疾的案例最后，说说猫别担心，应该没有猫住在你的身体里控制你的思想我是说，应该是但是有一种微生物叫弓形虫需要猫和啮齿动物两者来完成它的生命周期当老鼠通过食用猫的粪便，感染了寄生虫，这种寄生虫会改变老鼠大脑中的化学成分水平使它在饥饿的猫科动物身旁疏于谨慎猫科动物甚至会吸引到它们这使得猫科动物更易捕食所以这些感染了的啮齿动物被吃掉 并继续传播寄生虫控制思维就这样成功了甚至还有证据证明寄生生物会影响人类的行为多数情况下，我们不会完全理解这些寄生生物是如何管理 它们的操控行为的本领但从我们知道的来看我们可以看出他们确实会耍不少花招线形虫似乎可以直接影响蟋蟀的大脑疟疾寄生虫（疟原虫）则可以阻碍生产可以帮助蚊子吃东西的酶强迫蚊子不停地叮咬狂犬病病毒会通过让免疫系统“开挂”来引起吼叫和流口水的行为但不管是什么方式当你想到这些寄生生物多么有效地控制着他们宿主的行为你就会想知道 有多少人类行为实际是由寄生生物主宰着的由于地球上超过一半的生物是寄生生物这种“主宰”恐怕是多于我们所以为的

**P200 2015-03-05 Earworms - Those songs that get stuck in your head - Elizabeth Hellmu**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=200)

Have you ever been waiting in line at the grocery store, innocently perusing the magazine rack, when a song pops into your head? Not the whole song, but a fragment of it that plays and replays until you find yourself unloading the vegetables in time to the beat. You've been struck by an earworm, and you're not alone. Over 90% of people are plagued by earworms at least once a week, and about a quarter of people experience them several times a day. They tend to burrow in during tasks that don't require much attention, say, when waiting on water to boil or a traffic light to change. This phenomenon is one of the mind's great mysteries. Scientists don't know exactly why it's so easy for tunes to get stuck in our heads. From a psychological perspective, earworms are an example of mental imagery. This imagery can be visual, like when you close your eyes and imagine a red wagon, or it can be auditory, like when you imagine the sound of a baby screaming, or oil sizzling in a pan. Earworms are a special form of auditory imagery because they're involuntary. You don't plug your ears and try to imagine "Who Let the Dogs Out," or, well, you probably don't. It just intrudes onto your mental soundscape and hangs around like an unwanted house guest. Earworms tend to be quite vivid and they're normally made up of a tune, rather than, say, harmonies. A remarkable feature of earworms is their tendency to get stuck in a loop, repeating again and again for minutes or hours. Also remarkable is the role of repetition in sparking earworms. Songs tend to get stuck when we listen to them recently and repeatedly. If repetition is such a trigger, then perhaps we can blame our earworms on modern technology. The last hundred years have seen an incredible proliferation of devices that help you listen to the same thing again and again. Records, cassettes, CDs, or streamed audio files. Have these technologies bread some kind of unique, contemporary experience, and are earworms just a product of the late 20th century? The answer comes from an unlikely source: Mark Twain. In 1876, just one year before the phonograph was invented, he wrote a short story imagining a sinister takeover of an entire town by a rhyming jingle. This reference, and others, show us that earworms seem to be a basic psychological phenomenon, perhaps exacerbated by recording technology but not new to this century. So yes, every great historical figure, from Shakespeare to Sacajawea, may well have wandered around with a song stuck in their head. Besides music, it's hard to think of another case of intrusive imagery that's so widespread. Why music? Why don't watercolors get stuck in our heads? Or the taste of cheesy taquitos? One theory has to do with the way music is represented in memory. When we listen to a song we know, we're constantly hearing forward in time, anticipating the next note. It's hard for us to think about one particular musical moment in isolation. If we want to think about the pitch of the word "you" in "Happy Birthday," we have to start back at "Happy," and sing through until we get to "you." In this way, a tune is sort of like a habit. Just like once you start tying your shoe, you're on automatic until you tighten the bow, once a tune is suggested because, for example, someone says, "my umbrella," we have to play through until it reaches a natural stopping point, "ella, ella, ella." But this is largely speculation. The basic fact remains we don't know exactly why we're susceptible to earworms. But understanding them better could give us important clues to the workings of the human brain. Maybe the next time we're plagued by a Taylor Swift tune that just won't go away, we'll use it as the starting point for a scientific odyssey that will unlock important mysteries about basic cognition. And if not, well, we can just shake it off.

**P200 2015-03-05 Earworms - Those songs that get stuck in your head - Elizabeth Hellmu**

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翻译人员: anastasia huang 校对人员: Ning Chen你有没有过这样的经历，当你正在杂货店排队，漫不经心地翻着杂志，一首曲子却突然蹦到你脑袋里去？不是整首曲目，但是其中的一段，一而再地重奏，直到你发现自己取蔬菜的动作已然是在和着节拍。你被“洗脑神曲”袭击啦！这样的遭遇不止你有。超过九成的人每周至少遭受一次这样的折磨，同时大约有四分之一的人每天都有数次这样的经历。那些不需要太多注意力的事务——比如说那些等水开或是等红灯的时候，更容易招惹“洗脑神曲”入侵。这一现象是大脑的重大秘密之一。科学家们也无法完全搞清楚那些曲调为何如此轻松地就留在了我们的脑袋里。一种心理学观点认为，“洗脑神曲”是一种心理意象。这类意象要么是可视的，比如当你闭上双眼想象一个红色的货车，要么是可听的，比如当你去想象一个婴儿的啼哭，或是平底锅里热油的嗞嗞声。“洗脑神曲”是一种可听觉意象的特殊形式，因为他们的出现是无意识的，比如说你并不会塞住自己耳朵然后拼命去想《谁把狗放出来了》（一首歌的名字）。当然了，或者应该说是，理论上你是不会这样做的。它只是硬闯进你脑海里的音乐背景中去，然后像个不速之客一样四处闲逛。“洗脑神曲”大多相当生动鲜明，他们通常由一个调子，而不是由所谓的和弦所构成。“洗脑神曲”的一个标志性特征就是他们倾向于陷入一个循环里，分分钟重复千遍万遍。值得记忆亦是洗脑神曲中那些“死循环”所担任的使命。那些最近重复播放的歌曲更易在脑子里阴魂不散。如果说重复近乎一种触发器，那也许我们应该将“洗脑神曲”的出现归罪于现代技术。近百年来音响设备以难以置信的速度普及，加助了人们一遍又一遍听到同样的音乐。唱片，磁带，CD，还有那些市面上涌现的音频。是否是那些技术滋生了那些各种各样独特地现代体验，而“洗脑神曲”只是二十世纪晚期才出现的产物？答案出自马克吐温的一次意外收获。1876年，就在留声机研发成功的前一年，他写了个小故事，想象了一个有节奏的叮当声阴险地掌控了整个小镇。这个例子，加上别的一些事，说明“洗脑神曲”只是个基本的心理现象，也许只是被现代的记录技术加强了却并非是本世纪的新事物。所以呢，没错，任何一个伟大的历史人物，从莎士比亚到萨卡加维亚，也都曾在“洗脑神曲”占领脑袋的时候徘徊了个够。很难想出除了音乐以外还能有什么入侵大脑的意象影响范围如此广泛。为什么音乐可以做到呢？为啥水彩画就没能卡在你的大脑里？还有那些奶酪味的小塔科（一种墨西哥美食）怎么也没有？有种理论认为这与音乐在记忆里表现的方式有关。当我们在听那些已知的歌曲时，我们总是不断地提前听到自己所期望的下一个音符。对我们来说单单想起一个音符是很难的。若是我们想去思考“祝你生日快乐”里“乐”的音高，我们不得不倒回去从“祝”开始，一直唱到“乐”。这样看来，一段曲调近似乎是种“习惯”。就像一旦你开始系鞋带，你就会不自觉地打完一个蝴蝶结才停下。一旦一个词被提及，因为，比如，有人说，“我的伞”在出现自然的停止符“san, san, san”之前我们根本停不下来。但这大部分只是推测。事实是我们仍然不知道我们到底为何如此易受“洗脑神曲”的影响。但是更好地理解他们会给我们提供人类大脑工作方式的重要线索。也许下一次我们会被泰勒斯威夫特的旋律困住而无法逃脱我们将把它当做科学路程的起点加以利用从而解开有关基本认识的重大玄机。万一失败了，好吧，那我们只能单纯地甩开它了。

**P201 2015-03-12 Plato’s Allegory of the Cave - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=201)

What is reality, knowledge, the meaning of life? Big topics you might tackle figuratively explaining existence as a journey down a road or across an ocean, a climb, a war, a book, a thread, a game, a window of opportunity, or an all-too-short-lived flicker of flame. 2,400 years ago, one of history's famous thinkers said life is like being chained up in a cave, forced to watch shadows flitting across a stone wall. Pretty cheery, right? That's actually what Plato suggested in his Allegory of the Cave, found in Book VII of "The Republic," in which the Greek philosopher envisioned the ideal society by examining concepts like justice, truth and beauty. In the allegory, a group of prisoners have been confined in a cavern since birth, with no knowledge of the outside world. They are chained, facing a wall, unable to turn their heads, while a fire behind them gives off a faint light. Occasionally, people pass by the fire, carrying figures of animals and other objects that cast shadows on the wall. The prisoners name and classify these illusions, believing they're perceiving actual entities. Suddenly, one prisoner is freed and brought outside for the first time. The sunlight hurts his eyes and he finds the new environment disorienting. When told that the things around him are real,` while the shadows were mere reflections, he cannot believe it. The shadows appeared much clearer to him. But gradually, his eyes adjust until he can look at reflections in the water, at objects directly, and finally at the Sun, whose light is the ultimate source of everything he has seen. The prisoner returns to the cave to share his discovery, but he is no longer used to the darkness, and has a hard time seeing the shadows on the wall. The other prisoners think the journey has made him stupid and blind, and violently resist any attempts to free them. Plato introduces this passage as an analogy of what it's like to be a philosopher trying to educate the public. Most people are not just comfortable in their ignorance but hostile to anyone who points it out. In fact, the real life Socrates was sentenced to death by the Athenian government for disrupting the social order, and his student Plato spends much of "The Republic" disparaging Athenian democracy, while promoting rule by philosopher kings. With the cave parable, Plato may be arguing that the masses are too stubborn and ignorant to govern themselves. But the allegory has captured imaginations for 2,400 years because it can be read in far more ways. Importantly, the allegory is connected to the theory of forms, developed in Plato's other dialogues, which holds that like the shadows on the wall, things in the physical world are flawed reflections of ideal forms, such as roundness, or beauty. In this way, the cave leads to many fundamental questions, including the origin of knowledge, the problem of representation, and the nature of reality itself. For theologians, the ideal forms exist in the mind of a creator. For philosophers of language viewing the forms as linguistic concepts, the theory illustrates the problem of grouping concrete things under abstract terms. And others still wonder whether we can really know that the things outside the cave are any more real than the shadows. As we go about our lives, can we be confident in what we think we know? Perhaps one day, a glimmer of light may punch a hole in your most basic assumptions. Will you break free to struggle towards the light, even if it costs you your friends and family, or stick with comfortable and familiar illusions? Truth or habit? Light or shadow? Hard choices, but if it's any consolation, you're not alone. There are lots of us down here.

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翻译人员: Simon Sun 校对人员: Cissy Yun什么是事实 ，什么是知识 生命的意义又是什么你可能用打比方的方式来回答这些博大的话题比如把存在解释成穿越一条大道、一片海洋或者爬山、战争、书、线、游戏、机会之窗亦或是转瞬即逝的火花两千四百年前一位伟大的思想家认为生命就像被锁在洞穴里看着石墙上来去匆匆的影子很有趣的比喻，对吗？这就是著名的柏拉图洞穴之喻记载在《理想国》第七章在《理想国》中，这位希腊哲学家通过检验诸如正义、真理、美这些概念，构想了一个完美社会在洞穴寓言中，有一群人从出生就被囚禁在洞穴中他们背对入口，而且不能转头往后看他们对外面的世界一无所知但偶尔会有人或动物经过洞口在囚犯面对的石墙上投出影子 声音也能传到洞里囚犯就给这些幻影命名、归类他们认为自己感知到的就是真实的存在突然，一个囚犯获得了自由 第一次来到外面的世界阳光亮得使他睁不开双眼 新环境让他很迷惑有人告诉他周围的事物是真实的影子只是事物的映像， 但他无法相信这一切因为他看影子更清楚但慢慢地，他适应了外面的光线能看清水中的倒影亲眼看到了各种事物并最终发现了天上的太阳正是阳光让他看到了这一切这个囚犯回到洞穴， 告诉其他人自己的发现而这时他已经不适应昏暗的洞穴了很难再看清墙上的影子其他囚犯认为他在这次旅行后变得愚蠢 甚至眼睛都变瞎了他们坚决地抵抗任何试图释放他们的行为柏拉图讲这个故事是要类比试图教育大众的哲学家大部分人不但安于自己的无知而且对任何指出他们无知的人充满敌意苏格拉底就是这样的哲学家 他最终被雅典政府处以死刑罪名是扰乱社会秩序他的学生柏拉图 在《理想国》中花了很大篇幅批判当时的雅典民主并提倡由哲学家称王，并统治国家柏拉图也许要借助洞穴寓言指出一般大众太过顽固无知无法管理自己两千四百年来 这个寓言不断启发人们的想象人们用很多方式来解读它值得一提的是， 这个寓言牵涉到形式理论这在柏拉图的其他对话录中有所阐述形式理论认为 如同投在石墙上的影子一样现实世界的事物是对理想形式例如圆、美的不完美映射这样一来 洞穴寓言就引出了很多哲学基本问题例如知识的起源再现的问题以及现实的本质对神学家来说 完美形式存在于造物主的意念中语言哲学家则把形式视作语言概念他们把具体事物分类并归于不同的抽象语汇之下另外，也有人仍在质疑洞外的事物是否真的比洞内的影子更真实就比如我们的人生我们真的知道自认为已经知道的事情吗也许有一天一束亮光在你最基本的假定上打出一个小孔你是否会挣脱着走向光明即使那意味着失去朋友和家人还是会固守在舒适熟悉的幻象之中追求真理还是固守习惯， 选择光明还是抱持幻影两难的选择，但不要担心 不只你一人有这样的感觉我们很多人都是这样

**P202 2015-03-12 Why it’s so hard to cure HIV\_AIDS - Janet Iwasa**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=202)

In 2008, something incredible happened: a man was cured of HIV. In over 70 million HIV cases, that was a first and, so far, a last. We don't yet understand exactly how he was cured. We can cure people of various diseases, such as malaria and hepatitis C, so why can't we cure HIV? Well, first let's examine how HIV infects people and progresses into AIDS. HIV spreads through exchanges of bodily fluids. Unprotected sex and contaminated needles are the leading cause of transmission. It, fortunately, cannot spread through air, water, or casual contact. Individuals of any age, sexual orientation, gender and race can contract HIV. Once inside the body, HIV infects cells that are part of the immune system. It particularly targets helper T cells, which help defend the body against bacterial and fungal infections. HIV is a retrovirus, which means it can write its genetic code into the genome of infected cells, co-opting them into making more copies of itself. During the first stage of HIV infection, the virus replicates within helper T cells, destroying many of them in the process. During this stage, patients often experience flu-like symptoms, but are typically not yet in mortal danger. However, for a period ranging from a few months to several years, during which time the patient may look and feel completely healthy, the virus continues to replicate and destroy T cells. When T cell counts drop too low, patients are in serious danger of contracting deadly infections that healthy immune systems can normally handle. This stage of HIV infection is known as AIDS. The good news is there are drugs that are highly effective at managing levels of HIV and preventing T cell counts from getting low enough for the disease to progress to AIDS. With antiretroviral therapy, most HIV-positive people can expect to live long and healthy lives, and are much less likely to infect others. However, there are two major catches. One is that HIV-positive patients must keep taking their drugs for the rest of their lives. Without them, the virus can make a deadly comeback. So, how do these drugs work? The most commonly prescribed ones prevent the viral genome from being copied and incorporated into a host cell's DNA. Other drugs prevent the virus from maturing or assembling, causing HIV to be unable to infect new cells in the body. But HIV hides out somewhere our current drugs cannot reach it: inside the DNA of healthy T cells. Most T cells die shortly after being infected with HIV. But in a tiny percentage, the instructions for building more HIV viruses lies dormant, sometimes for years. So even if we could wipe out every HIV virus from an infected person's body, one of those T cells could activate and start spreading the virus again. The other major catch is that not everyone in the world has access to the therapies that could save their lives. In Sub-Saharan Africa, which accounts for over 70% of HIV patients worldwide, antiretrovirals reached only about one in three HIV-positive patients in 2012. There is no easy answer to this problem. A mix of political, economic and cultural barriers makes effective prevention and treatment difficult. And even in the U.S., HIV still claims more than 10,000 lives per year. However, there is ample cause for hope. Researchers may be closer than ever to developing a true cure. One research approach involves using a drug to activate all cells harboring the HIV genetic information. This would both destroy those cells and flush the virus out into the open, where our current drugs are effective. Another is looking to use genetic tools to cut the HIV DNA out of cells genomes altogether. And while one cure out of 70 million cases may seem like terrible odds, one is immeasurably better than zero. We now know that a cure is possible, and that may give us what we need to beat HIV for good.

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翻译人员: Ying Wang 校对人员: Tianchang Luo2008 年，难以置信的事情发生了： 一名HIV患者被成功治愈在超过七千万HIV病例中，这是第一例， 目前为止也是最后一例我们无法确切的知道他是如何被治好的我们可以治愈很多疾病，比如疟疾与丙肝但是我们为何不能治愈HIV？首先，让我们来看HIV病毒是如何感染人类以及如何发展成为艾滋病HIV病毒通过体液交换传播无保护的性行为和污染的针头是传播的主要原因幸运的是，HIV 无法通过空气、水或者接触传播任何年纪，性取向，性别和种族的个体都有可能感染HIV一旦进入人体，HIV病毒便开始感染免疫系统的细胞它专门攻击辅助型T细胞这是一种帮助人体抵抗细菌和真菌感染的细胞HIV 是逆转录病毒它可以将自己的基因编码写入被感染细胞的基因组指派他们复制更多的病毒在HIV感染初期病毒在辅助性T细胞中复制在这个过程中破坏了许多T细胞在这个阶段，患者通常有类似流感的症状但不会有生命危险在几个月甚至几年的一段时期内患者可能看起来很健康但病毒持续复制，同时破坏T细胞当T细胞数目过低患者将处于致死性感染的危险中这种感染在健康的免疫系统中是可以被抵御的HIV感染的这个阶段被称作艾滋病好消息是已经有有效的药物能够控制HIV病毒水平，并防止T细胞数目过低，从而避免发展成为艾滋病如果进行抗逆转录病毒治疗，大部分HIV阳性的病人能够继续正常生活而且也会减少对其他人的感染但目前有两个难点第一，HIV阳性病人在有生之年必须一直服药如果停止，HIV会恶化那么，这些药物是如何起作用的？最常用的那些临床药物可以阻止病毒的基因复制并合并入宿主细胞DNA其他的药物可以阻止病毒的变异和组装使得HIV病毒不能感染体内其他细胞但是HIV病毒会藏在目前药物无法到达的地方：健康T细胞的DNA中大部分T细胞被HIV传染后迅速死亡但是很小的一部分被用作构建更多HIV病毒的场所，会处于休眠有时甚至好几年因此，即使我们能够清除感染人体的每一个HIV病毒一个这样的T细胞就能激活并且重新传播病毒另一个难点是，并不是世界上的所有人都能获得这些能够挽救他们生命的药物在撒哈拉以南非洲， 这个地区占全球艾滋病患者的70％以上2012年，仅有三个HIV阳性患者接受抗逆转录病毒治疗这个问题很难解决政治，经济，文化的障碍使得有效的预防和治疗变得困难即使是在美国，每年HIV夺去超过10000人的生命但是依然有希望研究人员比以往任何时候都接近发展出真正的治疗方法一项研究涉及使用一种药物激活隐含HIV遗传信息的所有细胞这将破坏这些细胞并且将病毒暴露出来接着我们现有的药物就可以起作用了另外一种是使用基因工具将HIV的DNA从细胞基因组剪切下来尽管七千万人中仅有一例治愈但是一个总比没有好我们现在清楚治疗还是有可能的这告诉我们将需要什么去击败HIV

**P203 2015-03-13 Can robots be creative - Gil Weinberg**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=203)

How does this music make you feel? Do you find it beautiful? Is it creative? Now, would you change your answers if you learned the composer was this robot? Believe it or not, people have been grappling with the question of artificial creativity, alongside the question of artifcial intelligence, for over 170 years. In 1843, Lady Ada Lovelace, an English mathematician considered the world's first computer programmer, wrote that a machine could not have human-like intelligence as long as it only did what humans intentionally programmed it to do. According to Lovelace, a machine must be able to create original ideas if it is to be considered intelligent. The Lovelace Test, formalized in 2001, proposes a way of scrutinizing this idea. A machine can pass this test if it can produce an outcome that its designers cannot explain based on their original code. The Lovelace Test is, by design, more of a thought experiment than an objective scientific test. But it's a place to start. At first glance, the idea of a machine creating high quality, original music in this way might seem impossible. We could come up with an extremely complex algorithm using random number generators, chaotic functions, and fuzzy logic to generate a sequence of musical notes in a way that would be impossible to track. But although this would yield countless original melodies never heard before, only a tiny fraction of them would be worth listening to. With the computer having no way to distinguish between those which we would consider beautiful and those which we won't. But what if we took a step back and tried to model a natural process that allows creativity to form? We happen to know of at least one such process that has lead to original, valuable, and even beautiful outcomes: the process of evolution. And evolutionary algorithms, or genetic algorithms that mimic biological evolution, are one promising approach to making machines generate original and valuable artistic outcomes. So how can evolution make a machine musically creative? Well, instead of organisms, we can start with an initial population of musical phrases, and a basic algorithm that mimics reproduction and random mutations by switching some parts, combining others, and replacing random notes. Now that we have a new generation of phrases, we can apply selection using an operation called a fitness function. Just as biological fitness is determined by external environmental pressures, our fitness function can be determined by an external melody chosen by human musicians, or music fans, to represent the ultimate beautiful melody. The algorithm can then compare between our musical phrases and that beautiful melody, and select only the phrases that are most similar to it. Once the least similar sequences are weeded out, the algorithm can reapply mutation and recombination to what's left, select the most similar, or fitted ones, again from the new generation, and repeat for many generations. The process that got us there has so much randomness and complexity built in that the result might pass the Lovelace Test. More importantly, thanks to the presence of human aesthetic in the process, we'll theoretically generate melodies we would consider beautiful. But does this satisfy our intuition for what is truly creative? Is it enough to make something original and beautiful, or does creativity require intention and awareness of what is being created? Perhaps the creativity in this case is really coming from the programmers, even if they don't understand the process. What is human creativity, anyways? Is it something more than a system of interconnected neurons developed by biological algorithmic processes and the random experiences that shape our lives? Order and chaos, machine and human. These are the dynamos at the heart of machine creativity initiatives that are currently making music, sculptures, paintings, poetry and more. The jury may still be out as to whether it's fair to call these acts of creation creative. But if a piece of art can make you weep, or blow your mind, or send shivers down your spine, does it really matter who or what created it?

**P203 2015-03-13 Can robots be creative - Gil Weinberg**

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翻译人员: Zongzhen Yang 校对人员: Zhiqiang Pi这音乐让你感觉如何？你觉得好听吗？有创意吗？那么如果现在告诉你作曲家 是一个机器人，你会改变刚才自己的回答吗？信不信由你，人们一直在试图攻克人工创意及人工智能这两大难题，为此研究了一百七十多年。1843年，Ada Lovelace夫人一位被誉为世界上第一个 电脑程序员的英格兰数学家写道机器不会有人类一样的智慧。如果人们只让机器按照所编程程序它们的，根据Lovelace，一个机器必须要能够创造新的想法才算是聪明。2001年形成的Lovelace测试提出了一个检测这个想法的方法。如果机器能够形成程序员无法根据原代码所解释的输出才可以通过检测。根据设计，Lovelace测试更像是思想实验而非客观的科学检测。但是这是一个起点。乍一看。机器创作高质量，原版的音乐的想法看起来不可能。我们可以想出一个使用随机生成数字，混乱的函数和模糊的逻辑来创造一系列音符的，极为复杂的算法，使其不可能理解。但是即使这样能够产生无数的，没人听过的原版旋律，只有一小部分值得一听。电脑是不法区分我们觉得好听或者不好听的旋律。但是如果我们退一步然后尝试塑造一个自然的创意形成过程会怎样？我们恰巧知道至少一个可以带来原创，宝贵甚至美丽的结果：进化。算法的进化，或者模仿物种进化的基因算法，是有希望让机器产生原创的，珍贵的艺术品。因此计划是如何让一个机器音乐创新？相比生物，我们可以从最初的一些乐段和一个基础的通过调换有些部分，结合另一些和替换一些随机的音节来模仿生育和随机变异的算法来完成。现在我们有一个新的音段创作，我们可以使用一个叫适应函数的运算。就像生物的适应是由外界压力所导致，我们的适应函数可以由音乐人或歌迷们所选择的外界旋律所定，以此来表现最终的，动听的旋律。算法可以比较我们的乐段和动听的旋律从而选择最相似的乐段。一旦最不相似的组合被淘汰，算法可以再次替换和组合剩下的，在从新的组合选择最接近的，或者最适合的，然后在许多的组合重复。这个过程有那么多的随机性和复杂性以至于结果可能可以通过Lovelace测试。更重要的，多亏在这个过程中人类的审美，我们理论上可以产生我们觉得动听的旋律。但是这能满足我们对真正创新的直觉吗？这足够产生原创而美好的东西吗？创新需要意图和意识吗？也许这样的创新其实源于程序员，即使他们不能理解过程。什么才算是人类的创新？是什么比一个互相连接的，由生物算法过程演变的神经元系统以及随机发生的，塑造我们生活的经验还要多的吗？秩序与混乱，机器与人类。现在有些创意机器的核心正在创造音乐，雕塑，图画，诗歌等等。评委可能会质问是否因当把这些创造行为叫做有创意。但是如果一枚艺术品能让你落泪，能让你大开眼界，或让你全身一颤，谁创造的还重要吗？

**P204 2015-03-13 The real story behind Archimedes’ Eureka! - Armand D'Angour**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=204)

When you think of Archimedes' "Eureka!" moment, you probably think of this. As it turns out, it may have been more like this. In the third century BC, Hieron, king of the Sicilian city of Syracuse, chose Archimedes to supervise an engineering project of unprecedented scale. Hieron commissioned a sailing vessel 50 times bigger than a standard ancient warship, named the Syracusia after his city. Hieron wanted to construct the largest ship ever, which was destined to be given as a present for Egypt's ruler, Ptolemy. But could a boat the size of a palace possibly float? In Archimedes's day, no one had attempted anything like this. It was like asking, "Can a mountain fly?" King Hieron had a lot riding on that question. Hundreds of workmen were to labor for years on constructing the Syracusia out of beams of pine and fir from Mount Etna, ropes from hemp grown in Spain, and pitch from France. The top deck, on which eight watchtowers were to stand, was to be supported not by columns, but by vast wooden images of Atlas holding the world on his shoulders. On the ship's bow, a massive catapult would be able to fire 180 pound stone missiles. For the enjoyment of its passengers, the ship was to feature a flower-lined promenade, a sheltered swimming pool, and bathhouse with heated water, a library filled with books and statues, a temple to the goddess Aphrodite, and a gymnasium. And just to make things more difficult for Archimedes, Hieron intended to pack the vessel full of cargo: 400 tons of grain, 10,000 jars of pickled fish, 74 tons of drinking water, and 600 tons of wool. It would have carried well over a thousand people on board, including 600 soldiers. And it housed 20 horses in separate stalls. To build something of this scale, only for that to sink on its maiden voyage? Well, let's just say that failure wouldn't have been a pleasant option for Archimedes. So he took on the problem: will it sink? Perhaps he was sitting in the bathhouse one day, wondering how a heavy bathtub can float, when inspiration came to him. An object partially immersed in a fluid is buoyed up by a force equal to the weight of the fluid displaced by the object. In other words, if a 2,000 ton Syracusia displaced exactly 2,000 tons of water, it would just barely float. If it displaced 4,000 tons of water, it would float with no problem. Of course, if it only displaced 1,000 tons of water, well, Hieron wouldn't be too happy. This is the law of buoyancy, and engineers still call it Archimedes' Principle. It explains why a steel supertanker can float as easily as a wooden rowboat or a bathtub. If the weight of water displaced by the vessel below the keel is equivalent to the vessel's weight, whatever is above the keel will remain afloat above the waterline. This sounds a lot like another story involving Archimedes and a bathtub, and it's possible that's because they're actually the same story, twisted by the vagaries of history. The classical story of Archimedes' Eureka! and subsequent streak through the streets centers around a crown, or corona in Latin. At the core of the Syracusia story is a keel, or korone in Greek. Could one have been mixed up for the other? We may never know. On the day the Syracusia arrived in Egypt on its first and only voyage, we can only imagine how residents of Alexandria thronged the harbor to marvel at the arrival of this majestic, floating castle. This extraordinary vessel was the Titanic of the ancient world, except without the sinking, thanks to our pal, Archimedes.

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翻译人员: Yang Zhou 校对人员: Gabriella Hu当提起阿基米德定律的发现时，你想象的画面可能是这样的。但真实的故事可能是另外一个样子。公元前三世纪，西西里城市叙拉古的国王希伦，任命阿基米德监督一项前无古人的巨大工程。希伦 下令建造一艘巨大的帆船比当时标准大小的帆船要大上50倍并以他统治的城市叙拉古命名。希伦的目标是建造有史以来最大的帆船。并将这艘船作为礼物送给埃及法老托勒密但这艘巨大的海上宫殿能浮起来吗？在阿基米德的时代，还没有人解决过类似的问题。这就好比问“ 山能飞吗？”希伦国王对此深表疑虑。成百的工人将花好多年的时间建造叙拉古号砍伐埃特纳火山上的松木和杉木作为船梁采用西班牙生长的大麻搓成麻绳并使用法国生产的树脂甲板上将矗立八座瞭望塔支撑它们的不是柱子而是传说中背负整个世界的阿特拉斯像在船首，巨大的投石机可以投射180磅的石块。为了乘客能享受美好的旅途，船上会有装饰着美丽花纹的走廊有遮阳的游泳池有热水的浴池有摆满了图书和雕塑的图书室还有供奉阿芙罗狄蒂的神庙以及一个体操馆。最后，好像这些还不够阿基米德忙活的，希伦还要给船装满货物：400吨的谷物10000坛子的腌鱼，74吨的饮用水，600吨的羊毛。并且还有1000名乘客其中包括600名士兵。还要装载20匹马，各自有单独的马厩。建造一艘如此庞大的巨物，然后在第一次航行时就沉到水底？嗯，对阿基米德来说这应该不会是一个愉快的选择。那么问题就来了：这艘船会沉吗？可能有那么一天，阿基米德坐在浴缸里洗澡，一个问题浮现在他的脑海：这么重的浴缸为什么能浮起来呢？然后灵感乍现了！部分浸入水中的物体受到向上的浮力等于它排开水的体积。也就是说，如果2000吨重的叙拉古号能排开2000吨重的水它就刚刚能浮起来。如果能排开4000吨重的水，那就更没有问题了。当然，如果只能排开1000吨的水，那么希伦国王显然就不高兴了。这就是浮力定理。而工程师们仍然习惯称其为阿基米德定理。这个定理解释了为什么万吨巨轮能和小木船一样轻而易举的浮起来。对浴缸也是同一个道理。如果船龙骨线以下船身排开的水的重量等于船的重量，那么无论在龙骨线以上的是什么，都能浮在水面上。这跟另一个阿基米德和浴缸的故事版本很像。而这很可能由于这两个故事本身就是同一回事。只是被历史流传的变换莫测弄得摸棱两可了。在广为流传的故事里，阿基米德大叫着“我找到了!" 飞奔过街道。故事的核心是一顶皇冠，皇冠在拉丁文中是corona。而叙拉古这个版本的核心是龙骨，在拉丁文中是korone。可能是将corona与korone混淆了吗？我们永远无法知道了。当叙拉古号在完成它第一次也是唯一一次的航程抵达埃及时，我们可以想象，亚历山大城当地的居民成群结队的去港口观瞻这艘非凡的浮动的城堡，定会惊叹不已的。这艘巨船就好比古代的泰坦尼克号一样，不同的只是它没有沉没。而这，要感谢我们的阿基米德！

**P205 2015-03-14 Where did Earth’s water come from - Zachary Metz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=205)

It has no taste, color or smell, and we often look right through it. It covers over 70% of the Earth, cycling from the oceans and rivers to the clouds and back again. It even makes up about 60% of our bodies. With all this water around and inside us, it's easy to take its presence for granted. But in the rest of the solar system, liquid water is almost impossible to find. So how did our planet end up with so much of this substance and where did it come from? As you probably know, a water molecule consists of two basic parts. Hydrogen, the simplest of all elements, has been around since close to the beginning of our universe. Oxygen entered the scene several hundred million years later after stars began to form. The massive pressure at the center of these fiery infernos was so great that hydrogen atoms fused together to form helium. Helium, in turn, fused to form heavier elements, like beryllium, carbon and oxygen in a process known as nucleosynthesis. When stars eventually collapsed and exploded into supernovas, these new elements were spread across the universe and combined into new compounds, like the now familiar H2O. These water molecules were present in the dusty cloud that formed our solar system and more collided with our planet after its formation. But there's a big question that we don't have the answer to: how much water arrived on Earth, and when? If, as one theory goes, relatively small amounts of water were present on Earth when the rock formed, the high temperatures and lack of any surrounding atmosphere would have caused it to evaporate back into space. Water would have been unable to remain on the planet until hundreds of millions of years later when our first atmosphere formed through a process called outgassing. This occurred when molten rock in the Earth's core released volcanic gasses to the surface, creating a layer that could then trap escaping water. So how then did water get back to the planet? Scientists have long suspected that much of it was brought by ice-bearing comets, or more likely asteroids that bombarded the Earth over millions of years. Recent research has challenged this theory. In examining carbonaceous chondrite meterorites that formed shorty after the birth of our solar system, scientists have found that not only did they contain water, but their mineral chemical composition matched rocks on Earth and samples from an asteroid that formed at the same time as our planet. This suggests that the Earth may have accumulated a substantial amount of water early on that was able to stay put, despite the lack of an atmosphere, though asteroids may have brought more over the eons. If this turns out to be true, life may have formed much earlier than previously thought. So we do not yet definitively know whether the water on Earth came from its initial formation, later impacts, or some combination of the two. Regardless, the water that runs from our showers, drinking fountains and faucets is something that didn't just come from a nearby lake or river, but first underwent a cosmic and chaotic journey to get here.

**P205 2015-03-14 Where did Earth’s water come from - Zachary Metz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=205)

翻译人员: Min WANG 校对人员: Chen Zou它没有味道，颜色，或者任何气味 而且透明它覆盖了70%的地球表面通过海洋，河流到云层 循环往复它甚至占了我们身体成份的60%由于我们身边和体内有这么多的水我们觉得水的存在 理所当然但是在太阳系的其它地方 几乎找不到液态的水那么我们的星球怎么会 有如此多的这种物质它到底来自哪里？就像你大概会知道的一个水分子由 两个基本部分组成氢原子－所有元素中最简单的元素自宇宙诞生时就有氧原子映入眼帘是在 几亿年星球开始形成之后在这些炽热的如地狱般的中心压力巨大使得氢原子聚变产生氦原子氦原子接着聚变产生其他重原子如铍，碳，以及氧原子， 这样的过程叫做核合成当星球最终坍塌 爆炸形成超新星这些元素就 遍及整个宇宙并且合成新物质 就像我们熟知的水分子这些水分子 存在于尘云之中尘云形成了我们的太阳系并且在形成之后 与我们的星球发生了更多碰撞但是这里有一个大的疑问 我们还没有对此有答案：多少水到达了地球，以及何时到达的地球？如果按一种理论当岩石形成之时 有相对少的水到达了地球高温以及缺少大气会导致水很快 挥发回到了太空水就不可能保存在地球上直到亿万年之后当我们的第一个大气层 通过释气过程形成的时候这个过程发生在 岩石在地核融化的时候释放火山气体到地表产生了可以捕捉到 逃逸水分子的一层大气那么水是怎样 回到地球的呢？科学家们长期怀疑大部分水来自带冰的彗星或者更可能来自百万年间 撞击地球的小行星最近的研究 挑战了这个理论根据对太阳系诞生后即形成的碳质球粒陨石的化验科学家们发现 这些陨石不仅含水而且它们的矿物化学成分 与地球岩石以及与跟地球同时期形成的 小行星的样品一致这个发现表明了 地球可能在早期累积了大量的可以保留的水尽管在缺乏大气的情况下尽管小行星也许会 日积月累带来更多的水如果这是真的生命可能在比之前认为的 更久前的时间形成所以我们不是绝对地知道 是否地球上的水来自于它最初的形式还是受后期的影响或是两者皆有不管怎样，洗澡用的水 饮用的水，以及自来水不是直接来自 附近的河流湖泊而是首先经历一个混沌的宇宙漫长 的旅途到达这里

**P206 2015-03-23 What did democracy really mean in Athens - Melissa Schwartzberg**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=206)

Hey, congratulations! You've just won the lottery, only the prize isn't cash or a luxury cruise. It's a position in your country's national legislature. And you aren't the only lucky winner. All of your fellow lawmakers were chosen in the same way. This might strike you as a strange way to run a government, let alone a democracy. Elections are the epitome of democracy, right? Well, the ancient Athenians who coined the word had another view. In fact, elections only played a small role in Athenian democracy, with most offices filled by random lottery from a pool of citizen volunteers. Unlike the representative democracies common today, where voters elect leaders to make laws and decisions on their behalf, 5th Century BC Athens was a direct democracy that encouraged wide participation through the principle of ho boulomenos, or anyone who wishes. This meant that any of its approximately 30,000 eligible citizens could attend the ecclesia, a general assembly meeting several times a month. In principle, any of the 6,000 or so who showed up at each session had the right to address their fellow citizens, propose a law, or bring a public lawsuit. Of course, a crowd of 6,000 people trying to speak at the same time would not have made for effective government. So the Athenian system also relied on a 500 member governing council called the Boule, to set the agenda and evaluate proposals, in addition to hundreds of jurors and magistrates to handle legal matters. Rather than being elected or appointed, the people in these positions were chosen by lot. This process of randomized selection is know as sortition. The only positions filled by elections were those recognized as requiring expertise, such as generals. But these were considered aristocratic, meaning rule by the best, as opposed to democracies, rule by the many. How did this system come to be? Well, democracy arose in Athens after long periods of social and political tension marked by conflict among nobles. Powers once restricted to elites, such as speaking in the assembly and having their votes counted, were expanded to ordinary citizens. And the ability of ordinary citizens to perform these tasks adequately became a central feature of the democratice ideology of Athens. Rather than a privilege, civic participation was the duty of all citizens, with sortition and strict term limits preventing governing classes or political parties from forming. By 21st century standards, Athenian rule by the many excluded an awful lot of people. Women, slaves and foreigners were denied full citizenship, and when we filter out those too young to serve, the pool of eligible Athenians drops to only 10-20% of the overall population. Some ancient philosophers, including Plato, disparaged this form of democracy as being anarchic and run by fools. But today the word has such positive associations, that vastly different regimes claim to embody it. At the same time, some share Plato's skepticism about the wisdom of crowds. Many modern democracies reconcile this conflict by having citizens elect those they consider qualified to legislate on their behalf. But this poses its own problems, including the influence of wealth, and the emergence of professional politicians with different interests than their constituents. Could reviving election by lottery lead to more effective government through a more diverse and representative group of legislatures? Or does modern political office, like Athenian military command, require specialized knowledge and skills? You probably shouldn't hold your breath to win a spot in your country's government. But depending on where you live, you may still be selected to participate in a jury, a citizens' assembly, or a deliberative poll, all examples of how the democratic principle behind sortition still survives today.

**P206 2015-03-23 What did democracy really mean in Athens - Melissa Schwartzberg**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=206)

翻译人员: Yixiong Zhu 校对人员: Moire Yim恭喜！你中奖了！不过，奖品不是现金和豪华游轮船票，而是你在国家立法机构中的席位。你也不是唯一的获奖者。你在立法机构的所有同事都是这样选出来的。这种政府运作方式在你看来可能很奇特，更别提这还是民主政府了。难道选举不是民主的象征么？发明“民主”这个词的雅典人看法却是不同。事实上，选举在雅典民主中只起很小的作用。大部分公职人员都是从一群公民志愿者中随机抽选出来的。与当今常见的代议制民主不同，代议制中选民选举领导人，领导人代表选民立法和执政，公元前五世纪的雅典是直接民主制，鼓励公民广泛参与政府，方法是通过“ho boulomenos”原则，即凡是愿意参政的公民，皆可参政。这意味着雅典的大约三万名合格公民中，任何一个人都可以参加“ecclesia”，一个每月召开数次的全体大会。原则上，出席的约六千名公民中，所有人都有权向公众进行演说，提出法律提案，或提起一场公诉。当然，如果6000人同时发言，效率不会太高，因此雅典的政治体系中还有一个500人的理事会，叫作“Boule”，负责制定议程和评估提案，此外还有数百名陪审员和法官处理法律事务。以上这些人都未经过选举或任命，而是通过抽签获得了席位。这种随机任选的过程叫做抽签制。唯一进行选举的职位，是被认为需要专业技术的职位，例如将领。但这些职位被认为是贵族性的，即由精英所掌控，从而与民主制，即多数统治，相违背。这种政治体制是如何产生的？雅典在经历了由贵族冲突导致的长期社会政治动荡之后，民主制开始兴起。精英曾经特有的权利，例如在公民大会发言和投票，被扩展给了普通公民。由公民来履行这些职责成为了雅典民主理念的中心特征。公民履责不是一种权利，而是所有公民的义务。抽签制和严格的届期限制防止了统治阶层和政党的出现。以21世纪的标准来看，雅典的民主制排除了相当多的人。妇女，奴隶，和外国人都没有完全的公民权，再除去未成年人，合格的雅典公民仅为总人口的10-20%。一些古典哲学家，包括柏拉图在内，否定这种民主制，认为这种制度毫无秩序，由愚民进行统治。但今天，“民主”这个词是如此正面，以至于截然不同的政府都自称“民主”。同时，一些人也认同柏拉图对民众智慧的疑虑。很多现代民主政府解决这一问题的方法是，由公民选举认可的人来代表公民自身进行立法。但这又创造了新问题，例如财富对政治的影响，以及职业政客的出现，其利益与其选民的利益有很大不同。恢复抽签制会不会让政府更加有效，因为立法机构更广泛更具有代表性？还是现代政治，如同雅典的军事体制一样，需要专业的知识和技巧？你或许不能完全寄托于中奖来参加你的政府。但是取决于你住的地方，你仍可能会被抽签进入陪审团，公民大会，或慎思民调，这些都是随机抽选背后的民主原则在今日发挥作用的例子。

**P207 2015-03-24 The science of static electricity - Anuradha Bhagwat**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=207)

It can strike without warning, at any moment. You may be walking across a soft carpet and reaching for the door knob when suddenly...zap! To understand static electricity, we first need to know a bit about the nature of matter. All matter is made up of atoms that consist of three types of smaller particles: negatively charged electrons, positively charged protons, and neutral neutrons. Normally, the electrons and protons in an atom balance out, which is why most matter you come across is electrically neutral. But electrons are tiny and almost insignificant in mass, and rubbing or friction can give loosely bound electrons enough energy to leave their atoms and attach to others, migrating between different surfaces. When this happens, the first object is left with more protons than electrons and becomes positively charged, while the one with more electrons accumulates a negative charge. This situation is called a charge imbalance, or net charge separation. But nature tends towards balance, so when one of these newly charged bodies comes into contact with another material, the mobile electrons will take the first chance they get to go where they're most needed, either jumping off the negatively charged object, or jumping onto the positively charged one in an attempt to restore the neutral charge equilibrium. And this quick movement of electrons, called static discharge, is what we recognize as that sudden spark. This process doesn't happen with just any objects. Otherwise you'd be getting zapped all the time. Conductors like metals and salt water tend to have loosely bound outer electrons, which can easily flow between molecules. On the other hand, insulators like plastics, rubber and glass have tightly bound electrons that won't readily jump to other atoms. Static build-up is most likely to occur when one of the materials involved is an insulator. When you walk across a rug, electrons from your body will rub off onto it, while the rug's insulating wool will resist losing its own electrons. Although your body and the rug together are still electrically neutral, there is now a charge polarization between the two. And when you reach to touch the door knob, zap! The metal door knob's loosely bound electrons hop to your hand to replace the electrons your body has lost. When it happens in your bedroom, it's a minor nuisance. But in the great outdoors, static electricity can be a terrifying, destructive force of nature. In certain conditions, charge separation will occur in clouds. We don't know exactly how this happens. It may have to do with the circulation of water droplets and ice particles within them. Regardless, the charge imbalance is neutralized by being released towards another body, such as a building, the Earth, or another cloud in a giant spark that we know as lightning. And just as your fingers can be zapped over and over in the same spot, you better believe that lightning can strike the same place more than once.

**P207 2015-03-24 The science of static electricity - Anuradha Bhagwat**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=207)

翻译人员: Yan Peng 校对人员: Annie Peng任何时候，毫无预警地，你就会被电到。你可能正走过一个软软的地毯，刚要伸手摸门把手然后突然......啪！为了理解静电，我们首先需要理解物质的一些性质。所有物质都是由原子组成的，原子又是由三种更小的粒子组成的：带负电的电子，带正电的质子，以及中性的中子。一般来说，一个原子中的电子数和质子数相平衡，这就是为什么大部分你接触过的物质都是电中性的。但是电子很小，质量几乎可以忽略，摩擦能使受到束缚较小的电子得到足够的能量，从而离开从属的原子 ，转移到其他原子上，在不同物体表面迁移。此时，第一个物体剩下的电子就比质子少了，从而变成了带正电；相对应地，拥有更多电子的物体就积累成了带负电。这种情况称为电荷失衡，或者净电荷分离。但是大自然趋向于平衡，所以当一个新产生的带电物体接触到另一个物质，这些游离的电子就会立即跑到最需要它们的地方，不是从带负电的物体上瞬间溜走，就是一拥而上到带正电的物体上试图恢复电中性的平衡状态。这种电子的快速移动被称为静电放电，这就是我们感受到的突然的触电。并不是任何物体都会静电放电。否则你会经常被电到。像金属和盐水一样的导体往往带有受到束缚较弱的外层电子这些电子能够轻易在分子间流动。另一方面，像塑料、橡皮和玻璃一样的绝缘体它们具有紧密结合的电子，所以不容易跑到其他原子上。静电积聚最容易发生在其中一种物质是绝缘体的情况下。当你走过一个地毯，你体内的电子就会通过摩擦转移到地毯上，然而，绝缘的毛地毯不会失去自己的电子。尽管你的身体和地毯的总和是电中性的，现在却在两者之间产生了电荷的极化。然后当你要摸门把手的时候，啪！金属门把上受束缚较弱的电子涌到你的手上来填补你体内丢失的电子。当静电放电发生在你的卧室，这还是小问题。但是在广阔的室外，静电可以变成大自然可怕的、具有破坏性的力量。在某种条件下，电荷分离会发生在云层里。我们不知道具体这是如何发生的。这可能和水滴的循环移动以及它们中的冰粒子有关。不管怎样，电荷失衡会通过对另一个物体放电从而达到中和，比如通过一个建筑，通过地球，或者另一个云，此时产生的巨大的电火花就是我们熟知的闪电就像你的手指的同一个地方可以一次又一次被电到，你最好相信闪电也可以在同一个地方闪好多次。

**P208 2015-03-26 How do geckos defy gravity - Eleanor Nelsen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=208)

It's midnight and all is still, except for the soft skittering of a gecko hunting a spider. Geckos seem to defy gravity, scaling vertical surfaces and walking upside down without claws, adhesive glues or super-powered spiderwebs. Instead, they take advantage of a simple principle: that positive and negative charges attract. That attraction binds together compounds, like table salt, which is made of positively charged sodium ions stuck to negatively charged chloride ions. But a gecko's feet aren't charged and neither are the surfaces they're walking on. So, what makes them stick? The answer lies in a clever combination of intermolecular forces and stuctural engineering. All the elements in the periodic table have a different affinity for electrons. Elements like oxygen and fluorine really, really want electrons, while elements like hydrogen and lithium don't attract them as strongly. An atom's relative greed for electrons is called its electronegativity. Electrons are moving around all the time and can easily relocate to wherever they're wanted most. So when there are atoms with different electronegativities in the same molecule, the molecules cloud of electrons gets pulled towards the more electronegative atom. That creates a thin spot in the electron cloud where positive charge from the atomic nuclei shines through, as well as a negatively charged lump of electrons somewhere else. So the molecule itself isn't charged, but it does have positively and negatively charged patches. These patchy charges can attract neighboring molecules to each other. They'll line up so that the positive spots on one are next to the negative spots on the other. There doesn't even have to be a strongly electronegative atom to create these attractive forces. Electrons are always on the move, and sometimes they pile up temporarily in one spot. That flicker of charge is enough to attract molecules to each other. Such interactions between uncharged molecules are called van der Waals forces. They're not as strong as the interactions between charged particles, but if you have enough of them, they can really add up. That's the gecko's secret. Gecko toes are padded with flexible ridges. Those ridges are covered in tiny hair-like structures, much thinner than human hair, called setae. And each of the setae is covered in even tinier bristles called spatulae. Their tiny spatula-like shape is perfect for what the gecko needs them to do: stick and release on command. When the gecko unfurls its flexible toes onto the ceiling, the spatulae hit at the perfect angle for the van der Waals force to engage. The spatulae flatten, creating lots of surface area for their positively and negatively charged patches to find complimentary patches on the ceiling. Each spatula only contributes a minuscule amount of that van der Waals stickiness. But a gecko has about two billion of them, creating enough combined force to support its weight. In fact, the whole gecko could dangle from a single one of its toes. That super stickiness can be broken, though, by changing the angle just a little bit. So, the gecko can peel its foot back off, scurrying towards a meal or away from a predator. This strategy, using a forest of specially shaped bristles to maximize the van der Waals forces between ordinary molecules has inspired man-made materials designed to imitate the gecko's amazing adhesive ability. Artificial versions aren't as strong as gecko toes quite yet, but they're good enough to allow a full-grown man to climb 25 feet up a glass wall. In fact, our gecko's prey is also using van der Waals forces to stick to the ceiling. So, the gecko peels up its toes and the chase is back on.

**P208 2015-03-26 How do geckos defy gravity - Eleanor Nelsen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=208)

翻译人员: Rebecca Wang 校对人员: Jenny Yang在午夜，一切都静止着，除了捕捉蜘蛛的壁虎飞掠发出的轻微的声音。壁虎看似是无视地心引力的，爬上垂直的表面不用爪子也能倒着爬，像有强力胶或超强蜘蛛网。取而代之的是， 它们利用了一个简单的原理：正负电荷相吸。吸引力把化合物绑在一起，就像食盐是由正电钠离子和负电氯离子黏在一起组成的。但壁虎的脚不带电，它们爬行的表面也不带电。那么，是什么使它们粘在一起呢？答案是分子之间的作用力与结构工程的巧妙结合。元素周期表中的所有元素对电子都有不同的亲和力。像氧、氟这样的元素真的真的很想要电子，电子对氢、锂这样的元素 就没有那么强的吸引力。一个原子对于电子的相对贪欲叫做负电性。电子在不停地运动而且可以移到它们最被需要的地方。所以当一个分子内的原子带有不同的负电性时，分子的一团电子会被拉向负电性最强的原子。这样一个电子云中的薄薄的小点就产生了，原子核的正电穿过这个点，带负电的电子也在别的地方聚集。这个分子本身并不带电，它只是有带正电和负电的区域。这些区域性电荷会吸引周围的分子。它们会连成一条线， 让一个分子的正点区域挨着另一个分子的负电区域。甚至根本不需要强负电的原子去创造这些吸引力。电子在不停地运动，有些时候它们暂时堆积在一个点。那一瞬间的电荷足以让分子互相吸引。这种不带电分子的相互运动被叫做范德华力（Van Der Waals Forces）。他们没有带电分子间的作用力那么强，但是如果有足够的量， 它们的积累也能十分可观。这就是壁虎的秘密。壁虎的脚趾上有易弯曲的凸起。这些凸起的表面被头发般的细小结构覆盖着，这些人类的头发还要细得多的结构叫刚毛（setae）。这些刚毛被更小的多叫做匙突(spatulae)的结构覆蓋。这些小铲子似的形状完美对地承担了壁虎的需求：在命令下粘牢和释放。当壁虎在天花板上展开它的柔韧的脚趾时，匙突与墙壁会形成能产生范德华力的完美角度。匙突变平，形成的很多表面积，使其正电和负电区在天花板上找到相对应的区域。每个匙突只有微乎其微的范德华力的黏力，但是一个壁虎有大约二十亿的匙突，这产生足够支持其体重的作用力，壁虎甚至可以整个吊在一根脚趾上。当然，如果角度有一丁点的改变，这些强大的粘力就会消失。所以，壁虎可以抬起它的脚，冲向一顿美餐或者逃离捕食者。这种用一丛丛特殊形状的刷毛让两个普通分子之间的范德华力最大化的策略启发了很多人造的，试图模仿壁虎超凡的黏合能力的材料。人造版本目前还不像壁虎的抓力那么强，但是它们已经不错了，可以让一个成年人有能力爬一个25英尺高的玻璃墙。事实上，壁虎的猎物也在用范德华力粘在天花板上。于是，壁虎抬起脚趾，一场追逐又开始了。

**P209 2015-03-27 Eye vs. camera - Michael Mauser**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=209)

Watch the center of this disk. You are getting sleepy. No, just kidding. I'm not going to hypnotize you. But are you starting to see colors in the rings? If so, your eyes are playing tricks on you. The disk was only ever black and white. You see, your eyes don't always capture the world as a video camera would. In fact, there are quite a few differences, owing to the anatomy of your eye and the processing that takes place in your brain and its outgrowth, the retina. Let's start with some similarities. Both have lenses to focus light and sensors to capture it, but even those things behave differently. The lens in a camera moves to stay focused on an object hurtling towards it, while the one in your eye responds by changing shape. Most camera lenses are also achromatic, meaning they focus both red and blue light to the same point. Your eye is different. When red light from an object is in focus, the blue light is out of focus. So why don't things look partially out of focus all the time? To answer that question, we first need to look at how your eye and the camera capture light: photoreceptors. The light-sensitive surface in a camera only has one kind of photoreceptor that is evenly distributed throughout the focusing surface. An array of red, green and blue filters on top of these photoreceptors causes them to respond selectively to long, medium and short wavelength light. Your eye's retinas, on the other hand, have several types of photoreceptors, usually three for normal light conditions, and only one type for lowlight, which is why we're color blind in the dark. In normal light, unlike the camera, we have no need for a color filter because our photoreceptors already respond selectively to different wavelengths of light. Also in contrast to a camera, your photoreceptors are unevenly distributed, with no receptors for dim light in the very center. This is why faint stars seem to disappear when you look directly at them. The center also has very few receptors that can detect blue light, which is why you don't notice the blurred blue image from earlier. However, you still perceive blue there because your brain fills it in from context. Also, the edges of our retinas have relatively few receptors for any wavelength light. So our visual acuity and ability to see color falls off rapidly from the center of our vision. There is also an area in our eyes called the blind spot where there are no photoreceptors of any kind. We don't notice a lack of vision there because once again, our brain fills in the gaps. In a very real sense, we see with our brains, not our eyes. And because our brains, including the retinas, are so involved in the process, we are susceptible to visual illusions. Here's another illusion caused by the eye itself. Does the center of this image look like it's jittering around? That's because your eye actually jiggles most of the time. If it didn't, your vision would eventually shut down because the nerves on the retina stop responding to a stationary image of constant intensity. And unlike a camera, you briefly stop seeing whenever you make a larger movement with your eyes. That's why you can't see your own eyes shift as you look from one to the other in a mirror. Video cameras can capture details our eyes miss, magnify distant objects and accurately record what they see. But our eyes are remarkably efficient adaptations, the result of hundreds of millions of years of coevolution with our brains. And so what if we don't always see the world exactly as it is. There's a certain joy to be found watching stationary leaves waving on an illusive breeze, and maybe even an evolutionary advantage. But that's a lesson for another day.

**P209 2015-03-27 Eye vs. camera - Michael Mauser**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=209)

翻译人员: Doris Swiftie 校对人员: Cissy Yun盯着这个圆盘的中心看你会感到昏昏欲睡没有啦，开玩笑的我不准备去催眠你但是你开始看见这些环中间的颜色了吗？如果是的话，你的眼睛在欺骗你这个圆盘一直以来就是黑白的你看，你的眼睛不总是像摄影机那样 捕捉这个世界的实际上，它们之间有不少的区别在于眼睛的结构在大脑中发生的处理过程还有它的副产物，视网膜让我们从一些相似点开始说起两者都有用于聚光的透镜和捕捉光的传感器但是它们也会表现的不一样摄像机中的透镜移动 去聚焦一个向它急速运动的物体然而，眼睛中的透镜（水晶体） 会对于形状的改变有所反应大部分摄像头的镜头是无色的所以它们将红蓝光都聚焦在同一个点你的眼睛则不一样当一个物体上的红光被聚焦了，蓝光就不受聚焦了为什么事物不是永久的，部分不受聚焦呢？为了回答这个问题我们先需要看一下你的眼睛和摄像头分别是如何捕捉光的感光器在一个摄像头内，感光表面只有一种平均分布于聚焦表面的感光器一束结合了红，绿，蓝的光束 在感光器上被过滤造成它们有选择性地对长，中，短波长的光 作出反应你眼睛的视网膜则有多种感光器通常有三种用于常光条件，只有一种用于低光这也是为什么我们在黑暗中会色盲在常光中，不像摄像头， 我们的眼睛不需要一个颜色过滤器因为我们的感光器 已经选择性地对不同波长的光作出了反应摄像头相反的还有你的感光器是不平均地分布的在中心，不存在接收暗光的感光器器这也是为什么晕星在当你直视它们的时候 似乎消失了中心有少数可以探测蓝光的接收器这也是为什么你不会注意到早前模糊的蓝光然而，你仍旧会感知到蓝色因为你的脑子将它从环境中填进同时，我们视网膜的边缘也有较少的针对任何波长光的接收器所以我们对看见颜色的灵敏度和能力从我们视觉中心快速地下降在我们的眼睛中 还有一个叫做盲点的区域那里没有任何的感光器在那，我们无法察觉到视力的缺乏因为，我们的大脑再一次地填充的之间的空白就此而言，我们用我们的大脑看，并不是眼睛而且因为大脑，包括视网膜在这个过程中涉入了太多，我们是易受视觉错觉影响的这是另一个由眼睛自身产生的错觉这个图像的中心看起来像是在抖动吗？这是因为眼睛其实在大多数时间都在抖动如果你看到的不是这样，说明你的视力会最终消失因为视网膜上的神经会停止向 一个有着恒定强度的静止图像作出反应不像摄像头，当你用你的眼睛做出一个很大的移动时，你的视力会短暂的消失这就是为什么 在镜子中你无法看到自己眼球的移动摄像机可以捕捉我们眼睛所错过的细节可以放大远处物体并精确地纪录它们所见但是我们的眼睛有着十分有效的适应能力这是经过了上亿年与大脑共同进化的结果我们不能总是精准地看这个世界， 但又怎样呢？看着静止的树叶在错觉形成的风中飘动也是很有趣的这甚至也许是一个进化的优势但是这就改日在谈了

**P210 2015-03-27 The effects of underwater pressure on the body - Neosha S Kashef**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=210)

Sometimes when a fish is reeled up to the surface it will appear inflated, with its eyes bulging out of their sockets and its stomach projecting out of its mouth, as if its been blown up like a balloon. This type of bodily damage, caused by rapid changes in pressure, is called barotrauma. Under the sea, pressure increases by 14.7 pounds per square inch for every 33 foot increase in depth. So, take the yelloweye rockfish, which can live as deep as 1800 feet, where there's over 800 pounds of pressure on every square inch. That's equivalent to the weight of a polar bear balancing on a quarter. Now, Boyle's gas law states that the volume of a gas is inversely related to pressure. So, any air-filled spaces, like a rockfish's swim bladder, or human lungs, will compress as they descend deeper and expand as they ascend. After a fish bites a fisherman's hook and is quickly reeled up to the surface, the air in its swim bladder begins to expand. Its rapid expansion actually forces the fish's stomach out of its mouth, while the increased internal pressure pushes its eyes out of their sockets, a condition called exophthalmia. Sometimes rockfish eyes will even have a crystallized appearance from corneal emphysemas, little gas bubbles that build up inside the cornea. Thankfully, a scuba diver doesn't have a closed swim bladder to worry about. A diver can regulate pressure in her lungs by breathing out as she ascends, but must be wary of other laws of physics that are at play under the sea. Henry's law states that the amount of a gas that dissolves in a liquid is proportional to its partial pressure. The air a diver breathes is 78% nitrogen. At a higher pressure under the sea, the nitrogen from the air in a scuba tank diffuses into a diver's tissues in greater concentrations than it would on land. If the diver ascends too quickly, this built up nitrogen can come out of solution and form microbubbles in her tissues, blood and joints, causing decompression sickness, aka the bends. This is similar to the fizz of carbon dioxide coming out of your soda. Gas comes out of solution when the pressure's released. But for a diver, the bubbles cause severe pain and sometimes even death. Divers avoid falling victim to the bends by rising slowly and taking breaks along the way, called decompression stops, so the gas has time to diffuse back out of their tissues and to be released through their breath. Just as a diver needs decompression, for a fish to recover, it needs recompression, which can be accomplished by putting it back in the sea. But that doesn't mean that fish should just be tossed overboard. An inflated body will float and get scooped up by a hungry sea lion or pecked at by seagulls. There's a common myth that piercing its stomach with a needle will let air escape, allowing the fish to swim back down on its own. But that is one balloon that shouldn't be popped. To return a fish properly to its habitat, fisherman can use a descending device instead to lower it on a fishing line and release it at the right depth. As it heads home and recompression reduces gas volume, its eyes can return to their sockets and heal, and its stomach can move back into place. This fish will live to see another day, once more free to swim, eat, reproduce and replenish the population.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=210)

翻译人员: Ruoxin Zheng 校对人员: Gabriella Hu当一条鱼从深海被钓上来的时候，它看起来像膨胀了一样。不仅眼睛会从眼眶里突出来，胃也会从嘴巴里出来，就像一个被吹鼓的气球。这些症状通常是因气压快速变化而产生，称作气压伤。在水下，每下潜33英尺（约10米），每平方英寸的压力就会增加14.7磅。拿黄眼石斑鱼举例，它可以生活 在1800英尺（约550米）的水下，这里的压强可以达到800磅每平方英寸，相当于一只北极熊站在一枚硬币上。波义耳定律描述的是气体的规律，它讲的是气体体积与其压强成反比。所以像石斑鱼的鱼鳔 或人类的肺部，这类充满气体的器官，在个体下潜的时候会被压缩，而上浮的时候会随之膨胀。所以当鱼上钩并且快速浮向水面的时候，鱼鳔内的空气会随之膨胀。快速的膨胀会将它的胃部从口腔推出，同时，持续增长的内部压强 会将眼睛顶出眼眶，医学上称之为突眼。有时石斑鱼的角膜还会气肿，在角膜内部生出许多小气泡，这使得眼睛看起来很像结晶。幸好潜水员们没有鱼鳔， 自然不用担心这种问题。在潜水员上升时， 她可以通过呼气来调节肺部的气压。但仍要考虑其他在深海中 会发挥作用的物理定律。亨利定律说，气体在液体中的溶解度…是与它的分压成比例的。潜水员呼吸的气体有78%是氮气。在深海高压的环境下，这时从氧气筒吸入的氮气……在体内的溶解度比在陆地时高。如果潜水员上浮速度过快，溶于体内的氮气会从溶液中跑出，并在组织、血液和关节处形成微小的气泡。从而造成减压病， 英文俗称为“the bends”。就像打开可乐会冒泡一样，气压降低， 液体中的气体就会被释放出来。但对潜水员而言， 这些气泡会带来剧烈的疼痛，有时甚至会造成死亡。他们通过减缓上浮速度 来预防患上减压病，又或者在上浮的过程中稍作休息， 即减压停留。因此，气体有足够的时间 扩散出组织，并通过呼吸排出。就像潜水员需要减压一样，鱼类需要再增压才能够康复。简单的办法就是把它们送回大海。但这并不意味着 直接把它们扔回海里，膨胀的鱼会漂浮于水面，从而被海鸥，海豹等天敌吃掉。大家还有一个常识性的误区，就是用针扎破鱼的胃部来放气，能使鱼可以自己游回栖息地。但这个气囊可万万不该戳破。要将鱼放回家园，捕鱼人可以用一个缓降器，用鱼线将鱼下放到合适的深度后再放生。在鱼回家时， 再增压使鱼体内气体的体积减少。眼睛会回到眼眶内， 突眼症痊愈，胃部也会回到原位。这条鱼将能再见到第二天的太阳，并能自由地游泳、吃喝与繁衍下去。

**P211 2015-03-27 What causes bad breath - Mel Rosenberg**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=211)

There is a curse that has plagued humanity since ancient times. The Greeks fought it by chewing aromatic resins, while the Chinese resorted to egg shells. In the ancient Jewish Talmud, it's even considered legal grounds for divorce. This horrible scourge is halitosis, otherwise known as bad breath. But what causes it, and why is it so universally terrifying? Well, think of some of the worst odors you can imagine, like garbage, feces or rotting meat. All of these smells come from the activity of microorganisms, particularly bacteria, and, as disgusting as it may sound, similar bacteria live in the moisture-rich environment of your mouth. Don't panic. The presence of bacteria in your body is not only normal, it's actually vital for all sorts of things, like digestion and disease prevention. But like all living things, bacteria need to eat. The bacteria in your mouth feed off of mucus, food remnants, and dead tissue cells. In order to absorb nutrients through their cell membranes, they must break down the organic matter into much smaller molecules. For example, they'll break proteins into their component amino acids and then break those down even further into various compounds. Some of the foul-smelling byproducts of these reactions, such as hydrogen sulfide and cadaverine, escape into the air and waft their way towards unsuspecting noses. Our sensitivity to these odors and interpretation of them as bad smells may be an evolutionary mechanism warning us of rotten food and the presence of disease. Smell is one of our most intimate and primal senses, playing a huge role in our attraction to potential mates. In one poll, 59% of men and 70% of women said they wouldn't go on a date with someone who has bad breath, which may be why Americans alone spend $1 billion a year on various breath products. Fortunately, most bad breath is easily treated. The worst smelling byproducts come from gram-negative bacteria that live in the spaces between gums and teeth and on the back of the tongue. By brushing and flossing our teeth, using antibacterial mouthwash at bedtime, gently cleaning the back of the tongue with a plastic scraper and even just eating a healthy breakfast, we can remove many of these bacteria and their food sources. In some cases, these measures may not be enough due to dental problems, nasal conditions, or rarer ailments, such as liver disease and uncontrolled diabetes. Behaviors like smoking and excessive alcohol consumption also have a very recognizable odor. Regardless of cause, the bad smell almost always originates in the mouth and not the stomach or elsewhere in the body. But one of the biggest challenges lies in actually determining how our breath smells in the first place, and it's unclear why. It may be that we're too acclimatized to the smell inside our own mouths to judge it. And methods like cupping your hands over your mouth, or licking and smelling your wrist don't work perfectly either. One study showed that even when people do this, they tend to rate the smell subjectively according to how bad they thought it was going to be. But there's one simple, if socially difficult, way of finding out how your breath smells: just take a deep breath and ask a friend.

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翻译人员: Kristie Leung 校对人员: Claire Zhang自古以来，人类一直被一个咀咒缠绕。古希腊人以咀嚼有芳香的树脂对抗它，而中国人则依靠蛋壳。在古犹太教的《塔木德》文献，它甚至是合法离婚的一个条件。这个可怕的灾祸就是口臭。但它是怎么样来的？为什么它被所有人害怕着呢？那么想像一下世界上你觉得最臭的气味，例如垃圾、粪便或者腐烂的肉。所有的这些气味来自微生物的活动，特别是细菌，虽然听起来不能再恶心，跟那些相似的细菌正住在你湿润的口腔里。不要慌张。你身体里有细菌不但是再正常不过的事，它们其实在很多方面上都必不可缺，比如消化和预防疾病。但跟其他生物一样，细菌也需要食物。在你口里的细菌以吃黏液、食物残渣和死的组织细胞生存。为了从细胞膜吸收养分，它们必须将有机物质变成小一点的分子。例如，它们会把蛋白质打碎成它的要素胺基酸，然后再把它们变成更小的其他化合物。有些从这个反应产生的臭的副产品，像硫化氢和尸胺，逃被释放到大气里然后飘到没有毫无防备预备的鼻子里。我们对这些味道的敏感度和辨别为臭味的举动可能是一种进化的途径来警告我们有腐烂的食物和疾病。气味是我们其中一个最本质和原始的感官，而它是未来伴侣的吸引中非常重要。投票显示，59%的男人和70%的女人说他们不会跟一个有口臭的人约会，那这就可以解释为什么美国人民可以用上一亿美元来买不同的口臭产品。幸运的是，大部分的口臭都能容易地解决。最臭的副产品来自格兰仕阴性的细菌，它们住在牙床和牙齿之间的空隙和舌头的底下。刷牙和用牙线清洁牙齿、睡觉前用抗菌的嗽口水、用塑胶刮片轻轻地清洁舌头的底下和甚至只吃一个健康的早餐，我们可以除去很多这种细菌和它们的食物来源在某些情况，这些措施可能还不够因为牙齿问题、鼻子的情况或者旱见的病，像肝病和没被控制的糖尿病。生活习惯，例如吸烟和酗酒都会有一股非常容易分辨的气味。无论什么原因，臭味差不多都是来自于口腔而不是胃或身体的其他部分。可是其中一个最大的挑战就在实际决定我们的口气怎样变臭，还有为什么。可能我们对自己口里的气味太习惯了所以才不能判断。方法像把手盖在口上，或者舔然后闻你的手腕都不怎么有效。研究显示即使人们这样做，它们倾向于主观地根据他们自己想像中气味来评价那气味但是有一种简单的，但是在社交场合中很困难的方法来知道你的口气闻起来怎样：只要深呼吸然后问你的朋友。

**P212 2015-03-31 What really happens to the plastic you throw away - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=212)

This is the story of three plastic bottles, empty and discarded. Their journeys are about to diverge with outcomes that impact nothing less than the fate of the planet. But they weren't always this way. To understand where these bottles end up, we must first explore their origins. The heroes of our story were conceived in this oil refinery. The plastic in their bodies was formed by chemically bonding oil and gas molecules together to make monomers. In turn, these monomers were bonded into long polymer chains to make plastic in the form of millions of pellets. Those were melted at manufacturing plants and reformed in molds to create the resilient material that makes up the triplets' bodies. Machines filled the bottles with sweet bubbily liquid and they were then wrapped, shipped, bought, opened, consumed and unceremoniously discarded. And now here they lie, poised at the edge of the unknown. Bottle one, like hundreds of millions of tons of his plastic brethren, ends up in a landfill. This huge dump expands each day as more trash comes in and continues to take up space. As plastics sit there being compressed amongst layers of other junk, rainwater flows through the waste and absorbs the water-soluble compounds it contains, and some of those are highly toxic. Together, they create a harmful stew called leachate, which can move into groundwater, soil and streams, poisoning ecosystems and harming wildlife. It can take bottle one an agonizing 1,000 years to decompose. Bottle two's journey is stranger but, unfortunately, no happier. He floats on a trickle that reaches a stream, a stream that flows into a river, and a river that reaches the ocean. After months lost at sea, he's slowly drawn into a massive vortex, where trash accumulates, a place known as the Great Pacific Garbage Patch. Here the ocean's currents have trapped millions of pieces of plastic debris. This is one of five plastic-filled gyres in the world's seas. Places where the pollutants turn the water into a cloudy plastic soup. Some animals, like seabirds, get entangled in the mess. They, and others, mistake the brightly colored plastic bits for food. Plastic makes them feel full when they're not, so they starve to death and pass the toxins from the plastic up the food chain. For example, it's eaten by lanternfish, the lanternfish are eaten by squid, the squid are eaten by tuna, and the tuna are eaten by us. And most plastics don't biodegrade, which means they're destined to break down into smaller and smaller pieces called micro plastics, which might rotate in the sea eternally. But bottle three is spared the cruel purgatories of his brothers. A truck brings him to a plant where he and his companions are squeezed flat and compressed into a block. Okay, this sounds pretty bad, too, but hang in there. It gets better. The blocks are shredded into tiny pieces, which are washed and melted, so they become the raw materials that can be used again. As if by magic, bottle three is now ready to be reborn as something completely new. For this bit of plastic with such humble origins, suddenly the sky is the limit.

**P212 2015-03-31 What really happens to the plastic you throw away - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=212)

翻译人员: anastasia huang 校对人员: Jessie JIN这是三个空废弃塑料瓶的故事它们即将分道扬镳，踏上各自的旅程，而且最终都将影响地球的命运。但故事不一定总是这样。想要了解这些瓶子将去向何方，我们必须先探究它们的来源。我们故事的主角在炼油厂诞生。形成它们身体的塑料是结合起来的油与汽的分子通过化学反应产生的单体所构成的。这些单体是由长长的聚合物链组成，以数百万的小球的形式形成塑料。这些单体在工厂里被加热融化，通过模具塑型，制造成弹性材料，用于生产这些塑料瓶。机器把甜汽水灌入瓶中，然后瓶子被包装成箱、运送发货、分销卖出、 再由消费者开瓶使用，最后被丢进垃圾桶。这就是它们现在的归宿，在未知世界的边缘蓄势待发。一号瓶子，同它亿万吨的塑料弟兄们一样，生命终结在垃圾填埋场。每天都有很多垃圾被丢到这里，于是这个巨大的垃圾堆就越来越大。塑料与其他的垃圾一层层累积，当雨水流经这些垃圾时，会吸收其中的水溶性化合物，而某些化合物是剧毒的。它们聚集在一起，形成有害的“垃圾渗滤液”，这种“垃圾渗滤液”可以进入地下水、土壤、河流，毒害生态系统和野生动物。一号瓶子大概要一千多年才能分解。二号瓶子的旅途则比较奇特。 但是，这场奇特的旅途并不愉快。它漂浮在山涧，山涧汇入小溪，小溪流向小河，小河流向了海洋，在漂浮于海洋数月后，它缓慢卷入了一个巨大的垃圾漩涡，那个地方叫作“太平洋垃圾带”。海洋涡流困住了无数垃圾碎片，这是世界上五大海洋垃圾漩涡之一。在这些地方，污染物把海水变成了浑浊的塑料汤。一些动物，比如海鸟，不小心陷入这里无法自救。还有其他动物，误将鲜艳的塑料当做食物。于是，即使不吃东西也不会有饥饿感，然后它们就饿死了，并把这些来自塑料的有毒物质带入了食物链。举个例子，那些物质被小灯笼鱼吃了，灯笼鱼又被乌贼吃了，乌贼又被金枪鱼吃了，金枪鱼被我们吃了。大多数塑料是无法生物降解的，这也就意味着，它们只会分解成越来越小的碎片，这种碎片叫做“微塑料”，它们可能会在海中循环，永远地留在海里。而三号瓶子却幸免于它兄弟们遭遇的炼狱。一辆卡车将它带到工厂,在这里，它和小伙伴们被压平，之后再被压缩成块。嗯，这听起来也很糟糕，但是不要着急，情况会有转机的。那些压缩块被切成小片，经过洗涤、熔化，又变成了可以利用的材料。奇迹般地，三号瓶子做好了准备，即将摇身一变，成为某样全新的物品。于是，看起来十分普通的塑料，也能够大放异彩了。

**P213 2015-04-06 How brass instruments work - Al Cannon**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=213)

What gives the trumpet its clarion ring and the tuba its gut-shaking "omm pah pah?" And what makes the trombone so jazzy? The answer lies not in the brass these instruments are made of, but in the journey air takes from the musician's lungs to the instrument's bell. Like any sound, music consists of vibrations traveling through air. Instruments are classified based on how those vibrations are produced. Percussion instruments are struck. String instruments are plucked or bowed. Woodwinds have air blown against a reed or sharp edge. For brass instruments, however, the vibration come directly from the musician's mouth. One of the first things a brass player must learn is to breathe in deeply, until every possible particle of air is crammed into the lungs. Once all that air is inside, it must come out through the mouth, but there, an internal battle takes place as the musician simultaneously tries to hold their lips firmly closed while blowing enough air to force them open. The escaping air meets resistance from the lip muscles, forms an opening called the aperture and creates the vibration that brass players call "the buzz." When a mouthpiece is held up to those vibrating lips, it slightly refines the buzz, amplifying the vibration at certain frequencies. But things get really interesting depending on what instrument is attached to that mouthpiece. A brass instrument's body is essentially a tube that resonates with the air column blowing through it. The way that sound waves travel through this column forms a limited pattern of pitches known as the harmonic series, with notes spaced far apart at the lower end, but coming closer together as the pitch increases. The musician can alter the pitch of the note through slight contractions of the lips and alterations to air volume and speed. Slower, warm sighing air produces lower pitches, and faster, cool, flowing air produces higher pitches in the series. But any single harmonic series has gaps where pitches are missing and the versatility of brass instruments lies in their ability to switch between multiple series. On instruments like the trumpet, valves can be lowered to increase the length of tubing the air travels through, while on a trombone, this is done by extending its slide. Lengthening the tube stretches the vibrating air column, reducing the frequency of vibrations and resulting in a lower pitch. This is why the tuba, the largest brass instrument, is also the one capable of playing the lowest notes. So changing the instrument length shifts its harmonic series, while slight variations of the air flow and the player's lips produce the different notes within it. And those notes finally emerge through the flared bell opening at the end. What started as a deep breath and a vibrating buzz on the lips has now been transformed into a bold and brassy tune. The musician's skillful manipulation of every part of the process from lungs, to lips, to the mouthpiece, to the instrument itself creates an amazing palette of pitches that can be heard in musical genres across the globe. By harnessing the power of natural resonance in a flexible and controllable way, brass instruments are great examples of the fusion of human creativity with the physics of our world.

**P213 2015-04-06 How brass instruments work - Al Cannon**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=213)

翻译人员: zac bleu 校对人员: Jenny Yang是什么赋予小号清澈的声音？是什么让大号发出荡气回肠的蓬叭叭又是什么赋予长号爵士风？答案并不在于它们的材质——铜而在于空气从音乐家肺部到乐器的旅程跟所有声音一样，音乐依靠空气震动来传播乐器是震动产生方式的不同而分类的就像打击乐靠敲击弦乐器靠弹拉木管乐器靠吹奏而对于铜管乐器来说演奏者的嘴巴才是震动的直接来源铜管乐器演奏家要学的第一件事就是深呼吸尽可能地把每一口气都吸进肺里吸满以后再吐出来于是，内部斗争就开始了音乐家在紧闭嘴唇的同时必须鼓足能够迫使它们打开的空气溢出的空气遇上了来自嘴唇的阻力从而形成空穴就能产生铜管演奏家所说的共鸣当乐器衔口紧贴颤动的嘴唇时便能提炼出共鸣特定频率的震动被放大真正有趣的是不同的乐器和嘴连接后产生的不同效果铜管乐器的其实就是一段能与空气柱共振的管体声波穿过这段柱体形成有限的一组固定样式的音调叫做泛音这些音符在低音区分得很开但当音调升高时音符就变得紧凑起来通过轻微收缩嘴唇，改变空气的体积和流速音乐家就可以改变音符的音高缓慢，柔和的呼气产生低音快速，冰冷，涌动的空气形成一系列高音但任何简单的泛音都会因音调的缺失而产生缺口所以铜管乐器的多功能性得依靠它们在多重演奏中的转换能力像在小号那样的乐器上，活塞可以变低增加空气流过管体的距离而在长号上则通过拉动滑管来完成拉动滑来管延伸空气柱的波长来降低振动频率产生低音这就是大型铜管乐器能够演奏重低音的原因所以调节乐器长度改变泛音流动的空气就会在演奏者的嘴唇产生微妙的变化不同的音符便随之舞蹈从喇叭口跃出，浮现在你的耳畔深呼吸，在唇间发出的震动变化身成了雄伟奔放的曲调音乐家们对每一步都能够得心应手从肺部到嘴唇再到乐器衔口造就了乐器本身能让全世界各流派音乐家为之感到惊艳的音调调节能力通过一种可调可控的方式对自然共振能量的驾驭铜管乐器成为了人的创造力和物理世界规则融合的一个很好的例证

**P214 2015-04-06 Why are manhole covers round - Marc Chamberland**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=214)

Why are most manhole covers round? Sure, it makes them easy to roll and slide into place in any alignment but there's another more compelling reason involving a peculiar geometric property of circles and other shapes. Imagine a square separating two parallel lines. As it rotates, the lines first push apart, then come back together. But try this with a circle and the lines stay exactly the same distance apart, the diameter of the circle. This makes the circle unlike the square, a mathematical shape called a curve of constant width. Another shape with this property is the Reuleaux triangle. To create one, start with an equilateral triangle, then make one of the vertices the center of a circle that touches the other two. Draw two more circles in the same way, centered on the other two vertices, and there it is, in the space where they all overlap. Because Reuleaux triangles can rotate between parallel lines without changing their distance, they can work as wheels, provided a little creative engineering. And if you rotate one while rolling its midpoint in a nearly circular path, its perimeter traces out a square with rounded corners, allowing triangular drill bits to carve out square holes. Any polygon with an odd number of sides can be used to generate a curve of constant width using the same method we applied earlier, though there are many others that aren't made in this way. For example, if you roll any curve of constant width around another, you'll make a third one. This collection of pointy curves fascinates mathematicians. They've given us Barbier's theorem, which says that the perimeter of any curve of constant width, not just a circle, equals pi times the diameter. Another theorem tells us that if you had a bunch of curves of constant width with the same width, they would all have the same perimeter, but the Reuleaux triangle would have the smallest area. The circle, which is effectively a Reuleaux polygon with an infinite number of sides, has the largest. In three dimensions, we can make surfaces of constant width, like the Reuleaux tetrahedron, formed by taking a tetrahedron, expanding a sphere from each vertex until it touches the opposite vertices, and throwing everything away except the region where they overlap. Surfaces of constant width maintain a constant distance between two parallel planes. So you could throw a bunch of Reuleaux tetrahedra on the floor, and slide a board across them as smoothly as if they were marbles. Now back to manhole covers. A square manhole cover's short edge could line up with the wider part of the hole and fall right in. But a curve of constant width won't fall in any orientation. Usually they're circular, but keep your eyes open, and you just might come across a Reuleaux triangle manhole.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=214)

翻译人员: Cissy Yun 校对人员: Jenny Yang为什么大多数井盖是圆的?当然，这使它们容易滚动和滑入任何对齐的位置；但是还有其它的更令人信服的原因涉及圆和其他形状的一种特殊的几何属性想象一个正方形分开两条平行线，当它旋转时，线先是推动分开，然后复位但是用圆来做尝试线间保持完全相同的距离--为圆的直径这使得圆不同于正方形，是一种称作定宽曲线的数学形态另外一种拥有此性质的形状是鲁洛三角形第一步创建一个等边三角形，然后以其中一个顶点为圆心，过其余两个顶点作圆分别以其余两个顶点为圆心，按同样的方式作出另外的两个圆，它们的重叠区域为鲁洛三角因为鲁洛三角形可以在平行线间旋转，且不改变线的间距，它们可以作为轮子，只要一点创造性的工程如果你旋转它同时使它的中心在一个近圆形的路径上转动，它的周界轨迹为一个圆角正方形，这使三角形的钻头能够剜出方形的孔任何有奇数条边的多边形都可以被用来生成等定宽曲线，使用与我们之前应用的同样的方法不过，还有其他的一些(定宽曲线)并不是用这种方式生成的例如，如果你使任一定宽曲线绕另一定宽曲线转动，你将生成第三个定宽曲线这组有尖头的曲线使数学家着迷他们给出了巴比尔定理，-- 任何定宽曲线的周长，不仅仅是圆，等于 π \* 直径。另外一个定理告诉我们：如果你有一群定宽曲线，宽度相同，他们会有同样的周长，但是鲁洛三角形会有最小的面积；圆是一个有效的鲁洛正多边形，有无数条的边，有最大的面积在三维空间，我们可以生成定宽面，比如鲁洛四面体，由把一个四面体，分别从每个顶点扩展一个触及相对顶点的球面，去除重叠部位以外的区域。定宽面使两平面间保持恒定的距离所以你可以在地上扔一堆鲁洛四面体，就像它们是弹珠一样平滑地滑板通过它们现在回到井盖方形井盖的短边会与洞孔较宽的部分对齐，掉进去但定宽曲线(该形状的井盖)不会从任何方向掉进去它们通常是圆形的，但是留意身边，你可能会无意中发现一个鲁洛三角形的检修孔

**P215 2015-04-10 What's the difference between accuracy and precision - Matt Anticole**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=215)

As the story goes, the legendary marksman William Tell was forced into a cruel challenge by a corrupt lord. William's son was to be executed unless William could shoot an apple off his head. William succeeded, but let's imagine two variations on the tale. In the first variation, the lord hires a bandit to steal William's trusty crossbow, so he is forced to borrow an inferior one from a peasant. However, the borrowed crossbow isn't adjusted perfectly, and William finds that his practice shots cluster in a tight spread beneath the bullseye. Fortunately, he has time to correct for it before it's too late. Variation two: William begins to doubt his skills in the long hours before the challenge and his hand develops a tremor. His practice shots still cluster around the apple but in a random pattern. Occasionally, he hits the apple, but with the wobble, there is no guarantee of a bullseye. He must settle his nervous hand and restore the certainty in his aim to save his son. At the heart of these variations are two terms often used interchangeably: accuracy and precision. The distinction between the two is actually critical for many scientific endeavours. Accuracy involves how close you come to the correct result. Your accuracy improves with tools that are calibrated correctly and that you're well-trained on. Precision, on the other hand, is how consistently you can get that result using the same method. Your precision improves with more finely incremented tools that require less estimation. The story of the stolen crossbow was one of precision without accuracy. William got the same wrong result each time he fired. The variation with the shaky hand was one of accuracy without precision. William's bolts clustered around the correct result, but without certainty of a bullseye for any given shot. You can probably get away with low accuracy or low precision in everyday tasks. But engineers and researchers often require accuracy on microscopic levels with a high certainty of being right every time. Factories and labs increase precision through better equipment and more detailed procedures. These improvements can be expensive, so managers must decide what the acceptable uncertainty for each project is. However, investments in precision can take us beyond what was previously possible, even as far as Mars. It may surprise you that NASA does not know exactly where their probes are going to touch down on another planet. Predicting where they will land requires extensive calculations fed by measurements that don't always have a precise answer. How does the Martian atmosphere's density change at different elevations? What angle will the probe hit the atmosphere at? What will be the speed of the probe upon entry? Computer simulators run thousands of different landing scenarios, mixing and matching values for all of the variables. Weighing all the possibilities, the computer spits out the potential area of impact in the form of a landing ellipse. In 1976, the landing ellipse for the Mars Viking Lander was 62 x 174 miles, nearly the area of New Jersey. With such a limitation, NASA had to ignore many interesting but risky landing areas. Since then, new information about the Martian atmosphere, improved spacecraft technology, and more powerful computer simulations have drastically reduced uncertainty. In 2012, the landing ellipse for the Curiosity Lander was only 4 miles wide by 12 miles long, an area more than 200 times smaller than Viking's. This allowed NASA to target a specific spot in Gale Crater, a previously un-landable area of high scientific interest. While we ultimately strive for accuracy, precision reflects our certainty of reliably achieving it. With these two principles in mind, we can shoot for the stars and be confident of hitting them every time.

**P215 2015-04-10 What's the difference between accuracy and precision - Matt Anticole**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=215)

翻译人员: Janiene Cheung 校对人员: Jenny Yang就像故事里说的那样，传说中的神射手威廉泰尔被一个腐败的地主强迫进行一个残忍的挑战威廉的儿子会被处决除非威廉可以从儿子头上把一个苹果射下来威廉成功了，但是让我们来设想一下这个传说的两个版本在第一个版本里那个地主雇了一个流氓偷走了威廉信赖的弓于是他不得不从一个农民那里借一把差一点的弓然而，这把借来的弓没有调整到位并且威廉发现，他试发的箭都紧凑地集中在靶心的下方所幸，他在为时已晚之前还来得及作出调整第二个版本：在挑战之前很长一段时间，威廉开始怀疑他的技术他的手开始发颤他试发的箭仍然簇集在苹果周围但是以一种随机的形式很偶然地，他射中了苹果但是在这种不稳定的情况下，不能保证会射中靶心他必须让紧张的手安定下来并且重新恢复他瞄准的确定性来救他的儿子这些变种的核心是两个经常交替使用的词准确度和准确性两者的区别对于科学事业来说，其实很关键准确度涉及到你和正确结果的接近程度你的准确度可以随着工具的正确校准以及你得到的良好的训练而提高另一方面，准确性是你用同一种方法得到的结果能够有多一致精度提高并且不需要太多估测的工具可以提高你的准确性偷弩弓的故事说的就是有准确性，无准确度威廉每一次射箭都得到错误的结果手抖的版本是有准确度，无准确性威廉的弩箭集中在正确结果周围但是对于任意一次射击 都不能有把握射中靶心在日常的任务里，低准确度或者低准确性或许影响不大但是工程师和科研人员常常需要显微镜级别的准确度以及有很大把握每次都得到正确结果工厂和实验室通过更优的设备和更细节的流程来提高准确性这些提高可能很昂贵，所以管理者必须决定每个项目可以接受的不确定性是多少然而，对于准确性的投资可以让我们超越之前的可能哪怕是在像火星这么远的地方可能让你吃惊的是，美国国家航空局也不知道具体他们的探测器会在另一个星球哪里着陆预测着陆地点需要大量的计算和测量而这些测算并不总是有一个准确的答案火星大气密度在不同海拔会如何变化？探测器会以什么角度接触大气层？探测器进入的速度会是什么？电脑模拟器运行了上千种不同的着陆方案混合搭配所有变量的值权衡过所有的可能性计算出一个可能的接触区域一个椭圆形的着陆区在1976年，海盗号着陆器的椭圆着陆区域是62×174英里，差不多是一个新泽西州的大小在这种局限下美国航天局只能忽略很多有趣但是危险的着陆地带从那时起，火星大气的新资料提高了宇宙飞船技术而更强的电脑模拟技术也大大减少了不确定性在2012年，好奇号的椭圆着陆区仅有4英里宽，12英里长比海盗号的小两百多倍这让美国航天局得以瞄准盖尔陨坑里一个特定的点一个之前无法着陆却有极高科学价值的地区我们在无止境地追求准确度而准确性反映了我们有把握得到准确度的确定程度牢记这两个原则我们可以射向星星并且相信每一次都可以将他们击中

**P216 2015-04-15 How to spot a counterfeit bill - Tien Nguyen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=216)

It's estimated that for every 10,000 bills in the U.S., one of those bills is fake. That may not sound like much, but it adds up to millions of dollars in cold hard cash. Counterfeit money has the potential to cause all sorts of problems, from leaving you short $20 to destabilizing national economies. But don't worry. You can help catch the counterfeits. All you need are some simple tools and a bit of chemistry. First up, the anti-counterfeit detection pen. The pen looks like a highlighter and contains a solution of potassium iodide and elemental iodine. It reveals of the presence of starch, which is commonly used to strengthen regular printer paper, but won't be found in real money. That's because authentic bills are made of cotton and linen and are threaded with tiny red and blue fibers. That material is made by a single, highly-guarded company called Crane and Company, which has been printing currency since Paul Revere asked them to help finance the Revolutionary War. The starch in many counterfeit bills, on the other hand, is made of two molecules: amylopectin and amylose. It's amylose that gives the fake away. Its long chain of sugar molecules connected by oxygen atoms forms a helical structure, like DNA. Iodide likes to squeeze inside this coil, forming a new compound that leaves a dark mark on the paper. However, in the absence of starch, there is no chemical reaction and the mark will look light yellow. So if the fake isn't printed on starchy paper, iodine solutions can't help you. That's one of the reasons U.S. bills printed since 1996 have been chemically enhanced to include another counterfeit countermeasure: a strip that fluoresces under UV light. That's the same kind of light used at black light parties and airport security lines. The polyester strip printed with invisble ink is just one millimeter wide and is found in different positions depending on a bill's value. If you hold your dollar up to natural light, you can see the amount and the word USA printed on the band. But under UV light, these strips really shine. They contain molecules that can be excited by absorbing certain amounts of energy, specifically, that given off by common UV light sources. As these excited molecules return to their original states, they lose a bit of energy as heat and then radiate the rest as light. Energy is inversely related to wavelength, which means that the longer wavelengths have lower energy. So the lower energy light given off by the strip means longer wavelengths that fall in the visible range, and suddenly we can see that which had been invisible. And if a glowing strip doesn't show up on a recent bill, you have a fake on your hands. For times when you're not dealing with counterfeit masterminds, looking for simple visual cues will do. Make sure the portrait looks lifelike and not flat, the seal has perfectly even sawtooth points, the inked border is unbroken, and the serial number has precisely equal spacing between each number. So the next time you come across some dubious dough, have a closer look, pull out your iodine solution, or take it to a rave and you just might catch a counterfeit.

**P216 2015-04-15 How to spot a counterfeit bill - Tien Nguyen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=216)

翻译人员: Ruoxin Zheng 校对人员: Jenny Yang在美国，大约每一万张纸币里，就有一张是假币。这听起来可能不多，但加起来能有几百美金的现金。假币可能带来种种问题，小至让你少二十美金， 大至让国家经济瘫痪。但不要担心， （出售中）你可以帮忙识别这些假币。而做到这些，你只需一些小道具 和一点化学物质。首先，是这根防伪探测笔。这笔看起来像是根记号笔，它里面还有碘化钾溶液……以及碘单质。它可以检测淀粉是否存在，而淀粉常用于加强常规印刷纸张，但是，真钞中并不会用到。 （淀粉）因为，真钞使用棉花和亚麻制成，并由细小的红蓝纤维编织而成。这种材料是由一家专门的、 受到严密保护的公司制成，公司名为克兰公司（Crane & Co.）。它自独立战争起，就收到Paul Revere希望它拯救经济的请求， 从而开始印刷货币。而假币里的淀粉……由两种分子组成：支链淀粉和直链淀粉。而让假币露馅的是直链淀粉。由氧原子相连的长链多糖分子……形成了如DNA的螺旋结构。碘元素常钻进这个螺旋管内部，从而形成一种可以在纸张上 显现深色的新混合物。但如果不含淀粉，就不会有化学反应产生，笔迹仍将是浅黄色。如果假币不是用含淀粉的纸张制造的，碘溶液就帮不了你了。这也是为什么，自1996年起，美金纸币从化学层面上进行了加强， 从而有了另一种鉴别假币的方法：一条在紫外线下会发荧光的印记。这种光也就是在黑光派对……及机场安检时用的灯光。印有隐形墨水的涤纶条……只有一毫米宽，并会因纸币面值大小的差异， 而设置在不同位置。如果你把纸币放在自然光下看，你能看到涤纶条上印刷的USA和纸币面值。在紫外线光线下，这些涤纶条会变得很亮。它们包含可以通过吸收一定程度的能量 来激发自己的分子，特别是普通紫外线光源发出的能量。在这些激发态分子变回基态的过程中，它们损失的能量先是以热能形式排出， 剩下的则以光能排出。能量与波长呈反相关，既波长越长，所持有的能量越少。所以涤纶条发出低能量光线时，肉眼可观察的长波长光线出现，于是我们突然能看到这些曾经看不到的光线。如果你最近收到的现金中 并没有这条发光的印记，那么你收到假币了。在你并没有直接与假币制造商打交道时，你可以找一些简单的视觉线索。确定画像看起来逼真且不扁平，印章的齿状边缘整齐完美，墨水没有印刷出界，以及序列号的每个数字间距离一样。下次你再遇上有些可疑的纸币时，仔细看看它，拿你的碘溶液试试，或带着它去家夜店，你或许会发现它是张假币。

**P217 2015-04-20 Why is biodiversity so important - Kim Preshoff**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=217)

Our planet's diverse thriving ecosystems may seem like permanent fixtures, but they're actually vulnerable to collapse. Jungles can become deserts, and reefs can become lifeless rocks, even without cataclysmic events, like volcanoes and asteroids. What makes one ecosystem strong and another weak in the face of change? The answer, to a large extent, is biodiversity. Biodiversity is built out of three intertwined features: ecosystem diversity, species diversity, and genetic diversity. The more intertwining there is between these features, the denser and more resilient the weave becomes. Take the Amazon rainforest, one of the most biodiverse regions on Earth due to its complex ecosystems, huge mix of species, and the genetic variety within those species. Here are tangled liana vines, which crawl up from the forest floor to the canopy, intertwining with treetops and growing thick wooden stems that support these towering trees. Helped along by the vines, trees provide the seeds, fruits and leaves to herbivores, such as the tapir and the agouti, which disperse their seeds throughout the forest so they can grow. Leftovers are consumed by the millions of insects that decompose and recycle nutrients to create rich soil. The rainforest is a huge system filled with many smaller systems, like this, each packed with interconnected species. Every link provides stability to the next, strengthening biodiversity's weave. That weave is further reinforced by the genetic diversity within individual species, which allows them to cope with changes. Species that lack genetic diversity due to isolation or low population numbers, are much more vulnerable to fluctuations caused by climate change, disease or habitat fragmentation. Whenever a species disappears because of its weakened gene pool, a knot is untied and parts of the net disintegrate. So, what if we were to remove one species from the rainforest? Would the system fall apart? Probably not. The volume of species, their genetic diversity, and the complexity of the ecosystems form such rich biodiversity in this forest that one species gap in the weave won't cause it to unravel. The forest can stay resilient and recover from change. But that's not true in every case. In some environments, taking away just one important component can undermine the entire system. Take coral reefs, for instance. Many organisms in a reef are dependent on the coral. It provides key microhabitats, shelter and breeding grounds for thousand of species of fish, crustaceans and mollusks. Corals also form interdependent relationships with fungi and bacteria. The coral itself is a loom that allows the tangled net of biodiversity to be woven. That makes coral a keystone organism, one that many others depend on for their suvival. So what happens when destructive fishing practices, pollution and ocean acidification weaken coral or even kill it altogether? Exactly what you might think. The loss of this keystone species leaves its dependents at a loss, too, threatening the entire fabric of the reef. Ecosystem, species and genetic diversity together form the complex tangled weave of biodiversity that is vital for the survival of organisms on Earth. We humans are woven into this biodiversity, too. When just a few strands are lost, our own well-being is threatened. Cut too many links, and we risk unraveling it all. What the future brings is unpredictable, but biodiversity can give us an insurance policy, Earth's own safety net to safeguard our survival.

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翻译人员: Xuesong Zhang 校对人员: Tianchang Luo我们星球上多样又生机勃勃的生态系统 也许看上去像固定的家具，但是实际上 它们脆弱又容易崩溃。丛林可能变成沙漠，珊瑚礁可能变成死气沉沉的石头，就算没有像火山喷发或行星冲撞这样的 毁灭性灾难，还是有可能会发生。在面对变化时，是什么决定了 一个生态系统的优胜劣汰？这个问题的答案，在很大程度 上来说，是生物多样性。生物多样性由三种 息息相关的特征组成：生态系统多样性，物种多样性，和基因多样性。这三种特征之间联系的越紧密，生态网就越会越密集 并且恢复能力越强。例如亚马逊雨林，这个地球上生物多样性 最丰富的地区之一。它具有复杂的生态系统，大量混杂的物种，并且这些物种的遗传因子十分多样。这些是缠绕在树上的藤蔓，它们从丛林地面向树冠攀爬，与树梢和正在不断成长从而支撑耸立的大树的 粗壮树干缠绕在一起。在藤蔓的帮助下，树林为食草动物提供种子、水果 和叶子作为食物。这些动物如貘和刺豚鼠，又将种子散播到丛林内外， 这样丛林才会成长。剩下的会被数不尽的昆虫吃掉，营养物质会被分解和循环，将土壤变得更肥沃。雨林这个大系统包含了很多这样的小系统，每个小系统中不同物种紧密相连。这些联系一环扣一环，不断强化着生物多样性网络。这个网也通过单个物种间的遗传多样性而进一步增强，这种多样性能让它们更好的应对改变。由于被隔离、或者种群数量小而遗传多样性低的物种，在面对由气候变化、疾病或栖息地破碎化 导致的波动时会更加脆弱。每当一个物种由于它脆弱的基因池而消失时，联系网的一环解扣， 某些部分的联系也随之分裂。那么，如果我们 移除雨林中的一个物种呢？这个系统会崩溃吗？也许并不会。多样的物种、它们的遗传多样性、和生态系统的复杂性形成了生态多样性如此丰富的雨林。单个物种的消失并不能使之瓦解。自愈能力使丛林可以适应这种变化。但是也有例外。在某些环境中，一个重要部分的缺失可以破坏整个系统。以珊瑚礁为例，很多生物寄生在珊瑚上。珊瑚为成千上万种鱼类、虾蟹 和软体动物提供着重要的微生境、庇护所和繁殖地。珊瑚同时也和真菌和细菌互相依存。有了珊瑚这个织布机，生物多样性的网才细细的编织起来。这就让珊瑚成为其它微生物赖以生存的基石。所以当破坏性捕鱼行为、污染和海洋酸化伤害或将珊瑚全部杀死的时候 会发生什么呢？就像你想的那样。这一基础物种的消失会让依靠它的生物岌岌可危，同时也威胁着礁石的整个生态网。生态系统、物种多样性和遗传多样性一同组成了生态多样性这个复杂的网络。这个网络是地球生物存活的关键。我们人类也在这个生物多样网络中。即使只少了网上的几根线，我们的安康也会受到威胁。切段太多的联系，将有全军覆没的风险。未来发生的事不可预见，但是生物多样性可以给我们上个保险。地球的安全网保护着我们的平安。

**P218 2015-04-22 Could your brain repair itself - Ralitsa Petrova**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=218)

Imagine the brain could reboot, updating its withered and damaged cells with new, improved units. That may sound like science fiction, but it's a potential reality scientists are investigating right now. Will our brains one day be able to self-repair? It's well known that embryonic cells in our young developing brains produce new neurons, the microscopic units that make up the brain's tissue. Those newly generated neurons migrate to various parts of the developing brain, making it self-organize into different structures. But until recently, scientists thought cell production came to an abrupt halt soon after this initial growth, leading them to conclude that neurological diseases, like Alzheimer's and Parkinson's, and damaging events, like strokes, are irreversible. But a series of recent discoveries has revealed that adult brains actually do continue to produce new cells in at least three specialized locations. This process, known as neurogenesis, involves dedicated brain cells, called neural stem cells and progenitor cells, which manufacture new neurons or replace the old ones. The three regions where neurogenesis has been discovered are the dentate gyrus, associated with learning and memory, the subventricular zone, which may supply neurons to the olfactory bulb for communication between the nose and brain, and the striatum, which helps manage movement. Scientists don't yet have a good grasp on exactly what role neurogenesis plays in any of these regions, or why they have this ability that's absent from the rest of the brain, but the mere presence of a mechanism to grown new neurons in the adult brain opens up an amazing possibility. Could we harness that mechanism to get the brain to heal its scars similar to how new skin grows to patch up a wound, or a broken bone stitches itself back together? So here's where we stand. Certain proteins and other small molecules that mimick those proteins can be administered to the brain to make neural stem cells and progenitor cells produce more neurons in those three locations. This technique still needs improvement so that the cells reproduce more efficiently and more cells survive. But research shows that progenitor cells from these areas can actually migrate to places where injury has occurred and give rise to new neurons there. And another promising possible approach is to transplant healthy human neural stem cells, which are cultured in a laboratory, to injured tissue, like we can do with skin. Scientists are currently experimenting to determine whether transplanted donor cells can divide, differentiate and successfully give rise to new neurons in a damaged brain. They've also discovered that we might be able to teach other kinds of brain cells, such as astrocytes or oligodendrocytes to behave like neural stem cells and start generating neurons, too. So, a couple of decades from now will our brains be able to self-repair? We can't say for sure, but that has become one of the major goals of regenerative medicine. The human brain has 100 billion neurons and we're still figuring out the wiring behind this huge biological motherboard. But everyday, research on neurogenesis brings us closer to that reboot switch.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=218)

翻译人员: Qing Chen 校对人员: Yuanqing Edberg想象一下大脑能够自我重启，升级自己那些发育不良或者受损的细胞 为新的，改良的单元。这也许听起来跟科幻小说似的，但有朝一日这可能成为现实， 科学家们也正在研究。我们的大脑能够有朝一日 进行自我修复吗？众所周知，初期正在发育的大脑里 的胚胎细胞能够产生新的神经元，即构成脑组织的微单元。这些新生成的神经元 游走到发育中大脑的不同部分，并自我组织成为不同的结构。但直到最近，科学家们都一直认为，细胞增殖在初始发育过后 不久就突然中止了，这一想法导致他们认为， 神经性疾病比如阿兹海默症， 或者帕金森症跟中风一样，是无法逆转 的毁灭性损害。但一系列的最新发现显示，成人大脑竟然 至少在三个特殊的位置继续生成新的细胞。这一过程叫做神经发生，也就是说专门的大脑细胞， 叫做神经元细胞以及祖细胞,它们能够生成新的神经元 或代替老的神经元。科学家发现，神经发生这一过程 存在于三个脑部区域：一个是与学习及记忆相关的海马齿状回，一个是供给嗅球神经元的脑室下区，负责鼻子和脑部的交流，还有帮助管理运动的纹状体。科学家目前还未掌握在这些脑部区域的神经发生 具体扮演什么角色，或者说为什么它们仅存于这三区， 而非整个大脑。但是在成人大脑中新神经元生成的 这一机制本身的存在开放了一种惊人的可能性。我们是不是能利用这一机制 让大脑来修复自身的创伤，就像新皮长出来修复伤口，或者像断骨自我接合那样？那么我们现在的情况是这样：一部分蛋白质和其它模拟 这些蛋白质的小分子能被供给到大脑，使得神经干细胞及祖细胞在上述的三个区域 生成更多的神经元。这项技术仍需改善，让细胞更有效地增殖，让更多的细胞活下来。然而，研究表明来自这些区域的祖细胞竟然还能游离到 损伤发生的部位，并在那儿生成新的神经元。另一项有希望成功的做法就是移植健康的 在实验室里培育的人类神经元细胞到损伤组织中，就跟植皮一样。科学家们正在试验中，以测定这些移植的供体细胞 是否能够分裂，分化并成功地在受损大脑中 生成新的神经元。科学家们还发现我们也许能够教其它种类的脑细胞如星细胞或者单树突胶质细胞模仿神经元细胞的行为， 也来开始生成新的神经元。那么几十年以后， 我们的大脑就能自我修复了？我们没有十足的把握，但是这已然成为了 再生医学的主要目标。人类大脑有一千亿的神经元，现阶段我们仍在研究这一硕大的 生物主板是如何布线的。但每天，关于神经发生的研究都让我们 离那个所谓的重启开关又更近了一步。

**P219 2015-04-22 How to unboil an egg - Eleanor Nelsen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=219)

It's so obvious that it's practically proverbial. You can't unboil an egg. Well, it turns out you can, sort of. What thermal energy does to the eggs' molecules, mechanical energy can undo. Eggs are mostly made of water and proteins. The proteins start off folded up into intricate shapes, held together by weak chemical bonds. Adding heat disrupts those bonds, allowing the proteins to unfold, uncoil, unwind and wiggle freely. This process is called denaturing. The newly liberated proteins bump up against their neighbors and start to form new bonds with each other, more and more as the heat increases, until finally, they're so entangled that they gel into a solid mass, a boiled egg. That entanglement might look permanent, but it's not. According to a chemical idea called the principle of microscopic reversibility, anything that happens, like egg proteins seizing up, can theoretically unhappen if you retrace your steps. But adding more heat will tangle the proteins further, and cooling them down will only freeze them, so here's the trick: spin them around ridiculously fast. I'm not kidding. Here's how it works. First, scientists dissolve boiled egg whites in water with a chemical called urea, a small molecule that acts as a lubricant, coating the proteins' long strands and making it easier for them to glide past each other. Then, they spin that solution in a glass tube at a breakneck 5000 rotations per minute, making the solution spread out into a thin film. Here's the key part. The solution nearest the wall spins faster than the solution closer to the middle. That difference in velocity creates sheer stresses that repeatedly stretch and contract the proteins until eventually they snap back into their native shapes and stay there. By the time the centrifuge stops spinning, the egg white is back in its original unboiled state. This technique works with all sorts of proteins. Bigger, messier proteins can be more resistant to being pulled apart, so scientists attach a plastic bead to one end that adds extra stress and encourages it to fold up first. This unboiling method won't work with a whole egg in its shell since the solution has to spread throughout a cylindrical chamber. But the applications go way beyond uncooking your breakfast, anyhow. Many pharmaceuticals consist of proteins that are extremely expensive to produce, partly because they get stuck in tangled up aggregates, just like cooked egg whites and have to be untangled and refolded before they can do their jobs. This spinning technique has the potential to be an easier, cheaper and quicker method than other ways to refold proteins, so it may allow new drugs to be made available to more people faster. And there's one more thing you need to keep in mind before trying to uncook all of your food. Boiling an egg is actually an unusual cooking process because even though it changes the way proteins are shaped and bound together, it doesn't actually change their chemical identity. Most types of cooking are more like the famous Maillard reaction, which makes chemical changes that turn sugars and proteins into delicious caramel crunchiness and are a lot harder to undo. So you might be able to unboil your egg, but I'm sorry to say you can't unfry it...yet.

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翻译人员: Cissy Yun 校对人员: Zongzhen Yang很明显又众所周知的是你不能把一个熟蛋变生然而，其实在某种程度上， 你是可以的热能对蛋的分子所做的事机械能可以将其还原蛋主要是由水和蛋白质组成蛋白质最开始折叠成一种复杂的形状依靠弱的化学键连接在一起加热能分解化学键使的蛋白质展开，松绕，分离， 变得可以移动这个过程被称为“改性”新的被解放的蛋白质互相撞击并在其中形成新的化学键当热量变得越来越多后到达某一刻时，蛋白质之间的精密缠绕， 最终形成一个固体就是煮熟的蛋这个过程可能看起来不可逆， 但其实不是的根据一个叫做微观可逆原理的化学观点任何已发生的， 比如说鸡蛋中的蛋白质变为固体的情况如果你反之重复每一步，理论上可以反转但增加更多的热量会使蛋白质纠缠的更紧而冷却只会冻住它们所以这里的窍门是将其极快的旋转我没在开玩笑它们是这样做的首先，科学夹将煮熟的蛋白溶解在水中加以一种化学物质，尿素它是一个小分子，被用作润滑剂， 涂上蛋白质较长的一股使得它们更容易得滑过对方然后，他们将溶液放入试管以一个极快的5000转每分钟的速度旋转使得溶液展开形成一层很薄的生物膜接下来是关键的部分离试管壁最近的溶液旋转地比中间的溶液旋转得快这个速度上的区别产生了剪应力会重复拉伸和收缩蛋白质直到最后它们恢复成原始的性状， 并稳定下来当离心机停止旋转鸡蛋白恢复成了未被煮过的形态这个技术适用于所有蛋白质更大和更混乱的蛋白质将会更难还原所以科学家会在蛋白质一股的一端 黏上一个塑料珠产生额外的重量，并会加大收缩 促使它先折叠这个方法不适用于一个完整的带壳的蛋因为溶液必须在圆柱体容器内展开但它的应用远超出仅是还原你的早餐很多含有蛋白质的药物的生产费用非常高有些是因为他们卡在了聚集蛋白质中就像煮熟的蛋白这些必须在他们开始工作前被打散和展开这个旋转方法， 相比于其他再折叠蛋白质的方式有着成为一个更简单，便宜，快速的方法的潜力所以，它可能会使新药物的出现更加快捷还有一个事情你需要记住在还原你的食物之前煮蛋实际上是个不寻常的过程因为即使它使蛋白质的形状和连接方式 发生了改变它的化学性质并没有改变大多数烹饪过程类似著名的“梅拉德反应”就是会发生化学变化将糖分和蛋白质转换成美味的焦糖脆这会非常难还原所以你可以还原你的煮蛋但很抱歉，目前为止， 还不能还原你的煎蛋

**P220 2015-04-27 Why neutrinos matter - Sílvia Bravo Gallart**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=220)

They're everywhere, but you will never see one. Trillions of them are flying through you right this second, but you can't feel them. These ghost particles are called neutrinos and if we can catch them, they can tell us about the furthest reaches and most extreme environments of the universe. Neutrinos are elementary particles, meaning that they can't be subdivided into other particles the way atoms can. Elementary particles are the smallest known building blocks of everything in the universe, and the neutrino is one of the smallest of the small. A million times less massive than an electron, neutrinos fly easily through matter, unaffected by magnetic fields. In fact, they hardly ever interact with anything. That means that they can travel through the universe in a straight line for millions, or even billions, of years, safely carrying information about where they came from. So where do they come from? Pretty much everywhere. They're produced in your body from the radioactive decay of potassium. Cosmic rays hitting atoms in the Earth's atmosphere create showers of them. They're produced by nuclear reactions inside the sun and by radioactive decay inside the Earth. And we can generate them in nuclear reactors and particle accelerators. But the highest energy neutrinos are born far out in space in environments that we know very little about. Something out there, maybe supermassive black holes, or maybe some cosmic dynamo we've yet to discover, accelerates cosmic rays to energies over a million times greater than anything human-built accelerators have achieved. These cosmic rays, most of which are protons, interact violently with the matter and radiation around them, producing high-energy neutrinos, which propagate out like cosmic breadcrumbs that can tell us about the locations and interiors of the universe's most powerful cosmic engines. That is, if we can catch them. Neutrinos' limited interactions with other matter might make them great messengers, but it also makes them extremely hard to detect. One way to do so is to put a huge volume of pure transparent material in their path and wait for a neutrino to reveal itself by colliding with the nucleus of an atom. That's what's happening in Antarctica at IceCube, the world's largest neutrino telescope. It's set up within a cubic kilometer of ice that has been purified by the pressure of thousands of years of accumulated ice and snow, to the point where it's one of the clearest solids on Earth. And even though it's shot through with boreholes holding over 5,000 detectors, most of the cosmic neutrinos racing through IceCube will never leave a trace. But about ten times a year, a single high-energy neutrino collides with a molecule of ice, shooting off sparks of charged subatomic particles that travel faster through the ice than light does. In a similar way to how a jet that exceeds the speed of sound produces a sonic boom, these superluminal charged particles leave behind a cone of blue light, kind of a photonic boom. This light spreads through IceCube, hitting some of its detectors located over a mile beneath the surface. Photomultiplier tubes amplify the signal, which contains information about the charged particles' paths and energies. The data are beamed to astrophysicists around the world who look at the patterns of light for clues about the neutrinos that produced them. These super energetic collisions are so rare that IceCube's scientists give each neutrino nicknames, like Big Bird and Dr. Strangepork. IceCube has already observed the highest energy cosmic neutrinos ever seen. The neutrinos it detects should finally tell us where cosmic rays come from and how they reached such extreme energies. Light, from infrared, to x-rays, to gamma rays, has given us increasingly energetic and continuously surprising views of the universe. We are now at the dawn of the age of neutrino astronomy, and we have no idea what revelations IceCube and other neutrino telescopes may bring us about the universe's most violent, most energetic phenomena.

**P220 2015-04-27 Why neutrinos matter - Sílvia Bravo Gallart**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=220)

翻译人员: Gabriella Hu 校对人员: yuan longquan他们无处不在，但是你永远都看不到它们此时此刻，它们数以万亿从你身体中飞过，但是你感觉不到它们的存在这些幽灵粒子叫做中微子， 如果我们能抓到它们的话，他们能够告诉我们宇宙中最遥远，最极端的环境中微子是基本粒子,也就是说它们不能像原子那样被分成更小的粒子基本粒子是已知的最小的粒子，是构造宇宙中一切的建筑材料，而且中微子是最小的比电子还要小一百万倍，中微子能够轻易穿透物体，不受磁场影响实际上，它们几乎不与任何东西接触这意味着它们能够沿直线穿越宇宙长达数百万年，甚至数十亿年，携带着它们的来源地的信息那么它们到底从哪里来呢？几乎到处都是你的体内的钾的放射性衰变会产生中微子宇宙射线在地球大气层中撞击原子能够创造出一大波中微子太阳中的核反应和地球内部的放射性衰变都能产生中微子而且，我们也能够在核反应堆和粒子加速器中生成中微子但是最高能量的中微子来源于太空深处来自我们知之甚少的环境中宇宙中某个深处，或许有一个巨大的黑洞，或者有一个我们还未发现的“宇宙发电机”，把宇宙射线加速成动能的速度比任何人造加速器快超过一百万倍这些宇宙射线，大多是都是质子，与它们周围的物质和辐射产生剧烈反应创造出带有高能量的中微子，它们像面包屑一样，在宇宙中传播它们能够告诉我们宇宙中最强大的发动机的所在地和内部构造前提是，我们必须先抓到它们中微子与别的物体的有限的接触使它们成为极好的信使，但是同时也使它们很难被发现一种办法是在它们的路线上放置大量的纯透明物质然后等待中微子撞击原子核自现原形这就是南极洲上IceCube观测站试图做的事：世界上最大的中微子望远镜它被设置在一立方千米的冰内这些冰被几千年累积下来的冰雪的压强纯化了，以至于变成地球上最纯净的固体之一尽管用装有超过5000个侦测器的钻孔钻入冰面，大多数中微子依旧飞过IceCube，不留下一丝痕迹但是每年大约有十次，一个高能量的中微子撞击一个冰分子，带点亚原子粒子如火花一般弹射出来穿越冰层的速度比光速还快好比一架超音速飞机会产生音爆，这些超光速的带电粒子会留下蓝色的光椎像光爆一样这种光传遍IceCube，击中层面下一英里多深的探测器光电倍增管将信号放大，里面包含带电粒子的途径和能量信息这些数据被传输给世界各地的天体物理学家，他们观察光的规律，寻找产生这些光的中微子这种超级能量撞击特别罕见，IceCube科学家们甚至给每一个中微子起昵称，比如 ”大鸟“，还有 ”Strangepork博士“IceCube已经观测到已见的最高能量的宇宙中微子侦测到的中微子终于可以告诉我们宇宙射线从哪里来还有它们如何达到如此高的能量光，从红外线，到x射线，到伽马射线，已经给了我们日益强大，和不断令人吃惊的宇宙视角我们现在已经能看到中微子宇宙学时代的曙光，我们还不知道IceCube和其它的中微子望远镜能够给我们带来怎样的启示关于宇宙中最猛烈，最强大的现象

**P221 2015-04-28 What causes economic bubbles - Prateek Singh**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=221)

How much would you pay for a bouquet of tulips? A few dollars? A hundred dollars? How about a million dollars? Probably not. Well, how much would you pay for this house, or partial ownership of a website that sells pet supplies? At different points in time, tulips, real estate and stock in pets.com have all sold for much more than they were worth. In each instance, the price rose and rose and then abruptly plummeted. Economists call this a bubble. So what is exactly is going on with a bubble? Well, let's start with the tulips to get a better idea. The 17th century saw the Netherlands enter the Dutch golden age. By the 1630s, Amsterdam was an important port and commercial center. Dutch ships imported spices from Asia in huge quantities to earn profits in Europe. So Amsterdam was brimming with wealthy, skilled merchants and traders who displayed their prosperity by living in mansions surrounded by flower gardens. And there was one flower in particularly high demand: the tulip. The tulip was brought to Europe on trading vessels that sailed from the East. Because of this, it was considered an exotic flower that was also difficult to grow, since it could take years for a single tulip to bloom. During the 1630s, an outbreak of tulip breaking virus made select flowers even more beautiful by lining petals with multicolor, flame-like streaks. A tulip like this was scarcer than a normal tulip and as a result, prices for these flowers started to rise, and with them, the tulip's popularity. It wasn't long before the tulip became a nationwide sensation and tulip mania was born. A mania occurs when there is an upward movement of price combined with a willingness to pay large sums of money for something valued much lower in intrinsic value. A recent example of this is the dot-com mania of the 1990s. Stocks in new, exciting websites were like the tulips of the 17th century. Everybody wanted some. The more people who wanted the tulip, the higher the price could go. At one point, a single tulip bulb sold for more than ten times the annual salary of a skilled craftsman. In the stock market, the price of stock is based on the supply and demand of investors. Stock prices tend to rise when it seems like a company will earn more in the future. Investors might then buy more of the stock, raising the prices even further due to an increased demand. This can result in a feedback loop where investors get caught up in the hype and ultimately drive prices far above intrinsic value, creating a bubble. All that is needed for a mania to end and for a bubble to burst is the collective realization that the price of the stock, or a tulip, far exceeds its worth. That's what happened with both manias. Suddenly the demand ended. Prices were pushed to staggering lows, and pop! The bubbles burst, and the market crashed. Today, scholars work long and hard trying to predict what causes a bubble and how to avoid them. Tulip mania is an effective illustration of the underlying principles at work in a bubble and can help us understand more recent examples like the real estate bubble of the late 2000s. The economy will continue to go through phases of booms and busts. So while we wait for the next mania to start, and the next bubble to burst, treat yourself to a bouquet of tulips and enjoy the fact that you didn't have to pay an arm and a leg for them.

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翻译人员: Zhiting Chen 校对人员: Geoff Chen你愿意出多少钱买一束郁金香？几美元？一百美元？如果是一百万美元呢？应该不会买吧。你愿意出多少钱买这栋房子，或者是售卖宠物用品网站的部分股权？在历史上某些时间点，郁金香、房地产、pets.com网站的股票都卖到了比它自身价值更高的价格。在每个实例中，价格不断上涨 然后突然剧烈下跌。经济学家称之为泡沫。那么，到底发生了什么呢？让我们从郁金香的例子开始解读在16世纪荷兰进入了 经济发展黄金时期。在1630年代，阿姆斯特丹成为 重要的贸易港口和金融中心。荷兰商船从亚洲大量进口香料在欧洲赚取利润。阿姆斯特丹充满了富裕 且经商有道的商人和交易员，他们展现富有的方式是 居住在豪华宅邸，宅邸周围是种满鲜花的花园。某一种花有特别高的需求量：郁金香。郁金香是货船从东方带来欧洲的品种，因此被称为异域风情的花，而且郁金香很难种植。一枝郁金香盛开需要好多年的时间。在1630年代，爆发的 郁金香色彩变异病毒让某些品种的郁金香愈发美丽，因为病毒让画板有了多种颜色 犹如火焰般的纹路。这样的郁金香比普通品种更加稀少，因此，这种郁金香的花朵的价格 开始上涨，与此同时，郁金香开始风靡全国。很快就到了举国上下为之轰动，郁金香热开始了。这场狂热伴随着另一种现象， 价格的上涨，人们乐意出很高的价格买一些价值很低的东西。一个最近的例子就是 1990年代对网络公司的风靡。新潮的网络公司的股票 犹如17世纪的郁金香花。每个人都想要。越多人想要购买郁金香， 其价格也就会越来越高。在某个时刻，一支郁金香的价格是熟练工匠年薪的10倍。在股票市场，股票价格由投资者的供需来决定。股票价格会上涨，当这个公司未来盈利 的前景较为乐观。投资者就会买购买更多的股票，因为需求量的增加， 股票价格就会更高。这会形成“反馈回路”， 投资者们为之兴奋疯狂，最终让价格远远高于 其内在价值，创造了一个泡沫。狂热的结束以及泡沫的破裂 会发生在人们集体意识到 股票的价格，或是郁金香的价格， 远远高于它的价值。对股票和郁金香的疯狂就是 这样终结的。突然间需求不再。价格跌到令人惊讶的低点，然后，嘭！泡泡破了，市场垮了。当今，学者们花费长时间的努力 来试图预测泡沫是如何产生的，以及如何预防泡沫产生。郁金香狂热就是个很好的例子来阐述泡沫的产生以及破灭能够帮助我们理解现代的例子像是2000年后段的房地产泡沫。经济会持续不断经历着繁荣和萧条。当我们等待下一场狂热开始，下一个泡沫破裂的时候，为自己买一束郁金香花吧，享受这个无需卖手卖脚 平易近人的价格。

**P222 2015-04-28 What is leukemia - Danilo Allegra and Dania Puggioni**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=222)

Despite advances in medicine, cancer remains one of the most frightening diagnoses patients can receive. What makes it so difficult to cure is that it's not one illness, but a family of over 100 diseases occurring in different types of cells. And one type of cancer has the unfortunate distinction of afflicting children more than any other type. This is leukemia, a cancer that begins in stem cells found in the bone marrow. A stem cell is a bit like an infant, undeveloped but possessing great potential. Many stem cells specialize and become cells of organs, like the liver, brain and heart. But in some tissues, they can continue to divide into new stem cells throughout development, and into adulthood in order to frequently generate new cells and keep up with the body's needs. One example is the bone marrow, where stem cells differentiate into many types of blood cells. That includes red blood cells, which carry oxygen from the lungs to all tissues, platelets, which help stop bleeding by sticking to damaged blood vessels, and white blood cells, which patrol the body, destroying potentially harmful invaders. Every once in a while, something goes wrong during a stem cell's specialization process and harmful mutations occur in the cell's DNA. Cells with compromised DNA are supposed to self-destruct, but some damaged cells ignore this order, replicating uncontrollably, even as they lose their original function. These are what we know as cancer cells. It is not yet clear why leukemia is the most common childhood cancer, but one contributing factor may be that leukemias are often caused by just one or two DNA modifications, while most cancers require many of them, allowing leukemias to arise faster than other types of cancer. Moreover, some DNA alterations can occur in white blood cells during fetal development, further increasing the risk of early leukemia. But though it affects more children than any other cancer, adults constitute the majority of leukemia patients overall. Once leukemia strikes, the damaged cells reproduce in the blood and the bone marrow until they take up all available space and resources. When the bone marrow can no longer produce the required amount of functional cells, the blood becomes depleted. The lack of red blood cells means that muscles don't get enough oxygen, the reduced number of platelets is not sufficient to repair wounds, and the dearth of functional white blood cells impairs the immune system, increasing the risk of infections. To restore the normal function of the blood, leukemic cells have to be eliminated. But because leukemias are not solid tumors, they can't be removed surgically. Instead, the cells are killed inside the body using various treatments that include chemotherapy, a combination of drugs that destroys quickly multiplying cells. Unfortunately, this has the side effect of killing healthy cells, such as those found in hair follicles or intestines. And in some cases, the dosage required is so high that it kills all cells in the bone marrow, including stem cells. When this happens, the body is no longer able to create new blood cells on its own. Fortunately, outside help can come in the form of stem cells from the bone marrow of a donor. Once transplanted into the patient, they rapidly repopulate the bone marrow and the blood. However, bone marrow transplants are a complicated process requiring antigen compatibility between the donor and recipient to keep the transplanted cells from from attacking the patient's own cells as foreign bodies. Unlike with blood transplants, there are thousands of HLA types, and even siblings and close relatives may not have compatible bone marrow. If this is the case, the search is expanded to a database containing the genetic makeup of millions of voluntary bone marrow donors. The more potential donors there are, the more patients lives can be saved through successful transplants. Leukemia may be a frightening disease, but there is strength and hope in numbers.

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翻译人员: fuyu you 校对人员: Amy H. Fann尽管医学在进步癌症仍是患者们最怕听到的诊断结果使它难以治愈的原因是：它并不是一个单一的病变而是在不同的细胞内发生的超过100种病变的统称其中有一种癌症给儿童带来的折磨比其它任何一种癌症都更加难熬那就是白血病一种始于骨隧中干细胞的癌症干细胞有点儿像一个婴儿还未充分发育但潜能巨大许多干细胞经过分化变成器官细胞例如肝脏、大脑和心脏但在某些组织中它们将继续分裂产生新的干细胞而后再分化成熟以跟上身体生长发育需求其中一个例子就是骨髓其中的干细胞将分化为多种血细胞包括红血球用于将氧气从肺输送到所有组织血小板，堵住受伤的血管以止血以及白血球它们负责守护身体，摧毁潜在的有害入侵者有时干细胞在分化过程中会出问题细胞DNA会出现有害突变受损DAN的细胞一般会凋亡但有些受损细胞没有遵守这个规律而是不受控制的不断复制尽管它们已失去了原有的功能这就是我们所说的癌细胞为什么白血病是儿童最易患的癌症还尚未知晓但原因之一可能是一两个DNA位点突变就能使白血病细胞产生而其他癌症则需要多个DNA位点的突变这就使得白血病比其他癌症发病快得多此外，白细胞中某些DNA改变在胎儿时期就能发生所以增加了早期患白血病的风险尽管比其他癌症，儿童更容易得白血病但总的来说成人白血病患者还是占大多数的患病后，受损细胞会在血液和骨髓里不断复制直到它们侵占所有空间和资源当骨髓不能产生足够数量的功能正常的细胞时血液便枯竭了红血球的缺乏意味着肌肉得不到足够的氧气血小板数量的减少也使得伤口难以修复而有用白细胞的缺乏降低了免疫力增加了受感染的风险要重建正常的血液系统白血病细胞需要被清除但因为白血病并非实体瘤所以它无法通过手术切除但存在许多其他方法能消灭体内的白血病细胞包括化疗也就是一系列药物，可杀死快速复制的细胞遗憾的是，这种疗法也会杀死健康的细胞例如毛囊或肠道有一些情况下，化疗需要的药量很大会杀死骨髓里全部的细胞包括干细胞这种情况下，身体无法自己产生新的血细胞幸运的是，干细胞可以从他人中获得也就是骨髓捐献者当骨髓被移植到患者身体后它会迅速产生骨髓和血液然而，骨髓移植的过程很复杂它要求捐献者和患者间的抗原能够匹配这样才能防治移植的细胞攻击患者自身细胞与输血不同HLA（人类白细胞抗原）有几千种甚至,患者与兄弟姐妹、近亲的HLA都不一定能相容这时，就得在数据库进行搜寻数据库录入了数百万骨髓捐献者的基因骨髓捐献者越多能通过骨髓移植被救治的患者就越多白血病固然可怕，但全体奋斗能带来力量与希望

**P223 2015-05-01 Why do your knuckles pop - Eleanor Nelsen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=223)

What's that sound? Depending on whom you ask, the crackle of popping joints is either the sound of sweet relief or the noxious tones of a stomach-turning habit. Really, though. What's that sound? I mean, why does bending your joints in a certain way make them pop like that? Scientists have offered several explanations, including rapidly stretching ligaments, and in severe cases, actual bones grinding against each other. But the most common explanation for why your stretched-out joints sound like bubbles popping is that, well, there are bubbles in there. The joints in your fingers are the easiest ones to crack, but many people also crack the joints between vertebrae in their neck and back, and even their hips, wrists, shoulders and so on. All these joints are synovial joints, and they're the most flexible ones in your body. The space between the two bones is filled with a viscous liquid, synovial fluid, which contains long, lubricating molecules, like hyaluronic acid and lubricin. Synovial fluid is more or less the texture of egg yolk and its primary purpose is to cushion the bones and help them glide past each other. It also contains phagocytic cells that help clean up any bone or cartilage debris that ends up in the joint. But the reason it's important for knuckle cracking is that, like other fluids in your body, it contains lots of dissolved gas molecules. Knuckle-crackers know that to get that satisfying pop, you stretch the joint farther than it normally goes by bending your fingers backwards, for example. When you do that, the bones move away from each other. The space between bones gets bigger, but the amount of synovial fluid stays constant. That creates a low-pressure zone that pulls dissolved gases out of the synovial fluid, just like the carbon dioxide that fizzes out of soda when you twist open the cap. Inside the joint, the escaping gases form a bubble with a pop. But the bubble doesn't last long. The surrounding fluid presses on it until it finally collapses. The bubble's gases scatter throughout the synovial cavity and slowly dissolve back into the fluid over the course of about twenty minutes, which is why it can take a while before you can pop the same joint again. Some scientists think there may actually be two pops. One when the bubble forms, and another when it bursts. Popping a joint temporarily enlarges it, which may be why dedicated knuckle-, neck- and back-crackers say the habit makes their joints feel looser and more flexible. But you may have heard from a concerned relative or annoyed officemate that cracking your joints will give you arthritis. A doctor named Donald Unger heard this, too. So, determined to disprove his mother's warnings, he cracked the knuckles of his left hand repeatedly for 50 years, while the right-hand knuckles went unpopped. 36,500 cracks later, both hands were arthritis-free. For this selfless act of devotion to science, Dr. Unger received an Ig Nobel Prize, a parody of the Nobel Prize that recognizes wacky, but weirdly fascinating, scientific accomplishments. Unger wrote that his results should prompt investigation into other parental beliefs, like the importance of eating spinach. The jury's still out on that one. As for knuckle-cracking, one study suggests that all that joint stretching and bubble bursting can cause your hands to swell and weaken your grip. But the biggest proven danger seems to be annoying those around you.

**P223 2015-05-01 Why do your knuckles pop - Eleanor Nelsen**

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翻译人员: Gabriella Hu 校对人员: Claire Zhang那是什么声音？取决于你问谁，关节弹响要不然是缓解骨节的声音，或者是一个令人肉麻的讨厌的声音真的，那到底是什么声音？为什么弯曲你的关节的时候会发出那种嘎嘎的声响？科学家给出了很多种解释，有人说是韧带快速伸张严重的时候，是骨头之间的磨损但是最常见的解释是当你伸展关节是发出的像泡泡爆裂的声音是因为里面真的有泡泡你的手指中的关节是最容易发出响声的但是很多人 颈部和背部的椎骨关节也可以发出响声甚至臀部，手腕，肩膀等部位这些关节叫做滑膜关节，它们是人体中最灵活的关节骨头之间被一种粘性的液体填满，滑液，里面含有长长的，润滑的分子就像透明质酸和PRG4滑液的质地和蛋黄相似它的主要的功能是保护骨头帮助它们滑动滑液也含有吞噬细胞帮助清理关节里任何骨头或软骨碎片但是它让关节响的原因是滑液和你的体内其它液体一样，它含有很多溶解的气体分子扳指关节的人知道发出那个响声需要你去伸展关节比如，向后弯曲你的手指的时候，骨头会移动，越来越远骨头之间的距离变得越来越大但是滑液的量是不变的这样产生了一个低压区把滑液中的溶解的气体提了出来就像汽水里冒出的二氧化碳一样当你打开瓶盖的时候在关节里面，气体形成了泡泡但是泡泡很容易爆掉周边的液体挤压泡泡直到它爆裂泡泡内的气体分散在滑液中，在20分钟内慢慢的溶解回液体中这就是为什么同样关节会过一段时间才发出响声有些科学家认为有可能有两个爆裂声一个是当泡泡形成的时候，另一个是爆裂的时候关节发出响声暂时地使它变大，可能那些经常扳手指，脖子，颈椎的人说这个习惯使他们感到放松的原因就在于此吧但是你可能从一个关切的家人或一个懊恼的同事那里听到扳动关节会导致关节炎一个叫做唐纳德·昂格尔的医生也听过这一说法为了证明他的母亲说的是错误的，他持续50年搬动他的左手关节而右手的关节没有扳动过36,500次关节响之后，两只手都没有关节炎这一无私的献身科学的举动，使昂格尔获得了搞笑诺贝尔奖，一个滑稽模仿的诺贝尔奖，颁发给怪诞，却奇异有趣的科学成就昂格尔写道他的实验结果应该引发其它旧信念的调查比如吃菠菜的重要性陪审团还在审理中......至于关节响，有一个调查指出所有的关节伸张和泡泡爆裂会使你的双手膨胀减弱你的握力但是最大的问题貌似是惹恼你周边的人

**P224 2015-05-07 How in vitro fertilization (IVF) works - Nassim Assefi and Brian A. L**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=224)

In 1978, Louise Brown became the world's first baby to be born by in vitro fertilization, or IVF. Her birth revolutionized the field of reproductive medicine. Given that approximately one in eight heterosexual couples has difficulty conceiving, and that homosexual couples and single parents often need clinical help to make a baby, the demand for IVF has been growing. IVF is so common, that more than 5 million babies have been born through this technology. IVF works by mimicking the brilliant design of sexual reproduction. In order to understand IVF, we first need to take a look at the natural process of baby making. Believe it or not, it all starts in the brain. Roughly fifteen days before fertilization can happen, the anterior pituitary gland secretes follicle stimulating hormone, FSH, which ripens a handful of follicles of the ovary that then release estrogen. Each follicle contains one egg, and on average, only one follicle becomes fully mature. As it grows and continues to release estrogen, this hormone not only helps coordinate growth and preparation of the uterus, it also communicates to the brain how well the follicle is developing. When the estrogen level is high enough, the anterior pituitary releases a surge of luteinizing hormone, LH, which triggers ovulation and causes the follicle to rupture and release the egg. Once the egg leaves the ovary, it is directed into the Fallopian tube by the finger-like fimbriae. If the egg is not fertilized by sperm within 24 hours, the unfertilized egg will die, and the entire system will reset itself, preparing to create a new egg and uterine lining the following month. The egg is the largest cell in the body and is protected by a thick, extracellular shell of sugar and protein called the zona pellucida. The zona thwarts the entry and fusion of more than one sperm, the smallest cell in the body. It takes a man two to three months to make sperm, and the process constantly renews. Each ejaculation during sexual intercourse releases more than 100 million sperm. But only 100 or so will ultimately make it to the proximity of the egg, and only one will successfully penetrate through the armor of the zona pellucida. Upon successful fertilization, the zygote immediately begins developing into an embryo, and takes about three days to reach the uterus. There, it requires another three or so days to implant firmly into the endometrium, the inner lining of the uterus. Once implanted, the cells that are to become the placenta secrete a hormone that signals to the ovulated follicle that there is a pregnancy in the uterus. This helps rescue that follicle, now called the corpus luteum, from degenerating as it normally would do in that stage of the menstrual cycle. The corpus luteum is responsible for producing the progesterone required to maintain the pregnancy until six to seven weeks of gestation, when the placenta develops and takes over, until the baby is born approximately 40 weeks later. Now, how do you make a baby in a lab? In patients undergoing IVF, FSH is administered at levels that are higher than naturally occuring to cause a controlled overstimulation of the ovaries so that they ultimately produce multiple eggs. The eggs are then retrieved just before ovulation would occur, while the woman is under anesthesia, through an aspirating needle that is guided by ultrasound. Most sperm samples are produced by masturbation. In the laboratory, the identified eggs are stripped of surrounding cells and prepared for fertilization in a petri dish. Fertilization can occur by one of two techniques. In the first, the eggs are incubated with thousands of sperm and fertilization occurs naturally over a few hours. The second technique maximizes certainty of fertilization by using a needle to place a single sperm inside the egg. This is particularly useful when there is a problem with the quality of the sperm. After fertilization, embryos can be further screened for genetic suitability, frozen for later attempted pregnancies, or delivered into the woman's uterus via catheter. Common convention is to transfer the embryo three days after fertilization, when the embryo has eight cells, or on day five, when the embryo is called a blastocyst, and has hundreds of cells. If the woman's eggs are of poor quality due to age or toxic exposures, or have been removed due to cancer, donor eggs may be used. In the case that the intended mother has a problematic uterus, or lacks one, another woman, called the gestational carrier or surrogate, can use her uterus to carry the pregnancy. To increase the odds of success, which are as high as 40% for a woman younger than 35, doctors sometimes transfer multiple embryos at once, which is why IVF results in twins and triplets more often than natural pregnancies. However, most clinics seek to minimize the chances of multiple pregnancies, as they are riskier for mothers and babies. Millions of babies, like Louise Brown, have been born from IVF and have had normal, healthy lives. The long-term health consequences of ovarian stimulation with IVF medicines are less clear, though so far, IVF seems safe for women. Because of better genetic testing, delayed childbearing, increased accessibility and diminishing cost, it's not inconceivable that artificial baby making via IVF and related techniques could outpace natural reproduction in years to come.

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翻译人员: Jin Wu 校对人员: Mengyu Zheng1978年 路易斯·布朗 成为世界上第一个通过体外受精 诞生的婴儿 即试管婴儿他的诞生革新了生殖医学领域由于大概八分之一的异性恋夫妇会遭遇受孕困难以及同性伴侣和单身父/母亲通常都需要医学帮助来生宝宝对试管婴儿的需求一直在增长试管婴儿已经常见到 超过五百万的婴儿由此诞生试管婴儿技术模拟了 有性繁殖的高明设计为了理解什么是试管婴儿技术我们首先需要看一下 自然的婴儿诞生过程无论你信不信， 一切都是从大脑开始的大概在可以受孕的十五天前脑垂体前叶腺体 会分泌促卵泡激素 FSH它会使卵巢内壁的几个卵泡成熟然后卵泡会分泌雌性激素每个卵泡中含有一个卵子通常而言 只会有一个卵泡充分成熟随着卵泡的成长并持续 释放雌性激素这种激素不仅有助于 协调子宫的生长和预备还会与大脑沟通 卵泡的发展状况如何当雌性激素的水平足够高脑垂体前叶会急剧释放 大量促黄体生成激素 LH这种激素会触发排卵导致卵泡破裂并释放卵子卵子一旦离开卵巢就会被手指状的纤毛导入输卵管如果卵子没有在二十四小时之内受精未受精的卵子会消亡然后整个系统会恢复原状准备好在下个月产生 一个新的卵子和子宫内膜卵子是身体内最大的细胞由一个厚厚的、糖和 蛋白质构成的细胞外壳保护这层细胞外壳叫做透明带透明带阻隔超出一个的 多余精子进入，并将其融化而精子是身体内最小的细胞男人需要两到三个月 来生成精子这个过程不断持续更新性交过程中的每次射精 会释放超过一亿个精子但是只有一百个左右 会最终接近卵子而且只有一颗精子能够 成功的穿透透明带的铠甲一旦受精成功受精卵即刻开始发育成胚胎然后大概要用三天的时间抵达子宫在这里，它还需要大约三天时间才能牢固的在宫内膜 即子宫内膜上着床一旦着床 未来变成胎盘的细胞会释放激素来通知卵泡子宫内已经有了受精卵这会使得卵泡，现在称为黄体免于像往常一样在月经 周期的某个阶段退化黄体负责产生孕酮而孕酮可以维持孕期 到六至七个星期这时候胎盘会发育好并接管 孕期的维持一直到大概40周后婴儿出生那么在实验室里如何培养婴儿呢？进行体外受精的病人会被给予高于自然水平的 卵泡刺激素来保持对于卵巢的可控过度刺激从而最终产生多个卵子在排卵发生之前这些卵子会在母体麻醉的状态下通过由超声波引导的吸针被采集大部分精子样本会通过自慰产生在实验室筛选出来的 卵子会剥去细胞外壁在培养皿里等待受精受精可以通过两种技术之一来实现第一种方法中，卵子会同几千个精子一起培养在几个小时之内受精会自然发生第二种技术会使得受精的确定性最大化这种技术使用探针将单个精子置入卵子内当精子质量有问题时，这种方式尤其有用受精之后，胚胎可以 继续筛查基因适宜性可以冷冻用来今后怀孕也可以直接通过导管置入子宫惯常做法是在受精三日之后植入胚胎这个时候胚胎会有八个细胞或者在第五天植入 这个时候胚胎叫做胚囊已经有了数百个细胞如果女性的卵子因为年龄或者有毒环境接触 而质量不高或者因为癌症而摘除了卵巢则可以使用捐赠的卵子如果想要怀孕的母亲子宫 存在问题或者缺失另一个女人，作为受孕载体或者代孕者可以用她的子宫来孕育婴儿为增加成功几率在35岁以下的女性中 会高达40%医生有时候会一次植入多个胚胎这就是为什么试管婴儿出现 双胞胎或者三胞胎的几率会远远高于自然怀孕然而大部分诊所都在 试图将多胞胎的几率最小化因为对于母亲和孩子来说 多胞胎的风险会更高数以百万计的宝宝， 比如路易斯·布朗，通过试管婴儿技术出生过着正常健康的生活关于试管婴儿技术进行卵巢刺激的长期健康后果目前还不清晰尽管直到目前 试管婴儿看起来对女性是安全的因为有更好的基因测试推迟的分娩，更高的便捷度和降低的花费通过体外受精及相关技术来人工 培育婴儿，在未来可能会超过自然生育也不会是多么难以置信的事情

**P225 2015-05-07 The wars that inspired Game of Thrones - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=225)

As far as we know, Medieval England was never invaded by ice zombies, or terrorized by dragons, but it was shaken by a power struggle between two noble families spanning generations and involving a massive cast of characters with complex motives and shifting loyalties. If that sounds familiar, it's because the historical conflicts known as the Wars of the Roses served as the basis for much of the drama in Game of Thrones. The real-life seeds of war were sewn by the death of King Edward III in 1377. Edward's oldest son had died before his father, but his ten-year-old son, Richard II, succeeded to the throne ahead of Edward's three surviving sons. This skipping of an entire generation left lingering claims to the throne among their various offspring, particularly the Lancasters, descended from Edward's third son, and the Yorks, descended from his fourth son. The name of the ensuing wars comes from the symbols associated with the two families, the white rose of York and the red rose of Lancaster. The Lancasters first gained the throne when Richard II was deposed by his cousin Henry IV in 1399. Despite sporadic unrest, their reign remained secure until 1422, when Henry V's death in a military campaign left an infant Henry VI as king. Weak-willed and dominated by advisors, Henry was eventually convinced to marry Margaret of Anjou to gain French support. Margaret was beautiful, ambitious, and ruthless in persecuting any threat to her power, and she distrusted Richard of York, most of all. York had been the King's close advisor and loyal General, but was increasingly sidelined by the Queen, who promoted her favorite supporters, like the Earls of Suffolk and Somerset. York's criticism of their inept handling of the war against France led to his exclusion from court and transfer to Ireland. Meanwhile, mounting military failures, and corrupt rule by Margaret and her allies caused widespread discontent, and in the midst of this chaos, Richard of York returned with an army to arrest Somerset and reform the court. Initially unsuccessful, he soon got his chance when he was appointed Protector of the Realm after Henry suffered a mental breakdown. However, less than a year later, Henry suddendly recovered and the Queen convinced him to reverse York's reforms. York fled and raised an army once more. Though he was unable to directly seize the throne, he managed to be reinstated as Protector and have himself and his heirs designated to succeed Henry. But instead of a crown, York's head acquired a pike after he was killed in battle with the Queen's loyalists. His young son took up the claim and was crowned Edward IV. Edward enjoyed great military success against the Lancasters. Henry was captured, while Margaret fled into exile with their reportedly cruel son, Edward of Westminster. But the newly crowned King made a tragic political mistake by backing out of his arranged marriage with a French Princess to secretly marry the widow of a minor Noble. This alienated his most powerful ally, the Earl of Warwick. Warwick allied with the Lancasters, turned Edward's jealous younger brother, George, against him, and even briefly managed to restore Henry as King, but it didn't last. Edward recaptured the throne, the Lancaster Prince was killed in battle, and Henry himself died in captivity not long after. The rest of Edward IV's reign was peaceful, but upon his death in 1483, the bloodshed resumed. Though his twelve-year-old son was due to succeed him, Edward's younger brother Richard III declared his nephews illegitimate due to their father's secret marriage. He assumed the regency himself and threw the boys in prison. Though no one knows what ultimately became of them, after a while, the Princes disappeared and Richard's power seemed secure. But his downfall would come only two years later from across the narrow sea of the English Channel. Henry Tudor was a direct descendant of the first Duke of Lancaster, raised in exile after his father's death in a previous rebellion. With Richard III's power grab causing a split in the York faction, Henry won support for his royal claim. Raising an army in France, he crossed the Channel in 1485 and quickly defeated Richard's forces. And by marrying Elizabeth of York, elder sister of the disappeared Princes, the newly crowned Henry VII joined the two roses, finally ending nearly a century of war. We often think of historical wars as decisive conflicts with clearly defined winners and losers. But the Wars of the Roses, like the fiction they inspired, show us that victories can be uncertain, alliances unstable, and even the power of Kings as fleeting as the seasons.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=225)

翻译人员: Moire Yim 校对人员: Jenny Yang就我们所知，中世纪的英国不是被冰僵尸入侵，也不是受到恶龙的威胁，而是被两个贵族家庭之间的权力斗阵而动摇。这场斗争持续了世世代代，牵连众多人物，有的动机复杂、有的见风使舵——如果那些听着耳熟的话，那是因为电视剧《权力的游戏》大部分的背景都是取材于刚才提及的历史斗争："玫瑰战争"。战争的起因是从1377年，爱德华三世逝世开始。爱德华的长子死在他之前，但他十岁的儿子，理查二世，越过顺位继承人－爱德华的其他三个儿子， 继承了王位。由于略过了一代人的关系，导致这三位儿子的后代一直缠绕着王位继承的问题。尤以三儿子的后代兰卡斯特一族和四儿子的后代约克一族争论最激烈。玫瑰战争的名字，和两个家族的家徽有关。白玫瑰代表约克一族；红玫瑰则是兰开斯特一族。1399年，亨利四世罢免理查二世。兰卡斯特一族首先夺得王位。尽管社会偶尔有骚动，兰卡斯特一族的统治亦一直持续到1422年。然而，当亨利五世于军营病逝，留下了幼小的亨利六世继承王位。意志软弱，同时受到臣子们的蠱惑，亨利六世最终被说服迎娶安茹的玛格丽特， 换取法国的支持。玛格丽特既美丽，亦有野心、她冷酷地对待任何威胁到她的权力的人，其中她特别不信任约克一族的理查。约克一族世世代代也是国王的近臣和忠诚的将军，但皇后渐渐提拔她的支持者，如萨福克伯爵和森密实伯爵， 架空了约克一族。约克一族对于他们在法国战役中的无能作出批评，导致在议会中被驱逐，和流放爱尔兰。同时，战场上接二连三的失败，和玛格丽特与她的同党们迂腐的管治下，引起了社会广泛的不不满。在这一片混乱之中，理查·约克带领军队回归， 捉拿森密实伯爵和重组议会。尽管一开始并不成功， 理查很快便发现他的机会，在亨利六世的一次精神崩溃的时候，他被任命为护国将军。然而，一年之内，亨利六世突然康复，同时玛格丽特劝喻他推翻理查·约克的改革。理查逃亡，再次组织一支军队。虽然他没办法直接地夺取王位，但他成功地再次成为护国将军，自己和后代亦成为亨利六世的继承者。可惜的是，理查·约克没能成功戴上王冠，而是在与皇后的支持者对战时被一枝矛刺中而亡。他年幼的儿子继承了他，成为了爱德华四世。后来，爱德华四世沉醉于战胜兰卡丝一族的喜悦。亨利六世被俘获，玛格丽特则带着他们残暴为名的儿子威敏斯特的爱德华被迫流亡可是，新国王犯了一个可悲的政治错误。他没有信守承诺，迎娶法国公主，而是私底下和一个低级贵族的寡妇结婚。这使他失去了最有力的支持——华威伯爵。华威伯爵于是与兰卡斯特一族练手，连同爱德华四世爱妒的弟弟，乔治， 一起对付他。他们甚至成功地重新拥立亨利六世为国王。可惜，这并没有持续太久。爱德华重新夺回王位，兰卡斯特一族的王子则战死于战役中。亨利六世亦在俘获后不久逝世。爱德华四世的统治一直安然无事，直至1483年，他的逝世使到腥风血雨再次刮起。虽然，他12岁的儿子继承了他的王位，但是他的弟弟，爱德华三世声称侄子并没有继承权，只因为他是父亲的秘密婚姻下的结果。他成了摄政王，然后囚禁侄子们。尽管没人清楚他们的结果，但在王子们消失以后，理查德王位看上去再没有任何威胁。可惜，两年之后，他在英伦海峡迎来了他的没落。亨利·都铎是兰卡斯特公爵的直系子孙，在他父亲死于叛乱之后， 一直在流放之地长大。理查三世夺取权力的关系， 导致约克一族开始分裂。亨利亦赢得别人的支持，拥护他为王。在法国筹备一支军队以后， 1485年亨利横渡英伦海峡，并且迅速地击退了理查三世的军队。他后来迎娶了消失的王子们的姐姐—— 约克的伊丽莎白。新上任的亨利七世联合两个家族，结束了持续接近了一个世纪的战争。我们经常认为，历史上的战争都是黑白分明，有着绝对的胜者和败者。但在“玫瑰战争”中， 正如那本被他们启发的小说一样，告诉了我们，胜利不一定是肯定的，联盟不一定是稳固的，甚至是国王的权力也可以像是四季更迭般一样飘忽。-完-

**P226 2015-05-08 Sunlight is way older than you think - Sten Odenwald**

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You may know that it takes light a zippy eight minutes to reach us from the surface of the Sun, so how long do you think it takes light to travel from the Sun's core to its surface? A few seconds or a minute at most? Well, oddly enough, the answer is many thousands of years. Here's why. Photons are produced by the nuclear reactions deep in the core of our Sun. As the photons flow out of the core, they interact with matter and lose energy, becoming longer wavelength forms of light. They start out as gamma rays in the core, but end up as x-rays, ultraviolet or visible light as they near the surface. However, that journey is neither simple nor direct. Upon being born, each photon travels at a speed of 300,000 kilometers per second until it collides with a proton and is diverted in another direction, acting like a bullet ricocheting off of every charged particle it strikes. The question of how far this photon gets from the center of the Sun after each collision is known as the random walk problem. The answer is given by this formula: distance equals step size times the square root of the number of steps. So if you were taking a random walk from your front door with a one meter stride each second, it would take you a million steps and eleven days just to travel one kilometer. So then how long does it take for a photon generated in the center of the sun to reach you? We know the mass of the Sun and can use that to calculate the number of protons within it. Let's assume for a second that all the Sun's protons are evenly spread out, making the average distance between them about 1.0 x 10^-10 meters. To random walk the 690,000 kilometers from the core to the solar surface would then require 3.9 x 10^37 steps, giving a total travel time of 400 billion years. Hmm, that can't be right. The Sun is only 4.6 billion years old, so what went wrong? Two things: The Sun isn't actually of uniform density and photons will miss quite a few protons between every collision. In actuality, a photon's energy, which changes over the course of its journey, determines how likely it is to interact with a proton. On the density question, our models show that the Sun has a hot core, where the fusion reactions occur. Surrounding that is the radiative zone, followed by the convective zone, which extends all the way to the surface. The material in the core is much denser than lead, while the hot plasma near the surface is a million times less dense with a continuum of densities in between. And here's the photon-energy relationship. For a photon that carries a small amount of energy, a proton is effectively huge, and it's much more likely to cause the photon to ricochet. And for a high-energy photon, the opposite is true. Protons are effectively tiny. Photons start off at very high energies compared to when they're finally radiated from the Sun's surface. Now when we use a computer and a sophisticated solar interior model to calculate the random walk equation with these changing quantities, it spits out the following number: 170,000 years. Future discoveries about the Sun may refine this number further, but for now, to the best of our understanding, the light that's hitting your eyes today spent 170,000 years pinballing its way towards the Sun's surface, plus eight miniscule minutes in space. In other words, that photon began its journey two ice ages ago, around the same time when humans first started wearing clothes.

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翻译人员: Xinlong Zhang 校对人员: Kai Ma或许你知道太阳光从太阳表面到达地球需要8分钟但是你认为太阳光要多久从太阳中心到达太阳表面呢几秒钟 顶多一分钟？扶好下巴 答案是需要好几千年这里是解释光子在太阳中心深处通过核反应产生光子从太阳中心流出与物质相互作用损失能量形成波长更长的光波光波在核心以伽马射线形式产生但是在表面却衰减为X射线紫外线或者可见光然而过程十分复杂光子刚刚产生时候速度是每秒30万千米直到它撞击到另一个光子并且改变方向好比子弹一样每次撞击改变一次方向经过无数次撞击光子到达表面到底要经过多久就是一个随机漫步问题这个公式会告诉我们答案距离等于步长乘以步数的平方根 （一步指撞击间隔）如果你从你家前门出发每秒走一米并且每次随机换一次方向会花费你11天时间 经过100万米的路程才能离开1千米远的距离所以光子要用多久才能从太阳中心到达地球我们知道太阳的质量可以通过质量计算光子的数量不妨假设这一秒钟内光子均匀扩散假设它们每次传播0.1纳米的距离从太阳核心到表面是69万千米的距离用随机漫步的话3.9X10^37步大概需要4千亿年的时间桥豆麻袋 这不科学啊太阳公公才460万岁好嘛 所以一定是哪里出问题了这里有两点第一 太阳并不是均匀的第二 每次撞击之间光子会失去一些质子实际上 在这个过程中光子的能量是在不断变化的并且能量决定着与质子反应的可能性在密度这个问题上我们假设的是溶解反应在太阳的核心中发生围绕核心的是辐射传播区域再其外是通向表面的对流区域核心的物质比金属铅还要密集表面附近的连续密度等离子体相比之下稀疏了100万倍这是光子-能量的关系对于携带少量能量的光子而言质子的影响是巨大的很可能引起光子的反弹对于携带大量能量的光子而言质子的影响就很微小光子出发时相对于到达表面时候而言携带大量的能量现在我们用电脑运算一下先进的太阳内部模型计算出随机路程中数量的变化答案是17万年未来的发现也许会精确这个数字但是现在我们最好的理解是今天我们看到的阳光经历了17万年跌跌撞撞的路途别忘了还要再加上8分钟的太空之旅也就是说 在两个冰河世纪之前 人类刚开始穿衣服的时候今天的阳光就已经启程了

**P227 2015-05-14 Mansa Musa, one of the wealthiest people who ever lived - Jessica Smi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=227)

If someone asked you who the richest people in history were, who would you name? Perhaps a billionaire banker or corporate mogul, like Bill Gates or John D. Rockefeller. How about African King Musa Keita I? Ruling the Mali Empire in the 14th century CE, Mansa Musa, or the King of Kings, amassed a fortune that possibly made him one of the wealthiest people who ever lived. But his vast wealth was only one piece of his rich legacy. When Mansa Musa came to power in 1312, much of Europe was racked by famine and civil wars. But many African kingdoms and the Islamic world were flourishing, and Mansa Musa played a great role in bringing the fruits of this flourishing to his own realm. By strategically annexing the city of Timbuktu, and reestablishing power over the city of Gao, he gained control over important trade routes between the Mediterranean and the West African Coast, continuing a period of expansion, which dramatically increased Mali's size. The territory of the Mali Empire was rich in natural resources, such as gold and salt. The world first witnessed the extent of Mansa Musa's wealth in 1324 when he took his pilgrimage to Mecca. Not one to travel on a budget, he brought a caravan stretching as far as the eye could see. Accounts of this journey are mostly based on an oral testimony and differing written records, so it's difficult to determine the exact details. But what most agree on is the extravagant scale of the excursion. Chroniclers describe an entourage of tens of thousands of soldiers, civilians, and slaves, 500 heralds bearing gold staffs and dressed in fine silks, and many camels and horses bearing an abundance of gold bars. Stopping in cities such as Cairo, Mansa Musa is said to have spent massive quantities of gold, giving to the poor, buying souvenirs, and even having mosques built along the way. In fact, his spending may have destabilized the regional economy, causing mass inflation. This journey reportedly took over a year, and by the time Mansa Musa returned, tales of his amazing wealth had spread to the ports of the Mediterranean. Mali and its king were elevated to near legendary status, cemented by their inclusion on the 1375 Catalan Atlas. One of the most important world maps of Medieval Europe, it depicted the King holding a scepter and a gleaming gold nugget. Mansa Musa had literally put his empire and himself on the map. But material riches weren't the king's only concern. As a devout Muslim, he took a particular interest in Timbuktu, already a center of religion and learning prior to its annexation. Upon returning from his pilgrimage, he had the great Djinguereber Mosque built there with the help of an Andalusian architect. He also established a major university, further elevating the city's reputation, and attracting scholars and students from all over the Islamic world. Under Mansa Musa, the Empire became urbanized, with schools and mosques in hundreds of densely populated towns. The king's rich legacy persisted for generations and to this day, there are mausoleums, libraries and mosques that stand as a testament to this golden age of Mali's history.

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翻译人员: Pengpeng Wang 校对人员: Melody Tang如果有人问你，哪些人是历史上最富有的人你会想到谁的名字？也许是坐拥亿万身家的银行家， 或是商业大亨诸如比尔·盖茨、约翰·D·洛克菲勒想想非洲国王穆萨·凯塔一世吧他在公元14世纪统治马里帝国 （中世纪西非强大的伊斯兰教帝国）本名为曼莎·穆萨，也被称为万王之王他积累了巨大的财富这些财富让他成为历史上最富有的人之一事实上，他巨大的财富只是他留给后世 丰富的遗产中的冰山一角当曼莎·穆萨在1312年取得政权时同时期的欧洲大部分地区正饱受着 饥荒与内战的折磨但是许多非洲的王国和伊斯兰世界 却正蓬勃发展曼莎·穆萨在马里帝国的蓬勃发展 扮演了极重要的角色他将伊斯兰世界的繁荣成果引入了 自己的国家通过战略性的进攻，曼莎·穆萨吞并了 廷巴克图地区并在加奥市重新建立了政权他获得了在地中海与西非海岸间重要商贸路线的控制权他不断扩张，极大地增加了 马里帝国的领土范围马里帝国境内自然资源丰富盛产黄金，盐田万顷人们第一次见识到曼莎·穆萨的富有 是在1324年这一年，曼莎·穆萨踏上了他前往麦加 （伊斯兰教圣城）的朝圣之旅在朝圣之路上，他不计成本携带的物资可以延伸至目之所及的地方关于这次朝圣的记录，多为人们口口相传文献记载上也存有许多不同的说法所以很难详尽地描述朝圣途中的细节但是人们一致认为，这是一次 斥巨资的旅程历史学者们称有大量随从参与了 这次朝圣，包括数万军人、平民以及奴隶先遣团由500人组成，他们手握 金制权杖，身着丝制服装为数甚多的骆驼与马身上驮着 大量的金条他们沿途在开罗等城市停留据记载，他将大量金子用以捐助穷人、购买纪念品甚至沿途修建清真寺事实上，他这一大肆出资的举动， 很可能使当地经济变得不稳定造成严重的通货膨胀据记载，这次朝圣之旅持续了一年多当曼莎·穆萨回到马里帝国的时候关于他拥有数目惊人的财富的消息， 已经传遍了地中海各地马里帝国和国王曼莎·穆萨一时间 几乎成为了传奇而马里帝国被纳入1375年的加泰罗尼亚 地图则巩固了这一传奇加泰罗尼亚地图是中世纪欧洲最重要的 世界地图之一这个地图描绘了曼莎·穆萨一手握权杖， 一手托着闪闪发亮的金块的场景曼莎·穆萨真的将马里帝国和他本人 放入地图里但是曼莎·穆萨并不只关注物质上的富裕作为一个虔诚的穆斯林教徒， 他对廷巴克图地区有着极大的向往在被吞并前，廷巴克图已是西非的 文化和学术中心在完成了朝圣之旅后曼莎·穆萨立即在巴克图修建了 津加利贝尔清真寺这一清真寺由来自安达卢西亚 （西班牙一地区）的建筑家设计他还在此修建了重点的大学， 进一步提升这座城市的声誉并吸引了许多来自伊斯兰世界的 专家与学生在曼莎·穆萨的统治下， 马里帝国完成了城市化人口稠密的数百个城镇拥有 学校和清真寺曼莎·穆萨国王的富有传奇被代代流传时至今日，这些王室陵寝、图书馆， 以及清真寺仍旧伫立作为马里帝国历史辉煌时期的证明

**P228 2015-05-14 The complex geometry of Islamic design - Eric Broug**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=228)

In Islamic culture, geometry is everywhere. You can find it in mosques, madrasas, palaces and private homes. This tradition began in the 8th century CE during the early history of Islam, when craftsmen took preexisting motifs from Roman and Persian cultures and developed them into new forms of visual expression. This period of history was a golden age of Islamic culture, during which many achievements of previous civilizations were preserved and further developed, resulting in fundamental advancements in scientific study and mathematics. Accompanying this was an increasingly sophisticated use of abstraction and complex geometry in Islamic art, from intricate floral motifs adorning carpets and textiles, to patterns of tilework that seemed to repeat infinitely, inspiring wonder and contemplation of eternal order. Despite the remarkable complexity of these designs, they can be created with just a compass to draw circles and a ruler to make lines within them. And from these simple tools emerges a kaleidoscope multiplicity of patterns. So how does that work? Well, everything starts with a circle. The first major decision is how will you divide it up? Most patterns split the circle into four, five or six equal sections. And each division gives rise to distinctive patterns. There's an easy way to determine whether any pattern is based on fourfold, fivefold, or sixfold symmetry. Most contain stars surrounded by petal shapes. Counting the number of rays on a starburst, or the number of petals around it, tells us what category the pattern falls into. A star with six rays, or surrounded by six petals, belongs in the sixfold category. One with eight petals is part of the fourfold category, and so on. There's another secret ingredient in these designs: an underlying grid. Invisible, but essential to every pattern, the grid helps determine the scale of the composition before work begins, keeps the pattern accurate, and facilitates the invention of incredible new patterns. Let's look at an example of how these elements come together. We'll start with a circle within a square, and divide it into eight equal parts. We can then draw a pair of criss-crossing lines and overlay them with another two. These lines are called construction lines, and by choosing a set of their segments, we'll form the basis of our repeating pattern. Many different designs are possible from the same construction lines just by picking different segments. And the full pattern finally emerges when we create a grid with many repetitions of this one tile in a process called tessellation. By choosing a different set of construction lines, we might have created this pattern, or this one. The possibilities are virtually endless. We can follow the same steps to create sixfold patterns by drawing construction lines over a circle divided into six parts, and then tessellating it, we can make something like this. Here's another sixfold pattern that has appeared across the centuries and all over the Islamic world, including Marrakesh, Agra, Konya and the Alhambra. Fourfold patterns fit in a square grid, and sixfold patterns in a hexagonal grid. Fivefold patterns, however, are more challenging to tessellate because pentagons don't neatly fill a surface, so instead of just creating a pattern in a pentagon, other shapes have to be added to make something that is repeatable, resulting in patterns that may seem confoundingly complex, but are still relatively simple to create. Also, tessellation is not constrained to simple geometric shapes, as M.C. Escher's work demonstrates. And while the Islamic geometric design tradition doesn't tend to employ elements like fish and faces, it does sometimes make use of multiple shapes to craft complex patterns. This more than 1,000-year-old tradition has wielded basic geometry to produce works that are intricate, decorative and pleasing to the eye. And these craftsmen prove just how much is possible with some artistic intuition, creativity, dedication and a great compass and ruler.

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翻译人员: Tianshu Wang 校对人员: Diana Li在伊斯兰文化中，几何无处不在。在清真寺、宗教学校、宫殿和私人房屋里， 你都能觅得它的踪迹。这个传统始于 公元8世纪的伊斯兰教早期，那时的工匠们借鉴了 罗马和波斯文化中已经存在的图案，用它们转化出新的的视觉效果。这段历史时期是 伊斯兰文化的黄金年代，在此期间，许多早期文明的成果都被保存和进一步发展，带来了科研和数学的显著提升。随之而来的便是 伊斯兰艺术中对抽象和复合几何 愈发熟练的运用，从装饰着复杂花卉图案的地毯和纺织品，到看似无限重复的瓷砖图案，引人惊叹，激发对永恒次序的遐想。这些设计看起来很复杂，其实只需要一个圆规， 和一把在圆里画线的直尺就可以创造，而且从这些简单的工具中 诞生了千变万化的图案。这是怎么做到的呢？嗯，一切都是从一个圆开始的。首先，你要决定 准备如何分割它？大多数图案把圆分成 四个，五个或六个部分。每次分割 都增加了图案的独特性。有一个简单办法 判断图案是基于四重，五重，还是六重对称。许多图案包含花瓣环绕的星星。数数星星有几个角，或者多少片花瓣，就能知道这个图案 属于哪种类型。一颗有六个角 或被六片花瓣包围的星星，就属于六重对称。八片花瓣也属于四重对称，以此类推。这些设计还有一个秘方：一个隐藏的坐标格。虽然看不见，但对每个图案都很重要，在创作开始之前， 用这个坐标格确定构图的比例，保证图案的准确性，有助于创作伟大的新图案。让我们看一个例子， 这些元素是怎样结合到一起的。我们先在正方形里画一个圆， 把它八等分。然后我们可以画一对交叉线，在它们上面再画一对。这些线叫作图线，从中选取一部分，就成了的重复图案的基础。从相同的作图线中， 只要选择不同的部分就能得到许多不同的设计。通过一个叫“密铺”的过程，作图线组在网格中多次重复，最终就形成了完整的图案。通过选一组不同的作图线，我们可能会得到这个图案，或者那个。可能性无穷无尽。通过同样的步骤 还可以创作六重图案，只要让作图线把圆分成六份，然后密铺， 就能得到这样的东西了。几个世纪以来， 这个六重图案一直流行于伊斯兰世界，包括马拉喀什、阿格拉、科尼亚 和阿罕布拉。四重图案很适合方形网格， 六重图案和六边形网格很配。五重图案则是密铺的一大挑战因为五边形不能铺满一个平面，所以为了能重复，除了五边形， 还要加入其他形状，这就形成了更复杂的 令人目眩的图案，但创作起来仍然比较容易。所以，密铺并不限于简单的几何图形，就像M·C·埃舍尔的作品那样。虽然鱼和脸谱这样的元素不符合伊斯兰几何设计的传统，但有时多用几种形状， 确实有助于创造复杂图案。这项有一千多年历史的 与基本几何共舞的传统，给眼睛带来了 错综复杂的美妙享受。而这些工匠也证明了 一点艺术直觉、创造力、热情以及一个大圆规和一把直尺， 能带来多大成就。

**P229 2015-05-15 Debunking the myths of OCD - Natascha M. Santos**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=229)

There's a common misconception that if you like to meticulously organize your things, keep your hands clean, or plan out your weekend to the last detail, you might have OCD. In fact, OCD, which stands for obsessive compulsive disorder, is a serious psychiatric condition that is frequently misunderstood by society and mental health professionals alike. So let's start by debunking some myths. Myth one: repetitive or ritualistic behaviors are synonymous with OCD. As its name suggests, obsessive compulsive disorder has two aspects: the intrusive thoughts, images, or impulses, known as obsessions, and the behavioral compulsions people engage in to relieve the anxiety the obsessions cause. The kinds of actions that people often associate with OCD, like excessive hand washing, or checking things repeatedly, may be examples of obsessive or compulsive tendencies that many of us exhibit from time to time. But the actual disorder is far more rare and can be quite debilitating. People affected have little or no control over their obsessive thoughts and compulsive behaviors, which tend to be time consuming and interfere with work, school or social life to the point of causing significant distress. This set of diagnostic criteria is what separates people suffering from OCD from those who may just be a bit more meticulous or hygiene obsessed than usual. Myth two: the main symptom of OCD is excessive hand washing. Although hand washing is the most common image of OCD in popular culture, obsessions and compulsions can take many different forms. Obsessions can manifest as fears of contamination and illness, worries about harming others, or preoccupations with numbers, patterns, morality, or sexual identity. And compulsions can range from excessive cleaning or double checking, to the fastidious arrangement of objects, or walking in predetermined patterns. Myth three: individuals with OCD don't understand that they are acting irrationally. Many individuals with OCD actually understand the relationship between their obsessions and compulsions quite well. Being unable to avoid these thoughts and actions despite being aware of their irrationality is part of the reason why OCD is so distressing. OCD sufferers report feeling crazy for experiencing anxiety based on irrational thoughts and finding it difficult to control their responses. So what exactly causes OCD? The frustrating answer is we don't really know. However, we have some important clues. OCD is considered a neurobiological disorder. In other words, research suggests that OCD sufferers brains are actually hardwired to behave in a certain fashion. Research has implicated three regions of the brain variously involved in social behavior and complex cognitive planning, voluntary movement, and emotional and motivational responses. The other piece of the puzzle is that OCD is associated with low levels of serotonin, a neurotransmitter that communicates between brain structures and helps regulate vital processes, such as mood, aggression, impulse control, sleep, appetite, body temperature and pain. But are serotonin and activity in these brain regions the sources of OCD or symptoms of an unknown underlying cause of the disorder. We probably won't know until we have a much more intimate understanding of the brain. The good news is there are effective treatments for OCD, including medications, which increase serotonin in the brain by limiting its reabsorption by brain cells, behavioral therapy that gradually desensitizes patients to their anxieties, and in some cases, electroconvulsive therapy, or surgery, when OCD doesn't respond to other forms of treatment. Knowing that your own brain is lying to you while not being able to resist its commands can be agonizing. But with knowledge and understanding comes the power to seek help, and future research into the brain may finally provide the answers we're looking for.

**P229 2015-05-15 Debunking the myths of OCD - Natascha M. Santos**

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翻译人员: Zongzhen Yang 校对人员: Chie Yao有个常见的误解如果你喜欢一丝不苟的整理你的东西经常洗手或者无微不至的计划你的周末你就可能有强迫症。事实上，强迫症的全名是 强迫性神经官能症，是一个经常被社会和心理健康专业人士误解的精神疾病我们今天就破解一下关于强迫症的謎思謎思之一： 重复或仪式性的行为是强迫症的同义词顾名思义强迫性神经官能症包含了两方面：内在的想法、印象、或者冲动， 又称为强迫思维，以及为了疏缓这种 强迫思维导致的不安，而作出的强迫性行为。一提起强迫症，大家通常联想起比如频繁的洗手， 或者一而再地查看着东西。可能为有强迫性行为倾向的表现大部分的人偶而会有这种行为。但是真正的病症極为罕见 而且会令患者十分虚弱。受影响的患者无法控制自己的强迫性想法和行为这不仅耗费时间还会影响工作，学习和社交生活甚至会导致严重的忧虑这一系列的诊断标准 将强迫症患者和比常人更一丝不苟或 注意清洁的的正常人区分开来。謎思之二： 强迫症的一大症状为太常洗手虽然洗手是大多数人 眼中的典型强迫症表现强迫思维和行为是多种多样的强迫思维主要体现为 对污染和疾病的极度恐惧担心伤害到其他人，或者对数字、图案、道德、 性别认定的过分执着强迫性行为可以从过度清洁到反复检查,到对物体过分苛刻的安排，或是走在一定的图形上。謎思之三：有强迫症的人不知道自己表现的很不寻常。许多有强迫症的人其实理解自己的癖好和强烈衝动的关系。尽管他们意识到它的不合理性，还是无法避免那些想法和行为，这是强迫症使人 痛苦的原因之一强迫症患者称自己像发了疯一样因为不理性的想法而焦躁不安可是又无法控制自己的反应。究竟是什么导致了强迫症?让人灰心的答案是我们并不楚清。但是我们有一些很重要的线索。强迫症被认为是神经错乱。换句话说，研究发现强迫症的大脑其实被某种一定的方式所限制。研究发现三个大脑区块有很多种的社会行为和复杂认知,以及自主性动作感情和动机反应。另一个误区是强迫症与低血清素相关，血清素是一个可以在大脑结构中交流并且帮助控制如情绪，好斗，脉冲控制，睡眠，食欲，身体温度和疼痛等 重要过程的神经传递素。但是血清素和大脑区块活动 是否为强迫症的起因或者其他不知原因的症状 暗藏着病因。直到我们对大脑更理解之前可能不得而知了。好消息是已经有 有效的强迫症疗法了包括可以增加大脑血清素的药物从而阻止大脑细胞的再吸收，逐渐使患者对焦虑麻木的行为疗法，有的时候甚至用电痉挛疗法，或者当其他疗法没反应时 就做手术。知道你的大脑在对你撒谎，但却无法拒抗它的指令 是很苦恼的。但是有了知识与理解 也就有求助的力量以及未来对大脑的研究或许最终能给我们想要的答案。

**P230 2015-05-19 How batteries work - Adam Jacobson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=230)

You probably know the feeling. Your phone utters its final plaintive "bleep" and cuts out in the middle of your call. In that moment, you may feel more like throwing your battery across the room than singing its praises, but batteries are a triumph of science. They allow smartphones and other technologies to exist without anchoring us to an infernal tangle of power cables. Yet even the best batteries will diminish daily, slowly losing capacity until they finally die. So why does this happen, and how do our batteries even store so much charge in the first place? It all started in the 1780s with two Italian scientists, Luigi Galvani and Alessandro Volta, and a frog. Legend has it that as Galvani was studying a frog's leg, he brushed a metal instrument up against one of its nerves, making the leg muscles jerk. Galvani called this animal electricity, believing that a type of electricity was stored in the very stuff of life. But Volta disagreed, arguing that it was the metal itself that made the leg twitch. The debate was eventually settled with Volta's groundbreaking experiment. He tested his idea with a stack of alternating layers of zinc and copper, separated by paper or cloth soaked in a salt water solution. What happened in Volta's cell is something chemists now call oxidation and reduction. The zinc oxidizes, which means it loses electrons, which are, in turn, gained by the ions in the water in a process called reduction, producing hydrogen gas. Volta would have been shocked to learn that last bit. He thought the reaction was happening in the copper, rather than the solution. None the less, we honor Volta's discovery today by naming our standard unit of electric potential "the volt." This oxidation-reduction cycle creates a flow of electrons between two substances and if you hook a lightbulb or vacuum cleaner up between the two, you'll give it power. Since the 1700s, scientists have improved on Volta's design. They've replaced the chemical solution with dry cells filled with chemical paste, but the principle is the same. A metal oxidizes, sending electrons to do some work before they are regained by a substance being reduced. But any battery has a finite supply of metal, and once most of it has oxidized, the battery dies. So rechargeable batteries give us a temporary solution to this problem by making the oxidation-reduction process reversible. Electrons can flow back in the opposite direction with the application of electricity. Plugging in a charger draws the electricity from a wall outlet that drives the reaction to regenerate the metal, making more electrons available for oxidation the next time you need them. But even rechargeable batteries don't last forever. Over time, the repetition of this process causes imperfections and irregularities in the metal's surface that prevent it from oxidizing properly. The electrons are no longer available to flow through a circuit and the battery dies. Some everyday rechargeable batteries will die after only hundreds of discharge-recharge cycles, while newer, advanced batteries can survive and function for thousands. Batteries of the future may be light, thin sheets that operate on the principles of quantum physics and last for hundreds of thousands of charge cycles. But until scientists find a way to take advantage of motion to recharge your cell battery, like cars do, or fit solar panels somewhere on your device, plugging your charger into the wall, rather than expending one battery to charge another is your best bet to forestall that fatal "bleep."

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翻译人员: Zongzhen Yang 校对人员: Yolanda Zhang你或许知道那种感觉。你的手机发出最后的，可悲的哔哔声然后中断了你的通话。在那个瞬间，比起唱赞歌， 你更想把你的电池怒摔到房间的另一边，不过电池可是科学届的一项巨大成就。它们使智能手机和 其他科技在我们不需要随时携带恶魔般恼人的 电源线的情况下存在。即使如此， 连最好的电池也会逐日消耗，慢慢的失去它的容电量直到 最后再也无法供电。这为什么会发生呢？还有我们的电池最初是 如何存放如此多电荷的呢？这一切都始于18世纪80年代， 有两名意大利科学家Luigi Galvani和Alessandro Volta，还有一只青蛙。根据传说，Galvani在研究青蛙腿时，用一个金属的装置逆向刷理神经，使青蛙腿发生抖动。Galvani把这叫做动物电，他认为这是一种储存在生命体 某个特殊部位的电。但是Volta不同意，他认为是金属本身导致了腿的颤抖。这个争论最终以Volta的 一个创新实验宣告结束。他使用了一摞锌铜交互的金属层，每两层间都由浸泡过盐溶液的纸或布分开， 以此来验证他的想法。Volta的电池中发生的就是化学家们 如今称作氧化和还原的反应。锌被氧化了，这意味着它失去了电子，这些电子被水中的离子 通过还原反应吸走了，从而产生了氢气。Volta如果得知最后这一点的话 一定会很震惊。他以为反应是在铜层发生的，而不是在溶液中。尽管如此，我们如今仍然把电势的标准单位命名为伏特（Volt）， 以此表彰他的贡献。这个氧化还原周期创造了 两个物质间的电子流动，如果你将一个灯泡或吸尘器放在中间，你就会为它供电。18世纪后， 科学家们改进了Volta的设计。他们用充满化学粘浆的 干电池取代了化学溶液，但工作原理是一样的。一种金属被氧化，释放电子并做功，然后这些电子会进入被还原的物质中。但是任何电池的金属补给都是有限的，一旦金属的大部分被氧化， 电池就无法工作了。所以充电电池通过可逆转的氧化还原过程暂时解决了这个问题。电子可以通过充电作用从而发生逆向流动。接通充电器能够引入 墙壁插座中的电流，这一反应可以恢复金属的供电能力，当你下次需要的时候会有 更多电子参与氧化反应。但是充电电池也不可能永久持续供电。随着使用时间增加， 过程的反复会导致金属表面发生消耗和不规则缺损， 无法进行正常的氧化反应。电子再也无法形成电流通路，电池也就失去了供电功能。有些日常的充电电池只经过几百个充电周期就会坏掉，但是高级一些的电池可以存活并 正常工作长达几千个周期。未来的电池可能会变成很轻的薄片，依据量子物理的原理工作，可以完成几十万次的充电周期。但是直到科学们找到 通过运动充电的方法，像汽车的充电电池那样，或者将太阳能板安装到 你的移动设备上，将充电器插入墙壁，而非消耗一个电池 去为另一个装置充电，才是最好的预防致命的哔哔声的方法。

**P231 2015-05-21 The battle of the Greek tragedies - Melanie Sirof**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=231)

Good afternoon, ladies and gentlemen. Let us welcome you to the final day of dramatic battle between great tragedians. It is a spring day here in Ancient Greece. Nearly 17,000 patrons are filing into the Theatre of Dionysus to watch top playwrights, including favorites Aeschylus and Sophocles duke it out to see whose hero may be deemed most tragic, whose story most awful. Well Seacrestopolis, in last week's battle of the choruses, all 50 members of each playwright's chorus traveled back and forth across the stage, singing the strophe and antistrophe, telling misbegotten tales of woe. Today's first chorus is entering through the parados, taking their positions in the orchestra at the bottom of the stage. Mario Lopedokia, this is nothing we haven't seen before. All 50 members speaking from the depths of their souls. Wait, what is this? I've not seen this before, Seacrestopolis. There is one actor stepping out of choral formation, assuming an independent role in this play. Can you make out who it is? That looks like Thespis. It seems he's changing his mask, and taking on the role of another character. Incredible. Surely, Thespis will go down in history as the very first actor. He has changed the face of theater forever. And that was just the warm-up act. On to the main attraction. Aeschylus will have the stage first. Let's see what he does. We expect great things. Last competition, Sophocles beat him by a smidge, but Aeschylus is still considered the Father of Tragedy. Now, Aeschylus frequently competes at this festival, the city Dionysia. Though his plays are violent, the bloodshed is never seen by the audience, which allows the dramatic tension to take center stage. Let's see what he does today to try to win his title back. Here comes Aeschylus's chorus, but they seem to be missing quite a few people. What is going on here? Not only are they down a few people. There are two actors taking center stage. This is absolutely unheard of. He has build on Thespis's idea and added a second actor to the mix. Aeschylus is relying on the two individuals to tell the story. The dialogue possible in tragedy now has taken precedence over the chorus. No wonder he drastically shrunk its size. This applause is well deserved. The crowd has hushed. Sophocles's actors and chorus are taking the stage for the play, "Oedipus Rex." As usual, the chorus is set up in the orchestra. And what's this? Sophocles has added a third actor. Will this one-upmanship never end? Three actors, and they are changing their masks to take on several different roles as they weave the tale of Oedipus, a nice fellow who kills his father and marries his mother. Kills his father and marries his mother. That sounds pretty tragic to me. It is most tragic, Mario Lopedokia. Call me crazy, but I'm willing to bet that future generations will hold this play up as the perfect example of tragedy. Excuse me, Seacrestopolis. Oedipus has left the stage after realizing Jocasta was his wife and also his mother. Where has he gone? I can't even imagine. Wait. The messenger has stepped on stage and is telling us of the great king's actions. He says that Oedipus, upon finding his mother, wife, whatever, Jocasta, dead of her own hand in their incestuous bedroom, took the broaches from her dress and stabbed his eyes repeatedly. You can't blame the guy, can you? Bedded his mother, killed his father, is father and brother to his children. I might do the same. My friend, I do believe we've seen it all. Indeed, we have. There is nothing more tragic than Oedipus. And sure enough, the judges who have been chosen by lot from all over Greece are ready to announce the winner. Oh, folks! This is one for the history books. Dark horse playwright, Philocles, has taken first prize. What an upset. What a tragedy. What a night, folks. We have witnessed the laying of the foundation of modern theater and some great innovations: the shrinking of the chorus, the addition of three actors, and such catharsis. Doesn't a great tragedy just make you feel renewed and cleansed? It sure does, but now we are out of time. I'm Seacrestopolis, and I'm Mario Lopedokia. Peace, love and catharsis.

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翻译人员: 宇飞 郑 校对人员: shup2399 shup2399女士们先生们，下午好，让我们带你走近伟大悲剧家比赛的 最后一天。今天是古希腊春季的一天，近17000名观众坐满了 狄奥尼索斯剧场来看顶尖的剧作家们，最受喜爱的埃斯库罗斯和 索福克勒斯将大战一场，来看谁笔下的英雄最悲剧，谁笔下的故事最令人痛惜。诶，西科利多普利斯，在上周的合唱比赛中每个剧作家笔下合唱团的50个成员 在台上走来走去唱着诗节和回舞歌， 讲述着悲剧故事。今天第一只合唱团从剧院侧面走入，在舞台后方的乐队演奏处摆下了阵势。马里奥·洛佩图吉雅，这没什么新鲜的。50个人都在用他们的灵魂讲述，等等，这是什么？我从没有见过这个，西科利多普利斯。有一个演员从阵势中走了出来，担当起了这个剧里的独立角色。你能认出这是谁吗？像是泰斯庇斯（古希腊诗人）。他好像在换面具，然后又演起了另一个角色。难以置信！真的， 泰斯庇斯会成为第一个演员而名垂青史他永远地改变了剧院的面貌。而且那只是热身。接下来重头戏来了。埃斯库罗斯会先主导这个舞台。让我们看看他会做什么。期待他有好表现。上一场比赛中， 埃斯库罗斯惜败于索福克勒斯。却依然被认为是悲剧之父。现在，埃斯库罗斯经常在狄奥尼索西亚 这座城市的重大节日上参加比赛。虽然他的剧很暴力，但是观众们却从未真正见过杀戮。这也使舞台气氛一直保持紧张。让我们来看看他今天做什么 来赢回他的称号吧。埃斯库罗斯的合唱团来了。但是好像少了几个人。到底发生了什么？他们不仅少了几个人，居然还有两个演员站到了舞台中央。这绝对是从没听说过的。他在泰斯庇斯想法的基础上， 加上了第二个演员。埃斯库罗斯靠两个演员来讲这个故事。悲剧里独有的对话开始主导合唱。怪不得他把合唱团规模减小了。这确实值得热烈的掌声。现在，观众安静了下来。索福克勒斯的演员和合唱团开始演绎《俄狄浦斯》像往常一样，合唱团立在管弦乐队中间。诶，这是什么？索福克勒斯加上了第三个演员。一个一个加演员的戏码 是不是不会结束了？三个演员，他们通过不断更换面具， 来演绎不同角色在演绎《俄狄浦斯》中表演那个杀父娶母的好人，杀了自己父亲然后娶了母亲， 我觉得这个好悲剧啊这是最悲剧的吧，马里奥·洛佩图吉雅。说我疯吧，但是我愿意打赌，子孙后代会认为这是完美的典型的悲剧。不好意思，西科利多普利斯。俄狄浦斯知道约卡斯塔是 他的妻子也是他的母亲后，离开了舞台那他去哪儿了呢？我真的不知道。等等，信使走上了舞台，他会告诉我们那个伟大国王的行动。他说俄狄浦斯在发现他的母亲， 还是妻子，不管了，反正就是 约卡斯塔， 在他们乱伦的房间里自杀时，从她的裙子里取下饰针， 不断刺戳自己的眼睛。你能怪他吗？能吗？与母亲同房，杀死了父亲， 成为自己孩子的父亲兼兄弟。我觉得我要是他，会做同样的事儿。我的朋友，我相信我们是领教了。确实如此。不会有比俄狄浦斯更悲剧的了。当然，希腊人民通过抽签选出来的判官也准备好宣布赢家了。嗨，伙计们！这会是历史性的一刻。黑马剧作家，菲洛克里斯， 获得了第一名。这多伤心！多么悲剧的剧啊！多美好一夜啊，朋友们！我们见证了现代剧院奠基的根本。还有一些伟大的创新之举：不断缩减的合唱团，新加的三个演员。还有令人惊叹的情感净化。难道伟大的悲剧不能让你耳目一新吗？当然能，只是我们没时间了。我是西科利多普利斯。我是马里奥·洛佩图吉雅。和平，爱意，情感净化。

**P232 2015-05-21 What’s the big deal with gluten - William D. Chey**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=232)

Maybe you've recently seen the phrase "gluten-free" on food packaging, or take-out menus, shampoo bottles, apartment listings, the tag of your shirt, on a hammer, as a lower back tattoo, or in your friend's resume. Next time someone starts telling you about their newfound freedom from gluten, here are some questions you can ask, and the well-informed answers that your friend, being a reasonable individual making educated dietary choices, and by no means just following the latest diet craze, will tell you. What is gluten? Gluten is an insoluble protein composite made up of two proteins named gliadin and glutenin. Where might you encounter gluten? Gluten is found in certain grains, particularly wheat, rye and barley. What has gluten been doing for the previous entirety of human history, and why do you suddenly care about it? Gluten is responsible for the elastic consistency of dough and the chewiness of foods made from wheat flour, like bread and pasta. For some people, these foods cause problems, namely wheat allergy, celiac disease, and non-celiac gluten sensitivity. Wheat allergy is an uncommon condition that occurs when a person's immune system mounts an allergic response to wheat proteins, leading to mild problems, and in rare cases, a potential dangerous reaction called anaphylaxis. Celiac disease is an inherited disease, in which eating foods with gluten leads to inflammation and damage of the lining of the small intestine. This impairs intestinal function, leading to problems like belly pain, bloating, gas, diarrhea, weight loss, skin rash, bone problems like osteoporosis, iron deficiency, small stature, infertility, fatigue and depression. Untreated, celiac disease increases the risk of developing certain types of cancer. Celiac disease is present in one in every 100 to 200 persons in the U.S. When blood tests suggest the possibility of celiac, the diagnosis is confirmed with a biopsy. The most effective treatment is a gluten-free diet, which helps heal intestinal damage and improve symptoms. Some people don't have celiac disease or a wheat allergy, but still experience symptoms when they eat foods with gluten. These people have non-celiac gluten sensitivity. They experience painful gut symptoms and suffer from fatigue, brain fog, joint pain or skin rash. A gluten-free diet typically helps with these symptoms. So how many people actually have this gluten sensitivity you speak of? Gluten sensitivity's occurrence in the general population is unclear, but likely much more common than wheat allergy or celiac disease. Diagnosis is based on the development of symptoms, the absence of wheat allergy and celiac disease, and subsequent improvement on a gluten-free diet. There's no reliable blood or tissue test, partly because gluten sensitivity isn't a single disease, and has a number of different possible causes. For example, it may be the case that gluten can activate the immune system in the small intestine, or cause it to become leaky. But sometimes, people claiming gluten sensitivity are actually sensitive not to wheat proteins, but sugars found in wheat and other foods, called fructans. The human intestine can't break down or absorb fructans, so they make their way to the large intestine or colon, where they're fermented by bacteria, producing short-chain fatty acids and gases. This leads to unpleasant symptoms in some people with bowel problems. Another possible explanation behind gluten sensitivity is the nocebo effect. This occurs when a person believes something will cause problems, and because of that belief, it does. It's the opposite of the more well-known and much more fortuitous placebo effect. Given how much bad press gluten is getting in the media, the nocebo response may play a role for some people who think they're sensitive to gluten. For all these reasons, it's clear that the problems people develop when they eat wheat and other grains aren't exclusively due to gluten. So a better name than non-celiac gluten sensitivty might be wheat intolerance.

**P232 2015-05-21 What’s the big deal with gluten - William D. Chey**

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翻译人员: Yunxi Shi 校对人员: Chenlu Wang也许你最近常在食品包装袋外卖菜单，香波瓶子，公寓列表或者体恤衫上在铁锤上，在后背下部的纹身，或在你朋友的简历上看到“无谷蛋白“的字样。下次如果有人告诉你关于他们避免摄入谷蛋白以后有多么舒服自在你可以问问待会我告诉你的几个问题你一定会从你这个保持理性选择最佳饮食方案无论看似多疯狂也要遵从健康饮食的朋友身上获得一个信息量丰富的答案。什么是谷蛋白？谷蛋白是一种不能溶解的蛋白质组成由醇溶朊和麦谷蛋白两种蛋白质组成。你在哪儿可以见到谷蛋白？谷蛋白可以在某些特定的谷物中被发现，尤其是小麦、黑麦和大麦谷蛋白在之前的整个人类历史中起到了什么作用？为什么我们突然之间对它如此感兴趣？谷蛋白可以保持生面团的弹性和粘稠度以及由小麦粉做成的食物的咀嚼性比如面包和意大利面对于某些人来说，这些食物可能会带来麻烦即小麦过敏，脂泻病和非腹腔谷蛋白敏感性小麦过敏是一种不常见的情况人们的免疫系统对小麦蛋白产生过敏反应导致出现轻微的不良反应，极少数情况下也会出现严重的蛋白质过敏反应，这种过敏反应叫做刺激性接触性皮肤炎脂泻病是一种遗传病当吃进去的食物中含有谷蛋白的时候会导致发炎和小肠内壁损伤这会导致肠道功能损伤引发诸如腹痛、腹胀、多屁、腹泻体重下降、皮肤过敏、骨头问题比如骨质疏松症贫血、身材矮小、不孕、疲劳、压力等一系列疾病不进行治疗的脂泻病会增加患某些癌症的风险在美国，每100-200人中就有1人患有脂泻病当血液检测显示出潜在的腹腔疾病可能性时会利用腹腔活组织切片检查加以诊断。最有效的治疗方法就是不含谷蛋白的饮食这种方法可以帮助治愈肠道损伤以及缓解病症一些人没有脂泻病或者不会对小麦过敏但是吃了含有谷蛋白的食物的时候仍然有病症这些人患有非腹腔谷蛋白敏感性疾病他们经历着极度痛苦的胆炎症承受着疲劳、头脑发晕、关节疼痛或者皮肤过敏不含谷蛋白的饮食基本上可以帮助缓解以上症状所以到底多少人患有这种我们所说的非腹腔谷蛋白敏感性疾病？谷蛋白敏感性在总人口中的发病率现在还是未知数但是很有可能比小麦过敏和脂泻病更常见这种病的诊断基本上靠症状的发展排除小麦过敏和脂泻病以及食用不含谷蛋白的饮食以后身体的恢复来诊断现在还没有可靠地血液和组织检测一部分原因是因为非腹腔谷蛋白敏感性疾病不是一个单一的疾病它可能有一系列不同的发病原因比如，很有可能是这种情况谷蛋白可以在小肠中激发免疫系统的反应或者让它变得有漏洞但是有些时候，人们声称谷蛋白敏感性实际上敏感的对象不是小麦蛋白而是在小麦和其他食物中发现的一种糖，叫果聚糖人类的小肠不能分解或者吸收果聚糖所以它们直接到达了大肠或者结肠在那里它们被细菌发酵产生了短链脂肪酸和气体这使得某些人的肠部出现了令人不愉快的症状另一个对谷蛋白敏感性的可能的解释就是反安慰剂效应当一个人相信某事会导致某些问题的时候这个效应就会出现并且因为他们相信，身体就真的做出了相应的动作上述效应和更广为人知、更有效的"安慰剂效应"正好相反由于谷蛋白的媒体形象每况愈下，在这种情况下反安慰剂效应也许会影响到那些他们自认为对谷蛋白敏感的人们以上这些原因清楚地显示人们食用小麦等谷物时，遇到的种种问题不能完全归咎于谷蛋白给"非腹腔谷蛋白敏感性"更恰当的名字，可能是小麦不耐症

**P233 2015-05-26 How plants tell time - Dasha Savage**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=233)

In the 18th century, Swedish botanist Carolus Linnaeus designed the flower clock, a timepiece made of flowering plants that bloom and close at specific times of day. Linnaeus's plan wasn't perfect, but the idea behind it was correct. Flowers can indeed sense time, after a fashion. Mornings glories unfurl their petals like clockwork in the early morning. A closing white water lily signals that it's late afternoon, and moon flowers, as the name suggests, only bloom under the night sky. But what gives plants this innate sense of time? It's not just plants, in fact. Many organisms on Earth have a seemingly inherent awareness of where they are in the day's cycle. That's because of circadian rhythms, the internal timekeepers that tick away inside many living things. These biological clocks allow organisms to keep track of time and pick up on environmental cues that help them adapt. That's important, because the planet's rotations and revolutions put us in a state of constant flux, although it plays out in a repetitive, predictable way. Circadian rhythms incorporate various cues to regulate when an organism should wake and sleep, and perform certain activities. For plants, light and temperature are the cues which trigger reactions that play out at a molecular scale. The cells in stems, leaves, and flowers contain phytochromes, tiny molecules that detect light. When that happens, phytochromes initiate a chain of chemical reactions, passing the message down into the cellular nuclei. There, transcription factors trigger the manufacture of proteins required to carry out light-dependent processes, like photosynthesis. These phytochromes not only sense the amount of light the plant receives, but can also detect tiny differences in the distribution of wavelengths the plant takes in. With this fine-tuned sensing, phytochromes allow the plant to discern both time, the difference between the middle of the day and the evening, and place, whether it is in direct sunlight or shade, enabling the plant to match its chemical reactions to its environment. This makes for early risers. A few hours before sunrise, a typical plant is already active, creating mRNA templates for its photosynthesizing machinery. As the phytochromes detect increasing sunlight, the plant readies its light-capturing molecules so it can photosynthesize and grow throughout the morning. After harvesting their morning light, plants use the rest of the day to build long chains of energy in the form of glucose polymers, like starch. The sun sets, and the day's work is done, though a plant is anything but inactive at night. In the absence of sunlight, they metabolize and grow, breaking down the starch from the previous day's energy harvest. Many plants have seasonal rhythms as well. As spring melts the winter frost, phytochromes sense the longer days and increasing light, and a currently unknown mechanism detects the temperature change. These systems pass the news throughout the plant and make it produce blooming flowers in preparation for the pollinators brought out by warmer weather. Circadian rhythms act as a link between a plant and its environment. These oscillations come from the plants themselves. Each one has a default rhythm. Even so, these clocks can adapt their oscillations to environmental changes and cues. On a planet that's in constant flux, it's the circadian rhythms that enable a plant to stay true to its schedule and to keep its own time.

**P233 2015-05-26 How plants tell time - Dasha Savage**

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翻译人员: Yuanqing Edberg 校对人员: Gabriella Hu十八世纪的时候，一位瑞典植物学家Carolus Linnaeus设计了花钟表。一种用花做的时钟在一天中某个特定的时间开花和合拢。Linnaeus 的计划并不完美， 但是他的想法是对的。花朵在某种程度上的确可以感知时间，早晨的光线展开它们的花瓣， 就像清晨的发条装置。一朵合拢的白色的水莲意味着是下午。还有月光花，就像它的名字一样， 只在月光下开花。但是什么给了花天生的时间感觉？而且不只是植物地球上很多生物貌似 都有天生的时间感，知道它们在这一天中身处何时。这是因为昼夜的节律，许多生物都有内部计时这些生物钟让有机体记录时间，并且利用环境线索帮助他们适应。这很重要，因为行星的自转和公转，把我们放在一种不停波动的状态，不过它是以一种重复的， 可预知的方式在展现。昼夜节律整合各种线索来调节生物何时作息，和固定活动。对植物而言，光线和温度 是触发反应的线索，它可以作为分子生物测量表。根茎里的细胞，叶子和花朵都包含着 光敏色素，能够检测光线的分子。当这发生的时候， 光敏色素启动一系列的化学反应，把信息传到细胞核，在那儿，转录因子启动了蛋白的合成这种蛋白合成需要完成光依赖进程，比如光合作用。光敏色素不仅能感受植物收到光的量，而且能检测到吸收光谱的微小不同。带着这个微调感知光感色素可以让植物 辨别白天和晚上时间的不同，还可以辨别地点是向光还是在阴影处。使植物以化学反应来适应它的环境这使得有些植物早起，在太阳升起几小时之前就开始活动，为它的光合作用制造信息核糖核酸。当光敏色素检测到增加的阳光，植物就准备好它的捕光分子这样它就能够光合合成 在整个早晨生长。在它们收获了早晨的阳光后，植物就在剩下的一天里制造很长的能量链，这些能量链是多糖的形式，比如说淀粉。太阳落山了，一天的工作已经完成，不过植物在晚上还是在活动，在没有光的情况下，它们代谢并且生长。分解前一天的能量收获里得来的淀粉链。许多植物还有季节的韵律。当春天融化冬天的霜冻时，光敏色素感知渐增的阳光和白天，检测温度的变化是目前还不知的机制。这个系统在整株植物之间传递信息让它开花以准备由温暖天气带来的花粉传播。昼夜节律形成植物和环境之间的联络。这些波动来自植物自身。每一株都有自动的节律。即使如此，这些钟表能以它们的波动和暗示来适应环境的变化。在行星上面，这是不断的波动。是昼夜节律使得一株植物 真实地表达自己的作息时间并且保持自己的时间。

**P234 2015-05-26 The math behind Michael Jordan’s legendary hang time - Andy Peterson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=234)

Michael Jordan once said, "I don't know whether I'll fly or not. I know that when I'm in the air sometimes I feel like I don't ever have to come down." But thanks to Isaac Newton, we know that what goes up must eventually come down. In fact, the human limit on a flat surface for hang time, or the time from when your feet leave the ground to when they touch down again, is only about one second, and, yes, that even includes his airness, whose infamous dunk from the free throw line has been calculated at .92 seconds. And, of course, gravity is what's making it so hard to stay in the air longer. Earth's gravity pulls all nearby objects towards the planet's surface, accelerating them at 9.8 meters per second squared. As soon as you jump, gravity is already pulling you back down. Using what we know about gravity, we can derive a fairly simple equation that models hang time. This equation states that the height of a falling object above a surface is equal to the object's initial height from the surface plus its initial velocity multiplied by how many seconds it's been in the air, plus half of the gravitational acceleration multiplied by the square of the number of seconds spent in the air. Now we can use this equation to model MJ's free throw dunk. Say MJ starts, as one does, at zero meters off the ground, and jumps with an initial vertical velocity of 4.51 meters per second. Let's see what happens if we model this equation on a coordinate grid. Since the formula is quadratic, the relationship between height and time spent in the air has the shape of a parabola. So what does it tell us about MJ's dunk? Well, the parabola's vertex shows us his maximum height off the ground at 1.038 meters, and the X-intercepts tell us when he took off and when he landed, with the difference being the hang time. It looks like Earth's gravity makes it pretty hard for even MJ to get some solid hang time. But what if he were playing an away game somewhere else, somewhere far? Well, the gravitational acceleration on our nearest planetary neighbor, Venus, is 8.87 meters per second squared, pretty similar to Earth's. If Michael jumped here with the same force as he did back on Earth, he would be able to get more than a meter off the ground, giving him a hang time of a little over one second. The competition on Jupiter with its gravitational pull of 24.92 meters per second squared would be much less entertaining. Here, Michael wouldn't even get a half meter off the ground, and would remain airborne a mere .41 seconds. But a game on the moon would be quite spectacular. MJ could take off from behind half court, jumping over six meters high, and his hang time of over five and half seconds, would be long enough for anyone to believe he could fly.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=234)

翻译人员: Cissy Yun 校对人员: Jenny Yang迈克尔·乔丹曾说过“我不知有一天我是否会飞起来”“但我知道当我在空中时”“我有时会想永远也不落地”但是伊萨克·牛顿让我们知道上升的东西总会下降事实上，人类对于平面的滞空时间的极限或者说脚离地又触地的时间差不多是一秒钟是的，乔丹的著名的罚球是0.92秒当然，地心引力是使得物体在空中停留不长的原因地心引力会将物体以9.8m/s²的加速拉向地球表面在你跳起得那一刹那， 引力已经开始作用在你身上了对于我们熟以为知的引力可以推算出一个可以计算停留时间的简单等式这个等式显示出坠落物体离地面的高度等于物体本身离地的高度加上它最初的速度乘以在空中的时间（秒）加上½×9.8m/s²再乘以逗留时间的平方现在我们可以用这个等式来模拟乔丹的罚球比如说，乔丹从离地零米跳起时的垂直速度为4.51米每秒来看一下我们在坐标轴上模拟的情况因为这个等式是一个二次方程高度与时间的关系有一个抛物线的形状所以说，这个等式可以告诉我们什么呢？这个抛物线的顶点可以告诉我们MJ达到最高的高度是1.038米而x轴交点可以告诉我们他起跳和落地的时间 之间的不同便是在空中的时间看起来地心引力使得乔丹很难在空中逗留很长的时间但如果他是在其他地方打比赛呢？ 一个更遥远的地方在我们的近邻，金星上加速度为8.87m/s²，与地球很相近了如果乔丹是在金星上以与地球上相同的力气跳起他可以跳的比一米更高在空中还可以停留地比一秒更长这场比赛如果在木星上举行的话因为其24.92m/s²的加速度会变得无聊乔丹不但跳不到半米高而且在空中只能停留0.41秒但如果在月球上的话，这场比赛会变得十分精彩乔丹可以从中场跳起跳到六米高他在空中可以停留5.5秒这个时间足够让我们相信他是飞人乔丹

**P235 2015-05-27 How to detect a supernova - Samantha Kuula**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=235)

Just now, somewhere in the universe, a star exploded. There goes another one. In fact, a supernova occurs every second or so in the observable universe, and there is one on average every 25 to 50 years in a galaxy the size and age of the Milky Way. Yet we've never actually been able to watch one happen from its first violent moments. Of course, how would we? There are hundreds of billions of stars close enough that we could watch the supernova explosion break through the surface of the star. But we'd have to have our best telescopes focused on the right one at precisely the right time to get meaningful data. Suffice it to say, the odds of that happening are astronomically low. But what if we could anticipate a supernova before its light reached us? That may seem impossible. After all, nothing travels faster than the speed of light, right? As far as we know, yes. But in a race, fast doesn't matter if you take a detour while someone else beelines it for the finish line. For exactly that reason, photons don't win the supernova race to Earth. Neutrinos do. Here's why. There are two types of supernova. Type 1 is when a star accumulates so much matter from a neighboring star, that a runaway nuclear reaction ignites and causes it to explode. In type 2, the star runs out of nuclear fuel, so the gravitational forces pulling in overwhelm the quantum mechanical forces pushing out, and the stellar core collapses under its own weight in a hundredth of a second. While the outer reaches of the star are unaffected by the collapsed core, the inner edges accelerate through the void, smash into the core, and rebound to launch the explosion. In both of these scenarios, the star expels an unparalleled amount of energy, as well as a great deal of matter. In fact, all atoms heavier than nickel, including elements like gold and silver, only form in supernova reactions. In type 2 supernovae, about 1% of the energy consists of photons, which we know of as light, while 99% radiates out as neutrinos, the elementary particles that are known for rarely interacting with anything. Starting from the center of the star, the exploding matter takes tens of minutes, or even hours, or in rare cases, several days, to reach and break through the surface of the star. However, the neutrinos, thanks to their non-interactivity, take a much more direct route. By the time there is any visible change in the star's suface, the neutrinos typically have a several hour head start over the photons. That's why astronomers and physicists have been able to set up a project called SNEWS, the Supernova Early Warning System. When detectors around the world pick up bursts of neutrinos, they send messages to a central computer in New York. If multiple detectors receive similar signals within ten seconds, SNEWS will trigger an alert warning that a supernova is imminent. Aided by some distance and direction information from the neutrino detectors, the amateur astronomers and scientists alike will scan the skies and share information to quickly identify the new galactic supernova and turn the world's major telescopes in that direction. The last supernova that sent detectable neutrinos to Earth was in 1987 on the edge of the Tarantula Nebula in the large Magellanic Cloud, a nearby galaxy. Its neutrinos reached Earth about three hours ahead of the visible light. We're due for another one any day now, and when that happens, SNEWS should give you the opportunity to be among the first to witness something that no human has ever seen before.

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翻译人员: Haochen Wang 校对人员: Gabriella Hu刚刚，在宇宙的某一处，就有一颗恒星爆炸了。接着，又有一颗爆炸了。事实上，每秒种都有超新星。在巨大的宇宙里，每25至50年就会产生似银河系大小和年龄的星系。然而，我们从没机会目睹爆炸的瞬间。当然，这怎么可能呢？有上千亿颗恒星在我们可观察到的范围内演变超新星爆炸。但真正去取得有力的数据 首先需要一台先进望远镜以及它精准的对焦与时间的拿捏。不用多说，这个实践是很困难的。或许，我们可以尝试在光线传达到地球前 预测超新星的发生？这听起来不可能。毕竟，没有力量可以超越光速，不是吗？据我们所知，确实没有。不过，在竞赛中，速度不代表一切。相比绕路，走直径才能胜出。同样的道理最早往地球传达超新星的不是光子而是中微子。这就是原因：超新星分为两类。第一类是当一颗恒星从周围累积足够的物质后失控核反应启动并致其爆炸。在第二类中，恒星耗尽核燃料因此引力的作用压倒量子力使恒星的内核因自身重量的压力在百分之一秒内崩塌。虽然星系的外围不受内部的影响内缘在孔隙巨洞不断加速直到核心受到重击，而以此爆炸。在这两类情况下恒星将排出前所未有的能量以及大量物质。实际上，所有比镍重的原子，包括金和银只能在超新星爆炸中诞生。在第二类超新星中，大约1% 的能量是由光子组成的也就是我们所说的光。而其中的99%以中微子放射它们的基本粒子很少交涉。从恒星的中央爆炸物需要数分钟，或数小时甚至有些时候花几天时间来抵达和突破恒星的表层。相比之下，中微子的非交互性质促使它们选择更快的直径线路。在恒星表面发生明显变化前中微子就比光子占有时间上的优势。这就是为什么天文学家与物理学家建立了SNEWS项目，全称超新星早期预警系统。当探测器检测到微中子的存在时这些信息将被传输到位于纽约的中央计算机。如果多个探测器在十秒内同时检测到信号SNEWS会启动超新星爆炸警报。从微中子探测器提供的距离、方向等信息里业余的天文学家以及科学家可通过扫描天空以及分享资料从而识别新的超新星并且将世界最高级的望远镜转到那个方向。在1987年最新探测到往地球 发送中微子的超新星处于在蜘蛛星云边缘位于临近的大麦哲伦星系中。这些中微子比可见光提前三小时抵达地球。现在，随时都有可能发生超新星爆炸而当它发生的时候，SNEWS将给你一个千载难逢的机遇来见证人类从未见过的场景。

**P236 2015-05-27 Will future spacecraft fit in our pockets - Dhonam Pemba**

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When you picture a spaceship, you probably think of something like this, or this, or maybe this. What do they all have in common? Among other things, they're huge because they have to carry people, fuel, and all sorts of supplies, scientific instruments, and, in rare cases, planet-killing lasers. But the next real-world generation of spacecraft may be much, much smaller. We're talking fit-inside-your-pocket tiny. Imagine sending a swarm of these microspacecraft out into the galaxy. They could explore distant stars and planets by carrying sophisticated electronic sensors that would measure everything from temperature to cosmic rays. You could deploy thousands of them for the cost of a single space shuttle mission, exponentially increasing the amount of data we could collect about the universe. And they're individually expendable, meaning that we could send them into environments that are too risky for a billion dollar rocket or probe. Several hundred small spacecraft are already orbiting the Earth, taking pictures of outer space, and collecting data on things, like the behavior of bacteria in the Earth's atmosphere and magnetic signals that could help predict earthquakes. But imagine how much more we could learn if they could fly beyond Earth's orbit. That's exactly what organizations, like NASA, want to do: send microspacecraft to scout habitable planets and describe astronomical phenomena we can't study from Earth. But something so small can't carry a large engine or tons of fuel, so how would such a vessel propel itself? For microspacecraft, it turns out, you need micropropulsion. On really small scales, some of the familiar rules of physics don't apply, in particular, everyday Newtonian mechanics break down, and forces that are normally negligible become powerful. Those forces include surface tension and capillary action, the phenomena that govern other small things. Micropropulsion systems can harness these forces to power spacecraft. One example of how this might work is called microfluidic electrospray propulsion. It's a type of ion thruster, which means that it shoots out charged particles to generate momentum. One model being developed at NASA's jet propulsion laboratory is only a couple centimeters on each side. Here's how it works. That postage-stamp sized metal plate is studded with a hundred skinny needles and coated with a metal that has a low melting point, like indium. A metal grid sits above the needles, and an electric field is set up between the grid and the plate. When the plate is heated, the indium melts and capillary action draws the liquid metal up the needles. The electric field tugs the molten metal upwards, while surface tension pulls it back, causing the indium to deform into a cone. The small radius of the tips of the needles makes it possible for the electric field to overcome the surface tension, and when that happens, positively charged ions shoot off at speeds of tens of kilometers per second. That stream of ions propels the spacecraft in the opposite direction, thanks to Newton's third law. And while each ion is an extremely small particle, the combined force of so many of them pushing away from the craft is enough to generate significant acceleration. And unlike the exhaust that pours out of a rocket engine, this stream is much smaller and far more fuel efficient, which makes it better suited for long deep-space missions. These micropropulsion systems haven't been fully tested yet, but some scientists think that they will provide enough thrust to break small craft out of Earth's orbit. In fact, they're predicting that thousands of microspacecraft will be launched in the next ten years to gather data that today we can only dream about. And that is micro-rocket science.

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翻译人员: Joanna Ouyang 校对人员: Cissy Yun当你想象一架宇宙飞船时， 你的脑海中可能会出现它或者它，又或者它它们有什么共同之处呢？总的来说，它们十分巨大， 因为它们需要载人，需要装载燃料还需要装载各种各样的补给品 和科学仪器甚至，在非常时期 装载毁灭星球的镭射激光但是从现实世界的角度来说， 下一代的宇宙飞船可能会变得非常非常小我所说的小， 是指小到可以直接放进你的口袋的程度想象把一大群这样的微小型航天器 发射到宇宙的星系中去它们可以通过自身携带的复杂的点子感应器来探索遥远的恒星和行星他们能测量任何东西，从温度到宇宙射线仅仅需要发射一次航天器，你就能够操控数以万计的微小型航天器 飞向太空这极大地增加了我们能够在宇宙中采集的数据量而且，作为单个个体来说，他们可以算是消耗品也就是说，我们可以把它们送到那些造价高昂的火箭或者探测器 不能冒险探测的环境中去几百个小型航天器其实已经在绕地球轨道飞行了它们拍下外太空的照片收集各类数据比如地球大气层中细菌的行为特征还有发射磁信号来帮助预测地震但是设想一下，如果它们可以飞出地球轨道， 那我们将会收获多少东西呀！这就是许多组织，比如说 NASA（美国国家航空航天局），想做的事情发射微小型航天器去探索适合居住的星球或者描述在地球上无法研究的天文现象但是这么小的航天器 难以装载大引擎或者数以吨计的燃料那它要以什么动力向前推进呢？原来，对于微小型航天器来说，它需要的是非常轻微的微型推力有些人们熟知的物理学知识 并不能应用在它们身上举例来说，每天牛顿力学体系都在崩塌，许多平常被我们忽视的力变得无比强大这些力之中就包括表面张力和毛细引力还有那些其他小事上体现出来的现象微推进系统可以利用这些力量 来供微小型航天器使用关于这方面，我们可以举个例子叫做微射电流喷射推进这是一种离子推进器它可以通过喷射带电离子来产生动能NASA喷气推进实验室设计的一个模型只有几厘米大小让我们来看看它的工作原理那张邮票大小的金属板上覆盖着一百根纤细的针并且由一层低熔点的金属覆盖着， 比如说铟（第49号元素）一张金属网将位于这些针的上方并且一个在金属网和金属板之间 将会建立一个电场当金属板被加热的时候，铟就会融化随后毛细引力将液态的铟吸到针尖电场将融化的金属向上拖而表面张力则将融化的金属向下拉使铟变形成为圆锥状针尖极小的半径让电场力得以克服表面张力而当电场力克服表面张力时带正电的离子将以数万公里每秒的速度喷射而出由牛顿第三定律可知，这束离子流将推进航天器向相反的方向前进尽管每一个离子都是极其小的粒子但是无数个离子联合起来推动航天器的力量足以形成强有力的加速比起那些火箭引擎排出的大量气体这股离子流要小得多，而且也更省燃料这也让微小型航天器 更加适合长时间的外太空任务这些微小型航天器还没有完全测试完毕但是很多科学家任务他们能够提供足够的推力来让小型飞船飞出地球轨道事实上，他们预计， 数以千计的微小型宇宙飞船会在十年内被发射出去，用以收集那些我们现在看来难以企及的数据这就是微型火箭科学

**P237 2015-05-29 Can you solve the famously difficult green-eyed logic puzzle - Alex G**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=237)

Imagine an island where 100 people, all perfect logicians, are imprisoned by a mad dictator. There's no escape, except for one strange rule. Any prisoner can approach the guards at night and ask to leave. If they have green eyes, they'll be released. If not, they'll be tossed into the volcano. As it happens, all 100 prisoners have green eyes, but they've lived there since birth, and the dictator has ensured they can't learn their own eye color. There are no reflective surfaces, all water is in opaque containers, and most importantly, they're not allowed to communicate among themselves. Though they do see each other during each morning's head count. Nevertheless, they all know no one would ever risk trying to leave without absolute certainty of success. After much pressure from human rights groups, the dictator reluctantly agrees to let you visit the island and speak to the prisoners under the following conditions: you may only make one statement, and you cannot tell them any new information. What can you say to help free the prisoners without incurring the dictator's wrath? After thinking long and hard, you tell the crowd, "At least one of you has green eyes." The dictator is suspicious but reassures himself that your statement couldn't have changed anything. You leave, and life on the island seems to go on as before. But on the hundredth morning after your visit, all the prisoners are gone, each having asked to leave the previous night. So how did you outsmart the dictator? It might help to realize that the amount of prisoners is arbitrary. Let's simplify things by imagining just two, Adria and Bill. Each sees one person with green eyes, and for all they know, that could be the only one. For the first night, each stays put. But when they see each other still there in the morning, they gain new information. Adria realizes that if Bill had seen a non-green-eyed person next to him, he would have left the first night after concluding the statement could only refer to himself. Bill simultaneously realizes the same thing about Adria. The fact that the other person waited tells each prisoner his or her own eyes must be green. And on the second morning, they're both gone. Now imagine a third prisoner. Adria, Bill and Carl each see two green-eyed people, but aren't sure if each of the others is also seeing two green-eyed people, or just one. They wait out the first night as before, but the next morning, they still can't be sure. Carl thinks, "If I have non-green eyes, Adria and Bill were just watching each other, and will now both leave on the second night." But when he sees both of them the third morning, he realizes they must have been watching him, too. Adria and Bill have each been going through the same process, and they all leave on the third night. Using this sort of inductive reasoning, we can see that the pattern will repeat no matter how many prisoners you add. The key is the concept of common knowledge, coined by philosopher David Lewis. The new information was not contained in your statement itself, but in telling it to everyone simultaneously. Now, besides knowing at least one of them has green eyes, each prisoner also knows that everyone else is keeping track of all the green-eyed people they can see, and that each of them also knows this, and so on. What any given prisoner doesn't know is whether they themselves are one of the green-eyed people the others are keeping track of until as many nights have passed as the number of prisoners on the island. Of course, you could have spared the prisoners 98 days on the island by telling them at least 99 of you have green eyes, but when mad dictators are involved, you're best off with a good headstart.

**P237 2015-05-29 Can you solve the famously difficult green-eyed logic puzzle - Alex G**

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翻译人员: Rebecca Wang 校对人员: Zhuo Wang想象在一个岛上，一个疯狂的独裁者囚禁了100个完美的逻辑家他们没办法逃离，除了一个奇怪的规则在晚上任何囚犯都可以请求警卫放他走若他有绿眼睛，他就会被释放若不是，他就会被扔进火山口实际上，那一百个逻辑家都有绿眼睛但他们从出生起就住在那儿而且独裁者确保他们不会知道自己眼睛什么颜色那儿也没有反光表面所有水都装在不透明的容器里而且最重要的他们不能互相交流尽管他们每天早上点人数时都能看到彼此不仅如此，他们都知道 若没有绝对的把握会成功没人会尝试离开在人权组织的压力下那个独裁者勉强允许你访问那个岛并且和犯人说话时 要遵从以下条件：你只可陈述一个声明你不能告诉他们新的信息你说什么才能帮助这些犯人获得自由而不激怒这位独裁者呢？经过深思熟虑你告诉人群：你们当中 至少有一个人有绿眼睛独裁者持有怀疑的态度但还是告诉自己你的言论不会改变任何事情你离开了，岛上的生活依然照旧但在你访问后的第一百天早上所有的犯人都不见了每一个人都在前天晚上要求离开所以你是如何智胜独裁者的？意识到犯人的数量不固定也许能帮到你我们来把这个问题简化一下， 假设只有两个犯人，小红和小明彼此都能看到对方的绿眼睛他们心里清楚 也许只有对方有绿眼睛所以第一天，谁也没轻举妄动但当他们第二天早上又看到对方时他们得到了新的信息小红意识到如果小明看到了一个“非绿眼睛”的人在他旁边他就知道自己拥有绿眼睛第一天就会离开小明也同一时间想到了同样的事情两个人都在等这个事实告诉她或他的眼睛一定是绿色的之后的那天早上，他俩都走了现在想象第三个犯人小红小明和小刚各看到两个绿眼睛的人但不确定另外两人是不是也看到了一个或者两个绿眼睛的人他们第一天也和之前一样等着到了第二天，他们还是不确定小刚想：如果我没有绿眼睛小红和小明只是看着彼此那他们第二天早上就会都走了但当他第三天早上看到另外两人时他意识到那两人肯定也在观察他小红和小明在想同样的事情然后他们三人在第三天晚上都走了用这种归纳性推理我们可以看出这种模式会一直重复， 不论犯人的数量多少关键点是公识的概念来自哲学家David Lewis的创造新知识不在你的陈述里而在于你的声明同时陈述给了所有人现在呢，每个犯人除了知道他们中至少一个有绿眼睛也知道其他人都在观察记录他们能看到的所有绿眼睛的人而且所有人都知道每个人都是这么想的每个犯人不知道的是他们自己是不是别人观察记录的绿眼睛的人中的一员直到和犯人数量同等的夜数过去了才能确定当然啦，你也可以让犯人早98天离开这岛告诉他们至少99个人有绿眼睛但当疯狂独裁者在的时候，你最好做出明智的选择

**P238 2015-06-01 Football physics - The 'impossible' free kick - Erez Garty**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=238)

In 1997, in a game between France and Brazil, a young Brazilian player named Roberto Carlos set up for a 35 meter free kick. With no direct line to the goal, Carlos decided to attempt the seemingly impossible. His kick sent the ball flying wide of the players, but just before going out of bounds, it hooked to the left and soared into the goal. According to Newton's first law of motion, an object will move in the same direction and velocity until a force is applied on it. When Carlos kicked the ball, he gave it direction and velocity, but what force made the ball swerve and score one of the most magnificent goals in the history of the sport? The trick was in the spin. Carlos placed his kick at the lower right corner of the ball, sending it high and to the right, but also rotating around its axis. The ball started its flight in an apparently direct route, with air flowing on both sides and slowing it down. On one side, the air moved in the opposite direction to the ball's spin, causing increased pressure, while on the other side, the air moved in the same direction as the spin, creating an area of lower pressure. That difference made the ball curve towards the lower pressure zone. This phenomenon is called the Magnus effect. This type of kick, often referred to as a banana kick, is attempted regularly, and it is one of the elements that makes the beautiful game beautiful. But curving the ball with the precision needed to both bend around the wall and back into the goal is difficult. Too high and it soars over the goal. Too low and it hits the ground before curving. Too wide and it never reaches the goal. Not wide enough and the defenders intercept it. Too slow and it hooks too early, or not at all. Too fast and it hooks too late. The same physics make it possible to score another apparently impossible goal, an unassisted corner kick. The Magnus effect was first documented by Sir Isaac Newton after he noticed it while playing a game of tennis back in 1670. It also applies to golf balls, frisbees and baseballs. In every case, the same thing happens. The ball's spin creates a pressure differential in the surrounding air flow that curves it in the direction of the spin. And here's a question. Could you theoretically kick a ball hard enough to make it boomerang all the way around back to you? Sadly, no. Even if the ball didn't disintegrate on impact, or hit any obstacles, as the air slowed it, the angle of its deflection would increase, causing it to spiral into smaller and smaller circles until finally stopping. And just to get that spiral, you'd have to make the ball spin over 15 times faster than Carlos's immortal kick. So good luck with that.

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翻译人员: Zongzhen Yang 校对人员: Cissy Yun1997年，在一场法国与巴西之间的比赛中一名叫Robert Carlos的年轻巴西球员从35米外发了任意球没有任何通向球门的直线Carlos的尝试看起来是不可能他的射门让球飞过球员，但是就当球要出界时，它向左勾然后进门根据牛顿的第一定律一个物体会以同样的方向和矢量移动除非一个力被施加但Carlos踢球时，他已经给球速度和矢量了但是是什么力让球改变方向然后成为运动史以来最伟大的进球之一？诀窍是旋转Carlos从右下方踢球让球边绕轴心旋转，边向右侧高飞球从一个明显的直线起飞空气飞过两边使其变慢在一边，空气以球转的反方向旋转导致压力上升然而在另一边，空气以与球相同的方向旋转产生一部分低压区这个差异，使球向低压区弯曲这个现象叫做马格纳斯效应这种踢球，也被叫做香蕉球被经常使用而且它会让一场精彩的比赛更加精彩但是香蕉球所需要的精准度使其偏向墙然后进门，是非常困难的太高的话球会飞过球门太低的话会在旋转前击地角度太大的话会永远进不了球门角度不够大的话 防守者就可以拦截太慢的话球会早转弯，甚至不转太快的话球会转的太晚同样的物理理论使一个看起来不可能，没有收到任何帮助的的角球进球马格纳斯效应最初是被伊萨克·牛顿所记录在1670年，他打完一场网球后发现的这个原理同样适应于高尔夫球，飞碟和棒球在每个情况下，同样的事情总是发生球的旋转产生环绕的气流气压不等从而导致球向其旋转又有一个问题了从理论上来讲，你可以将球使劲踢足以让球转回你吗？可惜的是，不行即使球没有在冲撞中解体或者击中任何障碍物空气使其变慢偏转角会增加使螺旋变成越来越小的圆最终停止只是达到旋转你需要使球转的比Carlos不朽的进球快15倍那祝你好运

**P239 2015-06-02 How people rationalize fraud - Kelly Richmond Pope**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=239)

If you ask people whether they think stealing is wrong, most of them would answer, "Yes." And yet, in 2013, organizations all over the world lost an estimated total of 3.7 trillion dollars to fraud, which includes crimes like embezzlement, pyramid schemes, and false insurance claims. This wasn't just the work of a few bad apples. The truth is that many people are susceptible not only to the temptation to commit fraud but to convincing themselves that they've done nothing wrong. So why does fraud happen? While individual motivations may differ from case to case, the fraud triangle, a model developed by criminologist Donald Cressey, shows three conditions that make fraud likely: pressure, opportunity, and rationalization. Pressure is often what motivates someone to engage in fraud to begin with. It could be a personal debt, an addiction, an earnings quota, a sudden job loss, or an illness in the family. As for opportunity, many people in both public and private sectors have access to tools that enable them to commit and conceal fraud: corporate credit cards, internal company data, or control over the budget. The combination of pressure and being exposed to such opportunities on a daily basis can create a strong temptation. But even with these two elements, most fraud still requires rationalization. Many fraudsters are first time offenders, so in order to commit an act most would regard as wrong, they need to justify it to themselves. Some feel entitled to the money because they are underpaid and overworked and others believe their fraud is victimless, perhaps even planning to return the money once their crisis is resolved. Some of the most common types of fraud don't even register as such to the perpetrator. Examples include employees fudging time sheets or expense reports, taxpayers failing to report cash earnings, or service providers overbilling insurance companies. Though these may seem small, and can sometimes only involve hundreds of dollars, they all contribute to the big picture. And then there's fraud on a massive scale. In 2003, Italian dairy food giant Parmalat went bankrupt after it was found to have fabricated a 4 billion dollar bank account and falsified financial statements to hide the fact that its subsidiaries had been losing money. Because it was family controlled, corporate governance and regulator supervision were difficult, and the company likely hoped that the losses could be recouped before anyone found out. And it's not just corporate greed. Governments and non-profits are also susceptible to fraud. During her time as City Comptroller for Dixon, Illinois, Rita Crundwell embezzled over 53 million dollars. Rita was one of the country's leading quarter horse breeders and winner of 52 world championships. But the cost of maintaining the herd ran to 200,000 dollars per month. Because her position gave her complete control over city finances, she was easily able to divert money to an account she used for private expenses, and the scheme went unnoticed for 20 years. It is believed that Crundwell felt entitled to a lavish lifestyle based on her position, and the notoriety her winnings brought to the city. It's tempting to think of fraud as a victimless crime because corporations and civic institutions aren't people. But fraud harms real people in virtually every case: the employees of Parmalat who lost their jobs, the citizens of Dixon whose taxes subsidized horse breeding, the customers of companies which raise their prices to offset losses. Sometimes the effects are obvious and devestating, like when Bernie Madoff caused thousands of people to lose their life savings. But often they're subtle and not easy to untangle. Yet someone, somewhere is left holding the bill.

**P239 2015-06-02 How people rationalize fraud - Kelly Richmond Pope**

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翻译人员: Haochen Wang 校对人员: Zongzhen Yang如果你问人们偷窃是否是错误的大多数人会回答，“是的。”但在2013年，全世界的机构总共因商业欺诈损失3.7万亿美元。这些罪行包括挪用非法传销以及虚假医保报销。这不止是某些混蛋的作为。事实上，许多人被利益引诱并尝试说服自己没有做错任何事。那么，为什么商业欺诈会发生？虽然真正的动机因人而异舞弊三角一名刑事学家克雷西开发的理论模式阐述三个导致欺诈的因素：压力，机会，和借口。压力是最初促使人们犯罪的导火索。这包括个人债务上瘾业绩指标失业危机或家庭成员的疾病。至于机会，许多人可以轻易从公营、私营部门取得实施与掩饰欺诈罪行的手段：企业信用卡内部数据或预算控制。当压力以及裸露的机会在日常的基础上结合强大的邪念会被引发。但就算有了这两种因素多数欺诈罪还需要借口。很多行骗者属于初犯因此他们必须解释自己的犯罪行为。一些工资低、工作多的人认为这笔赃钱是应得的而其他人表示这是无受害人的案件并坚信自己会在处理好个人危机后，归还这笔钱。一些罪犯甚至不清楚自己的罪行。例子包括员工捏造表格以及费用报告纳税人漏报现金收益或服务提供商超额计费保险公司。虽然这些案件看起来很渺小并只牵涉几百美元它们展现的是一个普遍的现象。其次别忘了大规模的欺诈罪。在2003年, 一家名为帕玛拉特的意大利乳业巨头宣布破产起因牵涉到40亿美元银行存款的捏造与财务报告的篡改从而去隐藏子公司的经济损失。由于这是家族企业企业治理和监督管理相较困难帕玛拉特于是尝试在败露之前弥补损失。但这不只是企业贪婪的问题。政体和非营利机构同样会被困进诈骗危机。作为伊利诺斯州迪克森市的主计长丽塔·克伦德维尔挪用了5300万美元的资金。丽塔曾是美国有名的夸特马驯马者以及52次世界锦标赛的冠军。但供养畜群的费用高达每月20万。因为她的职位容许市级财政的全面掌握她可以轻易挪用公款到私人帐户以便个人消费并持续这项诡计20年。据说克伦德维尔的职务使她享身于奢侈的生活方式以及胜利带来的荣誉。同等欺诈于无受害人的案件是个可观的想法毕竟企业与民间机构不是人。但欺诈罪通常触犯并涉及到老百姓：帕玛拉特的员工因此失业迪克森市的市民需支出税金来资助养马业顾客们面临各大公司的提价去弥补损失。很多时候，这影响是显著并具有毁灭性的比如伯尼•麦道夫的行为曾导致上千人的生活储蓄流失。但常常，这罪行又狡猾又很难被揭发。不过，在某一处，某人绝对会承担该有的责任。

**P240 2015-06-08 How to make a mummy - Len Bloch**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=240)

Death and taxes are famously inevitable, but what about decomposition? As anyone who's seen a mummy knows, ancient Egyptians went to a lot of trouble to evade decomposition. So, how successful were they? Living cells constantly renew themselves. Specialized enzymes decompose old structures, and the raw materials are used to build new ones. But what happens when someone dies? Their dead cells are no longer able to renew themselves, but the enzymes keep breaking everything down. So anyone looking to preserve a body needed to get ahead of those enzymes before the tissues began to rot. Neurons die quickly, so brains were a lost cause to Ancient Egyptian mummifiers, which is why, according to Greek historian Herodotus, they started the process by hammering a spike into the skull, mashing up the brain, flushing it out the nose and pouring tree resins into the skull to prevent further decomposition. Brains may decay first, but decaying guts are much worse. The liver, stomach and intestines contain digestive enzymes and bacteria, which, upon death, start eating the corpse from the inside. So the priests removed the lungs and abdominal organs first. It was difficult to remove the lungs without damaging the heart, but because the heart was believed to be the seat of the soul, they treated it with special care. They placed the visceral organs in jars filled with a naturally occurring salt called natron. Like any salt, natron can prevent decay by killing bacteria and preventing the body's natural digestive enzymes from working. But natron isn't just any salt. It's mainly a mixture of two alkaline salts, soda ash and baking soda. Alkaline salts are especially deadly to bacteria. And they can turn fatty membranes into a hard, soapy substance, thereby maintaining the corpse's structure. After dealing with the internal organs, the priest stuffed the body cavity with sacks of more natron and washed it clean to disinfect the skin. Then, the corpse was set in a bed of still more natron for about 35 days to preserve its outer flesh. By the time of its removal, the alkaline salts had sucked the fluid from the body and formed hard brown clumps. The corpse wasn't putrid, but it didn't exactly smell good, either. So, priests poured tree resin over the body to seal it, massaged it with a waxy mixture that included cedar oil, and then wrapped it in linen. Finally, they placed the mummy in a series of nested coffins and sometimes even a stone sarcophagus. So how successful were the ancient Egyptians at evading decay? On one hand, mummies are definitely not intact human bodies. Their brains have been mashed up and flushed out, their organs have been removed and salted like salami, and about half of their remaining body mass has been drained away. Still, what remains is amazingly well-preserved. Even after thousands of years, scientists can perform autopsies on mummies to determine their causes of death, and possibly even isolate DNA samples. This has given us new information. For example, it seems that air pollution was a serious problem in ancient Egypt, probably because of indoor fires used to bake bread. Cardiovascular disease was also common, as was tuberculosis. So ancient Egyptians were somewhat successful at evading decay. Still, like death, taxes are inevitable. When some mummies were transported, they were taxed as salted fish.

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翻译人员: Bean Ink 校对人员: Quan Sun谁都会面临死亡，就如同所有人都得交税一样 但是 腐烂分解呢？见过木乃伊的都知道古埃及人费了很大功夫防止尸体腐烂那么，他们做的有多好呢？存活的细胞如今依然在进行自我修复酶还在分解被代谢的组织借此分解物重新合成新的组织但是，我们所说的“死亡”意味着什么？死亡的细胞不再自我修复但酶依然在分解组织所以 想要保持尸体完整就必须在组织腐烂前 获得这些酶神经元消亡的时间很短所以对于古埃及的木乃伊来说 脑组织是个麻烦这也就解释了 希腊历史学家希罗多德所提到的为什么木乃伊的制作过程第一步 是将长钉钉入头骨搅烂脑组织 让其从鼻孔排出然后将树脂注入头骨 以防止进一步腐烂。尽管脑组织可能是最先分解的 但更大的麻烦来源于内脏肝，胃，肠中含有消化酶与细菌一旦人死去，消化酶与细菌就开始 从内部侵蚀尸体所以牧师会首先 摘除肺部与腹部器官要想摘除肺又不伤及心脏 不太容易但是心脏被视为 灵魂归属之处需要特别小心的对待他们将内脏放在罐子里用泡碱这种天然盐保存同其他盐一样， 泡碱可以杀菌同时使天然消化酶失活 以防腐。但是泡碱不仅是一种盐其主要成分是纯碱与小苏打这两种碱性盐的混合物碱性盐杀菌效果极佳另外，碱性盐还可以将脂肪膜转化为 坚硬的泡状物质从而保持尸体原有形状搞定内部器官后牧师用大量泡碱填满尸体并冲洗干净为尸体消毒之后，牧师将尸体放在 充满泡碱的底座上这将持续35天左右 以保存尸体的皮肉尸体被移动时已被碱性盐完全脱水形成棕色坚硬物体虽然尸体并未腐烂但也会散发恶臭然后，牧师用树脂涂满身体表面 隔离恶臭再用含有香柏油的蜡状混合物覆于表面之后在尸体上缠满亚麻绳最后，木乃伊会被放在 层层嵌套的棺材中有些甚至是石棺那么，问题来了 古埃及人的尸体防腐做的有多好呢首先，木乃伊绝对不是完整的人体脑组织被捣碎取出器官被摘除 并像腌制腊肠一样用盐保存尸体由于脱水，重量减轻近半尽管如此，被完好保存的部分依然令人惊叹即使在数千年之后科研人员仍可以解剖木乃伊来断定其死因甚至还有可能会分离出DNA样本我们可从中获悉大量信息比如： 古埃及貌似空气污染严重可能是烘烤面包在室内生火引起心血管疾病与肺结核患者也很常见由此，古埃及人在尸体防腐方面还是有一定成就的就像我开始说的 税收，同死亡一样避免不了一些木乃伊在运输过程中 也要像咸鱼一样被征税

**P241 2015-06-15 How X-rays see through your skin - Ge Wang**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=241)

In 1895, a physicist named Wilhelm Roentgen was doing experiments with a cathode tube, a glass container in which a beam of electrons lights up a fluorescent window. He had wrapped cardboard around the tube to keep the fluorescent light from escaping, when something peculiar happened. Another screen outside the tube was glowing. In other words, invisible rays had passed through the cardboard. Wilhelm had no idea what those rays were, so he called them X-rays, and his discovery eventually won him a Nobel Prize. Here's what we now know was happening. When high energy electrons in the cathode tube hit a metal component, they either got slowed down and released extra energy, or kicked off electrons from the atoms they hit, which triggered a reshuffling that again released energy. In both cases, the energy was emitted in the form of X-rays, which is a type of electromagnetic radiation with higher energy than visible light, and lower energy than Gamma rays. X-rays are powerful enough to fly through many kinds of matter as if they are semi-transparent, and they're particularly useful for medical applications because they can make images of organs, like bones, without harming them, although they do have a small chance of causing mutations in reproductive organs, and tissues like the thyroid, which is why lead aprons are often used to block them. When X-rays interact with matter, they collide with electrons. Sometimes, the X-ray transfers all of its energy to the matter and gets absorbed. Other times, it only transfers some of its energy, and the rest is scattered. The frequency of these outcomes depends on how many electrons the X-rays are likely to hit. Collisions are more likely if a material is dense, or if it's made of elements with higher atomic numbers, which means more electrons. Bones are dense and full of calcium, which has a relatively high atomic number, so they absorb X-rays pretty well. Soft tissue, on the other hand, isn't as dense, and contains mostly lower atomic number elements, like carbon, hydrogen, and oxygen. So more of the X-rays penetrate tissues like lungs and muscles, darkening the film. These 2-D pictures are only useful up to a point, though. When X-rays travel through the body, they can interact with many atoms along the path. What is recorded on the film reflects the sum of all those interactions. It's like trying to print 100 pages of a novel on a single sheet of paper. To see what's really going on, you would have to take X-ray views from many angles around the body and use them to construct an internal image. And that's something doctors do all the time in a procedure called a CT, Computed Tomography scan, another Nobel Prize winning invention. Think of CT like this. With just one X-ray, you might be able to see the density change due to a solid tumor in a patient, but you wouldn't know how deep it is beneath the surface. However, if you take X-rays from multiple angles, you should be able to find the tumor's position and shape. A CT scanner works by sending a fan or cone of X-rays through a patient to an array of detectors. The X-ray beam is rotated around the patient, and often also moved down the patient's body, with the X-ray source tracing a spiral trajectory. Spiral CT scans produce data that can be processed into cross sections detailed enough to spot anatomical features, tumors, blood clots, and infections. CT scans can even detect heart disease and cavities in mummies buried thousands of years ago. So what began as Roentgen's happy accident has become a medical marvel. Hospitals and clinics now conduct over 100 millions scans each year worldwide to treat diseases and save lives.

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翻译人员: Yihan Liang 校对人员: Yuanqing Edberg1895年，有一位叫威廉.伦琴的物理学家用 一个阴极管做实验，这是一个玻璃装置， 里面有一道电子光束照亮荧光幕。他用纸板把阴极管包起来来阻止荧光消散，这时奇特的事情发生了。阴极管外面的一个屏幕发光了换句话说， 就是一道不可见光穿透纸板投射到外面来了威廉不知道这些光束叫什么， 于是就管它们叫做X光而他的这项发现为他赢得了诺贝尔奖以下就是他所发现的现象当具有高能量的电子在阴极管内撞击到金属物质时它们要么速度降低，释放一些额外能量或者把受到撞击的原子所带的电子敲掉，启动电子组合并继续释放能量在这两种情况下， 能量都通过X光的形式释放出来这也是一种电磁辐射的形式它的能量高于可见光，低于伽马射线X光足可以穿透任何物质好像任何物质都是半透明的一样X光的这一特性使得它在医学上应用广泛因为它可以下不伤害器官骨骼的情况下 获得器官以及骨骼的图像尽管有极小的可能它会引起分裂细胞突变像甲状腺组织这也就是为什么人们经常会用铅围裙去阻挡X光当X光与其他物质发生作用时，它会撞击电子有时候，X光会将它所有的能量转 移到其它物质上并被该物质所吸收，而有时， 它只转移了一部分能量剩余的能量则分散开来这些结果的发生频率取决于X光可能撞击到电子的数目物质的结构越紧密，碰撞越可能发生又或者如果该物质有较高的原子数，即较高电子数(原子数=核外电子数)， 碰撞也越可能发生骨头结构紧密并富有钙质, 即有较高电子数所以骨骼就更容易吸X光而其它较为柔软的物质，通常携带电子数较少像碳、氢、氧气等物质所以X光更容易穿透像肺和肌肉等柔软组织在屏幕显示黑色。但是这些2D影像并 不能非常清准确的反射人体的组织当X光穿过人体的时候它会和它途中遇到的所有电子发生反应因此反映到屏幕上面的影像是所有反应的汇总就像是我们将100页纸的内容都打在一页纸上一样如果你想要清楚地看清这些组织的结构你就需要从身体不同角度来照X光并用这些X光影像来构建出其内部的图像这就是医生们经常做的事情CT 扫描也赢得了诺贝尔奖我们可以这样理解CT扫描如果只有一道X光线你可能只能看到有肿瘤影像但是你并不能知道这个肿瘤有多深但是如果你从各个角度来做X光扫描你就能看清楚这个肿瘤的位置和形状CT扫描的工作原理是通过向探测器发射扇形或锥形的X光X光将会在患者体内旋绕X射线成螺旋形向下贯穿患者身体螺旋CT扫描产生的数据 能够被加工成截面足够详细到可以看清 具有解剖学特征的组织、肿瘤、血块和感染CT扫描还可以检测到千年木乃伊所有的心脏疾病和空腔症状所以说琴轮的意外发现已成为了一个医学奇迹。如今医院急诊所每年在全世界 要做超过一亿次的X光扫描来治愈疾病挽救生命。

**P242 2015-06-17 The benefits of a bilingual brain - Mia Nacamulli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=242)

¿Hablas español? Parlez-vous français? 你会说中文吗？ If you answered, "sí," "oui," or "会" and you're watching this in English, chances are you belong to the world's bilingual and multilingual majority. And besides having an easier time traveling or watching movies without subtitles, knowing two or more languages means that your brain may actually look and work differently than those of your monolingual friends. So what does it really mean to know a language? Language ability is typically measured in two active parts, speaking and writing, and two passive parts, listening and reading. While a balanced bilingual has near equal abilities across the board in two languages, most bilinguals around the world know and use their languages in varying proportions. And depending on their situation and how they acquired each language, they can be classified into three general types. For example, let's take Gabriella, whose family immigrates to the US from Peru when she's two-years old. As a compound bilingual, Gabriella develops two linguistic codes simultaneously, with a single set of concepts, learning both English and Spanish as she begins to process the world around her. Her teenage brother, on the other hand, might be a coordinate bilingual, working with two sets of concepts, learning English in school, while continuing to speak Spanish at home and with friends. Finally, Gabriella's parents are likely to be subordinate bilinguals who learn a secondary language by filtering it through their primary language. Because all types of bilingual people can become fully proficient in a language regardless of accent or pronunciation, the difference may not be apparent to a casual observer. But recent advances in brain imaging technology have given neurolinguists a glimpse into how specific aspects of language learning affect the bilingual brain. It's well known that the brain's left hemisphere is more dominant and analytical in logical processes, while the right hemisphere is more active in emotional and social ones, though this is a matter of degree, not an absolute split. The fact that language involves both types of functions while lateralization develops gradually with age, has lead to the critical period hypothesis. According to this theory, children learn languages more easily because the plasticity of their developing brains lets them use both hemispheres in language acquisition, while in most adults, language is lateralized to one hemisphere, usually the left. If this is true, learning a language in childhood may give you a more holistic grasp of its social and emotional contexts. Conversely, recent research showed that people who learned a second language in adulthood exhibit less emotional bias and a more rational approach when confronting problems in the second language than in their native one. But regardless of when you acquire additional languages, being multilingual gives your brain some remarkable advantages. Some of these are even visible, such as higher density of the grey matter that contains most of your brain's neurons and synapses, and more activity in certain regions when engaging a second language. The heightened workout a bilingual brain receives throughout its life can also help delay the onset of diseases, like Alzheimer's and dementia by as much as five years. The idea of major cognitive benefits to bilingualism may seem intuitive now, but it would have surprised earlier experts. Before the 1960s, bilingualism was considered a handicap that slowed a child's development by forcing them to spend too much energy distinguishing between languages, a view based largely on flawed studies. And while a more recent study did show that reaction times and errors increase for some bilingual students in cross-language tests, it also showed that the effort and attention needed to switch between languages triggered more activity in, and potentially strengthened, the dorsolateral prefrontal cortex. This is the part of the brain that plays a large role in executive function, problem solving, switching between tasks, and focusing while filtering out irrelevant information. So, while bilingualism may not necessarily make you smarter, it does make your brain more healthy, complex and actively engaged, and even if you didn't have the good fortune of learning a second language as a child, it's never too late to do yourself a favor and make the linguistic leap from, "Hello," to, "Hola," "Bonjour" or "你好’s" because when it comes to our brains a little exercise can go a long way.

**P242 2015-06-17 The benefits of a bilingual brain - Mia Nacamulli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=242)

翻译人员: melody yang 校对人员: Geoff Chen¿Hablas español? Parlez-vous français? 你会说中文吗？如果你回答 "si" "oui" 或"会" 而且用英文观看这视频你很可能是属於 这世上双语或多语的大多数之一除了旅行的时候比较容易或是看电影不用字幕会两种以上的语言，意谓你的大脑运作的方式和你单语的朋友不同怎样才叫真的会一种语言？语言能力通常以说和写二个主动部分和听和读二个被动部分衡量平衡双语的人两种语言的掌握能力是接近的世上大多数的双语者 以不同的比例了解和使用他们的语言根据他们的状况和每个语言不同的掌握双语者可以分成三种类型让我们以 Gabriella 为例她两岁的时候，家里从秘鲁移民到美国作为一个复合双语者Gabriella 对一个概念的两种语言码是同时发展的她同时学习英语和西班牙语来理解身边的世界他十几岁的哥哥，从另一方面来说 算是协调双语者用两组概念理解世界在学校学习英语在家还有跟朋友是说西班牙语Gabriella 的父母可能最后一种，从属双语者通过他们的母语来学习第二者语言除了口音和发音之外，所有类型的双语者最终都能透过学习流利使用语言因此如果只是随意观察 他们的差别并不明显但是最新的大脑成像技术让神经语言学家得以窥见学习语言对双言者的大脑有哪些影响众所周知，大脑的左半部擅於逻辑进程的分析右脑则是对於情绪和社交较於活跃不过这是程度上的问题 不是绝对的划分事实上语言和左右脑两边的功能都有关连随著年纪增长，大脑发展会侧重一边这是关键期假说的来由根据关键期假说理论小孩学语言比较容易因为他们发展中的大脑较有弹性让他们同时运用左右脑学习语言大部分的成人的语言学习是侧重於左脑如果这是事实，在小时候学习语言更能掌握社会和情感脉络相反地，最近的研究显示在长大这学习第二语言的人在第二语言上面临问题时 会采用更理性的方式相对於母语比较不会有情绪偏见不过不论你何时学习语言多语能力都能给予大脑相当好的益处有些甚至看得见像是大脑中的灰质呈现较高的密度包含脑中的神经元和突触投入第二语言时 大脑的特定区域也会更活跃而双语者大脑终生受到的锻炼可延缓一些疾病的发生 像是阿尔茨海默氏症和痴呆症达五年之久对於双语好处的认知现在看来直观稍早却会让专家们感到讶异六十年代以前人们认为双语会阻碍孩童的发展因为强迫孩童花太多精力在区别两种语言但是这是基於有缺陷的研究愈来愈多的近期研究指出在跨语言的测试中有些双语学生的反应时间和错误都增多同时也指出 转换语言需要更多的心力和注意力将触发大脑更多的活动并有可能加强背外侧前额叶皮层这是大脑用来执行功能、 解决问题、在不同任务间转换和专注在过滤不相干资讯的主要部位因此，双语可能不必然让你更聪明但确实会让你的大脑更健康、健全和更能专注即使你小时候未能学习第二种语言帮助自己永远不迟跨语言，就从 "Hello" 开始到 "Hola"、"Bonjour" 或 "你好"这让我们的大脑做一些小小的运动 从而带给我们长远的帮助

**P243 2015-06-22 How to grow a bone - Nina Tandon**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=243)

Can you grow a human bone outside the human body? The answer may soon be yes, but before we can understand how that's possible, we need to look at how bones grow naturally inside the body. Most bones start in a growing fetus as a soft, flexible cartilage. Bone-forming cells replace the cartilage with a spongy mineral lattice made of elements like calcium and phosphate. This lattice gets harder, as osteoblasts, which are specialized bone-forming cells, deposit more mineral, giving bones their strength. While the lattice itself is not made of living cells, networks of blood vessels, nerves and other living tissues grow through special channels and passages. And over the course of development, a legion of osteoblasts reinforce the skeleton that protects our organs, allows us to move, produces blood cells and more. But this initial building process alone is not enough to make bones strong and functional. If you took a bone built this way, attached muscles to it, and tried to use it to lift a heavy weight, the bone would probably snap under the strain. This doesn't usually happen to us because our cells are constantly reinforcing and building bone wherever they're used, a principle we refer to as Wolff's Law. However, bone materials are a limited resource and this new, reinforcing bone can be formed only if there is enough material present. Fortunately, osteoblasts, the builders, have a counterpart called osteoclasts, the recyclers. Osteoclasts break down the unneeded mineral lattice using acids and enzymes so that osteoblasts can then add more material. One of the main reasons astronauts must exercise constantly in orbit is due to the lack of skeletal strain in free fall. As projected by Wolff's Law, that makes osteoclasts more active than osteoblasts, resulting in a loss of bone mass and strength. When bones do break, your body has an amazing ability to reconstruct the injured bone as if the break had never happened. Certain situations, like cancer removal, traumatic accidents, and genetic defects exceed the body's natural ability for repair. Historical solutions have included filling in the resulting holes with metal, animal bones, or pieces of bone from human donors, but none of these are optimal as they can cause infections or be rejected by the immune system, and they can't carry out most of the functions of healthy bones. An ideal solution would be to grow a bone made from the patient's own cells that's customized to the exact shape of the hole, and that's exactly what scientists are currently trying to do. Here's how it works. First, doctors extract stem cells from a patient's fat tissue and take CT scans to determine the exact dimensions of the missing bone. They then model the exact shape of the hole, either with 3D printers, or by carving decellularized cow bones. Those are the bones where all of the cells have been stripped away, leaving only the sponge-like mineral lattice. They then add the patient's stem cells to this lattice and place it in a bioreactor, a device that will simulate all of the conditions found inside the body. Temperature, humidity, acidity and nutrient composition all need to be just right for the stem cells to differentiate into osteoblasts and other cells, colonize the mineral lattice, and remodel it with living tissue. But there's one thing missing. Remember Wolff's Law? An artificial bone needs to experience real stress, or else it will come out weak and brittle, so the bioreactor constantly pumps fluids around the bone, and the pressure tells the osteoblasts to add bone density. Put all of this together, and within three weeks, the now living bone is ready to come out of the bioreactor and to be implanted into the patient's body. While it isn't yet certain that this method will work for humans, lab grown bones have already been successfully implanted in pigs and other animals, and human trials may begin as early as 2016.

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翻译人员: Cissy Yun 校对人员: Sanqiang Xiao你可以在人体外长一根骨头吗？答案在不久的将来会变成是的但在了解这件事是如何达成之前我们首先要知道 骨头在身体里是如何自然生长的多数的骨头从胎儿长起，以柔韧的软骨组织存在骨形成细胞会和一种海绵状矿物晶格取代这种软骨组织这种物体是由钙和磷酸盐组成的晶格会越变越硬，并成为造骨细胞是一种专用的骨生长细胞它会产生更多的矿物质，提高骨头的强度晶格并非由活细胞、血管、神经或其它在特殊的管道中生长的活的组织组成在发展过程中大量的成骨细胞加固了骨架骨架可以保护器官，让我们移动也能产生血细胞的骨架，等等但单单这个最初的建造过程不足以让我们的骨头变得强壮及有功能如果你拿着一根这样子的骨头附上肌肉试着用它去举起一个较重的物体这根骨头很有可能会在强压下折断这一般不会在我们身上发生因为我们的细胞会持续地在身体各处需要用到骨头的地方加固并建造骨头这种理论来自于沃尔夫定律但是，形成骨头的物质是一种有限的资源这种新加固的骨头只有在物质足够的情况下才能产生幸运的是，成骨细胞，这个建造者拥有一个相对的细胞，称为破骨细胞，即循环者破骨细胞会用酸与酶降解不需要的矿物晶格从而使得成骨细胞可以制造更多的物质宇航员在太空轨道上必须时常运动的重要原因之一是失重导致的骨骼张力缺失根据沃尔夫定律中所提到的这使得破骨细胞变得比成骨细胞更活跃导致骨骼质量和力量的减少当骨头断掉后，你的身体有一项惊人的能力来重新建造断骨，恢复成未断之前的状态但有些情况，例如去除癌细胞外伤事故和基因缺陷则超出了了身体自己恢复的能力历史上的一些填充由此引发的孔洞的方法有： 用金属填充用动物的骨头来代替或采用他人捐献的骨头但是这些都不是理想的方法 因为他们都有可能会引起感染或是被人体的免疫系统排斥而且它们的功能并不像健康的骨头那样齐全一个理想的解决方法便是 用伤者自身的细胞重新制造一根根据孔洞的形状来订制这其实也是科学家正在尝试做的事他们是这么做的首先，医生会从伤者的脂肪组织中 提取出干细胞然后做CT扫描来确定缺骨的具体尺寸他们然后做出这个空洞形状的精准模型可以用3D打印也可以在脱细胞牛骨上挖刻出这个形状这些骨头上的细胞全都被剔除出去只剩下类似海绵一样的矿物晶格科学家接着会把伤者的干细胞 填入这些晶格之中然后放入生物反应器这是一个可以模仿身体内部环境的仪器温度，湿度，酸度和营养成分这些都需要调到合适的程度促使干细胞分裂成为成骨细胞和其他细胞在矿物晶阁上增殖然后用活组织来重塑但是还缺了一件事情记得沃尔夫定律吗？人造的骨头需要承受真实的压力不然的话，它会轻易地断掉或碎裂生物反应器会持续地在骨头周围泵入液体形成压力会让成骨细胞增强骨密度一切就绪，在三个星期后一根活骨便可以从生物反应器中取出并被移植到伤者的身体里虽然这个方法是否适用于人体还未确定实验室培养的骨头已经成功移植到猪与其他动物的体中而人体试验最早可能会在2016年开始

**P244 2015-06-25 Why do blood types matter - Natalie S. Hodge**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=244)

It's often said that despite humanity's many conflicts, we all bleed the same blood. It's a nice thought but not quite accurate. In fact, our blood comes in a few different varieties. Our red blood cells contain a protein called hemoglobin that binds to oxygen, allowing the cells to transport it throughout the body. But they also have another kind of complex protein on the outside of the cell membrane. These proteins, known as antigens, communicate with white blood cells, immune cells that protect against infection. Antigens serve as identifying markers, allowing the immune system to recognize your body's own cells without attacking them as foreign bodies. The two main kinds of antigens, A and B, determine your blood type. But how do we get four blood types from only two antigens? Well, the antigens are coded for by three different alleles, varieties of a particular gene. While the A and B alleles code for A and B antigens, the O allele codes for neither, and because we inherit one copy of each gene from each parent, every individual has two alleles determining blood type. When these happen to be different, one overrides the other depending on their relative dominance. For blood types, the A and B alleles are both dominant, while O is recessive. So A and A gives you type A blood, while B and B gives you type B. If you inherit one of each, the resulting codominance will produce both A and B antigens, which is type AB. The O allele is recessive, so either of the others will override it when they're paired, resulting in either type A or type B. But if you happen to inherit two Os, instructions will be expressed that make blood cells without the A or the B antigen. Because of these interactions, knowing both parents' blood types lets us predict the relative probability of their children's blood types. Why do blood types matter? For blood transfusions, finding the correct one is a matter of life and death. If someone with type A blood is given type B blood, or vice versa, their antibodies will reject the foreign antigens and attack them, potentially causing the transfused blood to clot. But because people with type AB blood produce both A and B antigens, they don't make antibodies against them, so they will recognize either as safe, making them universal recipients. On the other hand, people with blood type O do not produce either antigen, which makes them universal donors, but will cause their immune system to make antibodies that reject any other blood type. Unfortunately, matching donors and recipients is a bit more complicated due to additional antigen systems, particular the Rh factor, named after the Rhesus monkeys in which it was first isolated. Rh+ or Rh- refers to the presence or absence of the D antigen of the Rh blood group system. And in addition to impeding some blood transfusions, it can cause severe complications in pregnancy. If an Rh- mother is carrying an Rh+ child, her body will produce Rh antibodies that may cross the placenta and attack the fetus, a condition known as hemolytic disease of the newborn. Some cultures believe blood type to be associated with personality, though this is not supported by science. And though the proportions of different blood types vary between human populations, scientists aren't sure why they evolved; perhaps as protection against blood born diseases, or due to random genetic drift. Finally, different species have different sets of antigens. In fact, the four main blood types shared by us apes seem paltry in comparison to the thirteen types found in dogs.

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翻译人员: anastasia huang 校对人员: Yingxue Gao人们常说，除去人性中的诸多冲突，我们都流着同样的血。这种想法很好，但并不完全准确。事实上，我们的血液由几种成分构成。我们的红细胞包含一种能携带氧气的称为血红蛋白的的蛋白质，它能让细胞将氧气输送到全身。但在细胞膜外，它们拥有另一种复杂的蛋白质。这些蛋白质，如抗原负责与白细胞进行交流，如免疫细胞则负责抵御感染。抗原充当着识别标记者的身份，它让免疫系统识别出你体内自己的细胞而不会将他们当作外来的物质进行攻击。这两种主要的抗原A和B决定了你的血型。但仅从这两种抗原我们怎么得到四种血型的呢？这些抗原被三种不同的等位基因进行编码，成为特定基因的种群。A和B基因进行编码成为A和B抗原，O基因则一个都不是。因为我们从每一个父母那继承了每个基因的复制品，每个人拥有两个决定血型的等位基因。当这些基因出现不同时，根据它们间相对的主导地位其中一个会覆盖另一个。对于血型来说，A和B都是显性的，O则是隐性的。所以A和A组合产生A型血，B和B组合产生B型血。如果你每一种基因继承了一个，根据共显性会同时生产出A和B抗原，这就是AB型血。O基因是隐性i的，所以当它和其他基因配对时都将被覆盖，成为A型血或B型血。但如果你继承了两个O基因时，将会产生出没有A和B抗原的血球。因为这些基因间的相互作用，了解父母双方的血型能让我们预测他们孩子血型的相对概率。为什么血型那么重要呢？对于输血来说，找对血型是关乎生死的大事。如果给一个A型血的人输了B型血，反之亦然，他们的抗体会拒绝外来抗原并攻击它们，将可能导致输入的血凝块。但由于AB型血的人生产A和B两种抗原，他们对A和B型血都不产生抗体，所以他们对于两种血都能安全接受，这使得AB型血的人“来者不拒”。另一方面，O型血的人不生产任何一种抗原，这就使得他们成为了大众捐献者，但这也会导致他们的免疫系统制造抗体来拒绝其他任何一种血型。不幸的是，由于额外的抗原系统，将捐献者与接收者匹配稍微有点复杂。尤其是Rh因子，这个因子是以恒河猴第一次被隔离之后的地方命名的。Rh+或Rh-指的在Rh血群系统中的D抗原的存在或缺少。除了阻碍一些输血外，它还会在怀孕过程中产生严重的并发症。如果一个Rh-型的妈妈怀着一个Rh+型的宝宝，她的体内会产生Rh抗体，这种抗体会通过胎盘攻击胎儿。还有一种情况就是大家所熟知的新生儿的溶血病。一些文化认为血型与一个人的个性密切相关，虽然这并未经科学证实。虽然不同血型的比例在人群中大不相同，科学家也不能确定为什么它们会这样发展；也许是为了防止血液传播疾病，或者只是任意的基因漂流。不同的种群有不同的抗体。事实上，我们i这些类人猿所拥有的四种血型与狗的十三种血型相比简直微不足道。

**P245 2015-06-26 History vs. Genghis Khan - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=245)

He was one of the most fearsome warlords who ever lived, waging an unstoppable conquest across the Eurasian continent. But was Genghis Khan a vicious barbarian or a unifier who paved the way for the modern world? We'll see in "History vs. Genghis Khan." "Order, order. Now who's the defendant today? Khan!" "I see Your Honor is familiar with Genghis Khan, the 13th century warlord whose military campaigns killed millions and left nothing but destruction in their wake." "Objection. First of all, it's pronounced Genghis Kahn." "Really?" "In Mongolia, yes. Regardless, he was one of the greatest leaders in human history. Born Temüjin, he was left fatherless and destitute as a child but went on to overcome constant strife to unite warring Mongol clans and forge the greatest empire the world had seen, eventually stretching from the Pacific to Europe's heartland." "And what was so great about invasion and slaughter? Northern China lost 2/3 of its population." "The Jin Dynasty had long harassed the northern tribes, paying them off to fight each other and periodically attacking them. Genghis Khan wasn't about to suffer the same fate as the last Khan who tried to unite the Mongols, and the demographic change may reflect poor census keeping, not to mention that many peasants were brought into the Khan's army." "You can pick apart numbers all you want, but they wiped out entire cities, along with their inhabitants." "The Khan preferred enemies to surrender and pay tribute, but he firmly believed in loyalty and diplomatic law. The cities that were massacred were ones that rebelled after surrendering, or killed as ambassadors. His was a strict understanding of justice." "Multiple accounts show his army's brutality going beyond justice: ripping unborn children from mothers' wombs, using prisoners as human shields, or moat fillers to support siege engines, taking all women from conquered towns--" "Enough! How barbaric!" "Is that really so much worse than other medieval armies?" "That doesn't excuse Genghis Khan's atrocities." "But it does make Genghis Khan unexceptional for his time rather than some bloodthirsty savage. In fact, after his unification of the tribes abolished bride kidnapping, women in the Mongol ranks had it better than most. They controlled domestic affairs, could divorce their husbands, and were trusted advisors. Temüjin remained with his first bride all his life, even raising her possibly illegitimate son as his own." "Regardless, Genghis Khan's legacy was a disaster: up to 40 million killed across Eurasia during his descendents' conquests. 10% of the world population. That's not even counting casualties from the Black Plague brought to Europe by the Golden Horde's Siege of Kaffa." "Surely that wasn't intentional." "Actually, when they saw their own troops dying of the Plague, they catapulted infected bodies over the city walls." "Blech." "The accounts you're referencing were written over a hundred years after the fact. How reliable do you think they are? Plus, the survivors reaped the benefits of the empire Genghis Khan founded." "Benefits?" "The Mongol Empire practiced religious tolerance among all subjects, they treated their soldiers well, promoted based on merit, rather than birth, established a vast postal system, and inforced universal rule of law, not to mention their contribution to culture." "You mean like Hulagu Khan's annihilation of Baghdad, the era's cultural capital? Libraries, hospitals and palaces burned, irrigation canals buried?" "Baghdad was unfortunate, but its Kalif refused to surrender, and Hulagu was later punished by Berke Khan for the wanton destruction. It wasn't Mongol policy to destroy culture. Usually they saved doctors, scholars and artisans from conquered places, and transferred them throughout their realm, spreading knowledge across the world." "What about the devastation of Kievan Rus, leaving its people in the Dark Ages even as the Renaissance spread across Western Europe?" "Western Europe was hardly peaceful at the time. The stability of Mongol rule made the Silk Road flourish once more, allowing trade and cultural exchange between East and West, and its legacy forged Russia and China from warring princedoms into unified states. In fact, long after the Empire, Genghis Khan's descendants could be found among the ruling nobility all over Eurasia." "Not surprising that a tyrant would inspire further tyrants." "Careful what you call him. You may be related." "What?" "16 million men today are descended from Genghis Khan. That's one in ever 200." For every great conqueror, there are millions of conquered. Whose stories will survive? And can a leader's historical or cultural signifigance outweigh the deaths they caused along the way? These are the questions that arise when we put history on trial.

**P245 2015-06-26 History vs. Genghis Khan - Alex Gendler**

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翻译人员: Sanqiang Xiao 校对人员: Cissy Yun他曾是世上最令人闻风丧胆的军阀在欧亚大陆上发动过一场势不可挡的侵略战争但成吉思汗是一个凶狠的野蛮人吗？还是一个为现代社会奠定了道路的统一者？我们来在历史法庭“历史vs. 成吉思汗”中讨论一下这个问题“肃静，谁是被告？”“汉！”“法官大人，您对成吉思汗很熟悉吧他是13世纪的军阀，他的军队杀害了百万之众在他么身后只留下了断垣残壁”“反对。首先，应该是成吉思汗”“是吗？”“在蒙语中，是的不管怎样，他是人类历史上最著名的领袖出生时叫铁木真，没有了父亲，他自幼贫困但接着他征服并统一的纷争不断的蒙古各部落打造了世界上最伟大的帝国最终将版图从太平洋延展到欧洲腹地”“侵略和屠杀怎么能说是伟大呢？中国北部有2/3的人口死亡”“金朝长期骚扰北方部落收买他们相互斗争，定期侵略他们成吉思汗没有像上一代试图统一的大汗一样死于非命而人口的变化可能是不准确的人口调查导致的。"更不用说很多的农民被征召入伍了”“你能忽视所有不利于你的数据那不能忽略他们抹平了整个城市及所有聚居地的事实”成吉思汗更希望敌人投降并致敬但他坚信忠诚和外交法那些被屠城的地方都曾投降后又反叛或斩杀了大使他对正义有着严格的理解”“很多案例显示他的军队的残暴可远远超过了正义从孕妇子宫中剥出未出生的孩子用囚犯当人肉盾牌或填充护城河来放攻城武器将女人从被征服的地方赶出来..."“够了！太野蛮了”“这真比中世纪其他的军队更坏吗？”“这不是这些暴行的借口”“但这些行为在他的年代再正常不过相比于一些嗜血的暴行事实上，他统一各部消灭了抢新娘的行为蒙古女性的地位提升到了最高的水平她们管理家庭事务，能与丈夫离婚，是可靠的顾问。铁木真和他的首任妻子共度终身，甚至将她可能是私生子的孩子当自己的孩子一样看待""然而，成吉思汗的传奇是一场灾难在欧亚地区至多有4千万人在他后代的征伐中死亡占世界人口的10%这还不算黑死病带来的伤亡而黑死病是由钦察汗国围攻卡法时带到欧洲来的”“当然，这不是故意的”“事实上，当他们看见他们自己的军队死于瘟疫时他们将感染的尸体投入城中”“呃”“你所引用的案例是在事件发生100年后记录的你认为这可信吗？另外，幸存者在成吉思汗建立的帝国中获益了”“获益？”“ 蒙古帝国对各个宗教都实行宽容政策他们善待军人，择优提拔，不论出身建立庞大的邮政系统，强制推广法律，更不用提他们对文化的贡献。”“你是指他们对巴格达的毁灭吗？那可是那个时代的文化之都！图书馆，医院还有宫殿都化为灰烬；灌溉水渠填为平地？”“巴格达确实是一个不幸，但那是因为哈里发拒绝投降而且旭烈兀之后也被伯克汗以肆意破坏的罪名惩罚了破坏文化不是蒙古的政策通常他们都保护被征服地区的医生，学者和艺术家把他们从故地带出来向世界各地传递知识”“你怎么解释基辅罗斯的毁灭这使当地人陷入黑暗时期即使到了文艺复兴在西欧传播的时候？”“西欧在那时几乎没有和平蒙古统治的稳定使得丝绸之路再次繁荣促进了东西方的文化交流及贸易这也导致了俄罗斯和中国从交战的双方变成了统一的国家事实上，帝国之后成吉思汗子孙的身影出现在欧亚各地的统治贵族之中”“难怪，暴君之后总会有更多的暴君”“注意你的用词，你也可能与他有关”“啊？”“时至今日，成吉思汗的子孙有1600万人每200人中就有一个”每一个伟大的征服者，都有百万被征服者谁的故事会留下来呢？领袖对历史或文化的重要性比得过他们造成的死亡吗？这些都是我们在审视历史时会浮现的疑问。

**P246 2015-06-29 The incredible history of China's terracotta warriors - Megan Campisi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=246)

What happens after death? Is there a restful paradise? An eternal torment? A rebirth? Or maybe just nothingness? Well, one Chinese emperor thought that whatever the hereafter was, he better bring an army. We know that because in 1974, farmers digging a well near their small village stumbled upon one of the most important finds in archeological history: vast underground chambers surrounding that emperor's tomb, and containing more than 8,000 life-size clay soldiers ready for battle. The story of the subterranean army begins with Ying Zheng, who came to power as the king of the Qin state at the age of 13 in 246 BCE. Ambitious and ruthless, he would go on to become Qin Shi Huangdi, the first emperor of China after uniting its seven warring kingdoms. His 36 year reign saw many historic accomplishments, including a universal system of weights and measures, a single standardized writing script for all of China, and a defensive barrier that would later come to be known as the Great Wall. But perhaps Qin Shi Huangdi dedicated so much effort to securing his historical legacy because he was obsessed with his mortality. He spent his last years desperately employing alchemists and deploying expeditions in search of elixirs of life that would help him achieve immortality. And as early as the first year of his reign, he began the construction of a massive underground necropolis filled with monuments, artifacts, and an army to accompany him into the next world and continue his rule. This magnificent army is still standing in precise battle formation and is split across several pits. One contains a main force of 6,000 soldiers, each weighing several hundred pounds, a second has more than 130 war chariots and over 600 horses, and a third houses the high command. An empty fourth pit suggests that the grand project could not be finished before the emperor's death. In addition, nearby chambers contain figures of musicians and acrobats, workers and government officials, and various exotic animals, indicating that Emperor Qin had more plans for the afterlife than simply waging war. All the figurines are sculpted from terracotta, or baked earth, a type of reddish brown clay. To construct them, multiple workshops and reportedly over 720,000 laborers were commandeered by the emperor, including groups of artisans who molded each body part separately to construct statues as individual as the real warriors in the emperor's army. They stand according to rank and feature different weapons and uniforms, distinct hairstyles and expressions, and even unique ears. Originally, each warrior was painted in bright colors, but their exposure to air caused the paint to dry and flake, leaving only the terracotta base. It is for this very reason that another chamber less than a mile away has not been excavated. This is the actual tomb of Qin Shi Huangdi, reported to contain palaces, precious stones and artifacts, and even rivers of mercury flowing through mountains of bronze. But until a way can be found to expose it without damaging the treasures inside, the tomb remains sealed. Emperor Qin was not alone in wanting company for his final destination. Ancient Egyptian tombs contain clay models representing the ideal afterlife, the dead of Japan's Kofun period were buried with sculptures of horses and houses, and the graves of the Jaina island off the Mexican coast are full of ceramic figurines. Fortunately, as ruthless as he was, Emperor Qin chose to have servants and soldiers built for this purpose, rather than sacrificing living ones to accompany him, as had been practiced in Egypt, West Africa, Anatolia, parts of North America and even China during the previous Shang and Zhou dynasties. And today, people travel from all over the world to see these stoic soldiers silently awaiting their battle orders for centuries to come.

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翻译人员: Sanqiang Xiao 校对人员: Cissy Yun死后会发生什么？真的有宁静的天堂吗?还是永恒的煎熬？还是重生？还是化为虚无？有一个中国皇帝认为不论是什么，最好带上一支军队在1974年，几个农民在他们的小镇旁挖井时，偶然揭开了考古历史上最重要的发现之一：庞大的地下墓室，环绕在皇陵旁边里面有至少8,000个真人大小，全副武装的兵马俑地下军队的故事源于嬴政他13岁就成为了秦国的国王那是公元前246年他野心勃勃而冷酷无情在统一了七个交战不断的国家后他成为了中国第一个皇帝，秦始皇他36年的统治间实现了许多历史成就包括统一了度量衡统一了文字建立了防守城墙，也就是后来的长城但也许秦始皇做出如此大的贡献，以确保他历史上的传奇地位，是因为他对死亡的纠结在他的最后一年，他拼命地雇佣炼金师并派出探险队搜查长生不老药以使他永生早在他统治的第一年他就开始建造庞大的地下墓地填满了各种文物古器还有一支军队陪伴他进入另一个世界延续他的统治这支宏伟的军队仍然精确地保持战备姿态分布在几个坑中一个包含了6000士兵的主力部队每个重几百磅另一个有130辆战车，及超过600匹战马第三个坑存放高级统帅空的第四号坑说明这个巨大的工程可能在皇帝驾崩时还没有完成此外，邻近的墓穴放了乐师、杂技演员、工人及官员的陶俑及不同稀奇动物显示秦始皇对死后生活有更多的打算而不限于战争所有的人俑都由陶土及烤过的泥土造成那是一种泛红的棕色粘土为了建造他们，许多工坊及据称超720,000个工匠被皇帝征召包括许多技工，他们将陶俑的分成许多模块逐一雕塑皇帝的每个战士他们依序排列都有不同的武器和制服不同的发型及表情甚至不同的耳朵最初，每个战士都被涂明亮的颜色但暴露在空气中使得涂料褪色只剩下陶俑本身也是因为这个原因，在一英里之内的另一个墓穴尚未被挖掘这是真正的秦始皇陵据称含有宫殿，珍贵的石头及工艺品甚至有水银做成的河但除非能发现一种可以打开陵墓并不损坏宝藏的方法陵墓仍然被密封秦始皇不是唯一的希望人们陪他走到最后的人古埃及陵墓包含着象征着理想死后生活的泥俑日本古坟时代人死后与马和房屋的雕塑一起埋葬墨西哥海岸附件的耆那岛的洞穴中充满了陶瓷俑幸运的是，虽然秦始皇十分冷酷无情他却选择建造仆人和士兵人俑陪葬而不是牺牲真正的人来殉葬在埃及、西非、安纳托利亚及北美部分地区真人殉葬都被使用甚至存在于中国的商周朝时期今天， 人们从世界各地赶来参观这些守望的士兵他们已经在这等待出征的号角已经几个世纪了

**P247 2015-07-01 How to use a semicolon - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=247)

It may seem like the semicolon is struggling with an identity crisis. It looks like a comma crossed with a period. Maybe that's why we toss these punctuation marks around like grammatical confetti. We're confused about how to use them properly. In fact, it's the semicolon's half-half status that makes it useful. It's stronger than a comma, and less final than a period. It fills the spaces in between, and for that reason, it has some specific and important tasks. For one, it can clarify ideas in a sentence that's already festooned with commas. "Semicolons: At first, they may seem frightening, then, they become enlightening, finally, you'll find yourself falling for these delightful punctuation marks." Even though the commas separate different parts of the sentence, it's easy to lose track of what belongs where. But then the semicolon edges in to the rescue. In list-like sentences, it can exert more force than commas do, cutting sentences into compartments and grouping items that belong together. The semicolon breaks things up, but it also builds connections. Another of its tasks is to link together independent clauses. These are sentences that can stand on their own, but when connected by semicolons, look and sound better because they're related in some way. "Semicolons were once a great mystery to me. I had no idea where to put them." Technically, there's nothing wrong with that. These two sentences can stand alone. But imagine they appeared in a long list of other sentences, all of the same length, each separated by periods. Things would get monotonous very fast. In that situation, semicolons bring fluidity and variation to writing by connecting related clauses. But as beneficial as they are, semicolons don't belong just anywhere. There are two main rules that govern their use. Firstly, unless they're being used in lists, semicolons should only connect clauses that are related in some way. You wouldn't use one here, for instance: "Semicolons were once a great mystery to me; I'd really like a sandwich." Periods work best here because these are two totally different ideas. A semicolon's job is to reunite two independent clauses that will benefit from one another's company because they refer to the same thing. Secondly, you'll almost never find a semicolon willingly stationed before coordinating conjunctions: the words, "and," "but," "for," "nor," "or," "so," and "yet." That's a comma's place, in fact. But a semicolon can replace a conjunction to shorten a sentence or to give it some variety. Ultimately, this underappreciated punctuation mark can give writing clarity, force, and style, all encompassed in one tiny dot and squiggle that's just waiting to be put in the right place.

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翻译人员: Jing Zhou 校对人员: Cissy Yun分号看起来好像在为身份危机争斗着它看着像逗号和句号的杂交产物也许这就是我们为什么要像语法彩纸一样把这些标点符号一层层剥开我们还困惑着如何恰当得使用分号事实上，正是分号的一半一半的状态才使它有用它比逗号更斩钉截铁，又不像句号那么不可更改的它填在句子之间，由此，它肩负着特殊而重要的任务其一，它可以在一个句子里澄清观点，就算这个句子已经用逗号结束了“分号：起初它们可能开起来很唬人，随后它们变得有启发性的，最终你会发现自己爱上 这些讨人喜欢的标点符号。”尽管逗号分隔句子的不同部分它还是很容易把握不好什么成分属于哪里但是，分号就可以挤进去营救这种情况在列表式的句子中，分号会比逗号发挥更多的力量分号将句子切成间隔，再把同类的项目分成一组分号把句子分解开， 但同时也构建了彼此之间的联系它的另一个任务是将独立分句连在一起那些句子本身都可以独立成句但当它们被分号连起来的时候它们会看起来更顺眼，读起来更朗朗上口 因为它们在某方面是相关的“分号曾经一度对我来说是巨大的谜团。我不知道该把它们放在哪。”技术上来讲，这句话没有任何问题那两个句子确实可以独立成句但是设想下它们出现在一连串其他句子之间，它们长度一样，每个句子之间都用句号分开这立马就会显得非常单调在那样的情况下分号通过连接相关的子句，让写作更流畅多变但就算分号有很多的好处， 它并不适用与任何地方有两条主要规则管理着它们首先，除非它们被用在列表里，分号只能连接在某些方面相关的句子里你不可以用在这里，举个例子：“分号曾经一度对我来说是巨大的谜团；我真的很想要一个三明治。”句号最适用于这里，因为这是两个完全不同的想法一个分号的职责就是重新连接两个独立的子句这两个子句在对方陪伴的情况下 彼此都会获益因为它们指向的是同一件事第二，你几乎看不见分号被安置在协调的连词之前：比如：“和”、“但是”、“因为”、“也不”、“或者”、“所以”和“然而”事实上那是逗号的位置但是分号可以代替连词使句子缩短，或者使句子多变最终，这个不受欢迎的标点符号可以使写作清晰，有力量，有风格，这些所有的功能浓缩在一个小的点和一个不规则的曲线里就等着把它安放在那个对的位置了

**P248 2015-07-02 How do pregnancy tests work - Tien Nguyen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=248)

The earliest known pregnancy test dates back to 1350 BC in Ancient Egypt. According to the Egyptians, all you have to do is urinate on wheat and barley seeds, and wait. If either sprouts, congratulations, you're pregnant! And if wheat sprouts faster, it's a girl, but if barley, it's a boy. In 1963, a small study reproduced this test and found that it predicted pregnancy with a respectable 70% accuracy, though it couldn't reliably tell the sex of the baby. Scientists hypothesized that the test worked because pregnant women's urine contains more estrogen, which can promote seed growth. Now it's easy to take this ancient method for granted because modern pregnancy tests give highly accurate results within minutes. So how do they work? Over-the-counter pregnancy tests are all designed to detect one thing: a hormone called HCG. HCG is produced in the earliest stages of pregnancy and starts a game of telephone that tells the body not to shed the inner lining of the uterus that month. As the pregnancy progresses, HCG supports the formation of the placenta, which transfers nutrients from mother to fetus. The test starts when urine is applied to the exposed end of the strip. As the fluid travels up the absorbent fibers, it will cross three separate zones, each with an important task. When the wave hits the first zone, the reaction zone, Y-shaped proteins called antibodies will grab onto any HCG. Attached to these antibodies is a handy enzyme with the ability to turn on dye molecules, which will be crucial later down the road. Then the urine picks up all the AB1 enzymes and carries them to the test zone, which is where the results show up. Secured to this zone are more Y-shaped antibodies that will also stick to HCG on one of its five binding sites. Scientists call this type of test a sandwich assay. If HCG is present, it gets sandwiched between the AB1 enzyme and AB2, and sticks to the test zone, allowing the attached dye-activating enzyme to do its job and create a visible pattern. If there's no HCG, the wave of urine and enzymes just passes on by. Finally, there's one last stop to make, the control zone. As in any good experiment, this step confirms that the test is working properly. Whether the AB1 enzymes never saw HCG, or they're extras because Zone 1 is overstocked with them, all the unbound AB1 enzymes picked up in Zone 1 should end up here and activate more dye. So if no pattern appears, that indicates that the test was faulty. These tests are pretty reliable, but they're not failproof. For instance, false negatives can occur if concentrations of HCG aren't high enough for detection. After implantation, HCG levels double every two to three days, so it may just be too early to tell. And beverages can dilute the urine sample, which is why doctors recommend taking the test first thing in the morning. On the other hand, false positives can come from other sources of HCG, like IVF injections, ectopic pregnancies, or certain cancers such as uterine cancer or testicular cancer, making it possible for one of these tests to tell a man he's pregnant. The best way for a woman to find out for sure is at the doctor's office. The doctors are also looking for HCG, but with tests that are more sensitive and quantitative, which means they can determine the exact level of HCG in your blood. A few minutes can feel like forever when you're waiting on the results of a pregnancy test. But in that brief time, you're witnessing the power of the scientific method. That one little stick lets you ask a question, perform a controlled experiment, and then analyze the results to check your original hypothesis. And the best part is you won't even have to wait until the next harvest.

**P248 2015-07-02 How do pregnancy tests work - Tien Nguyen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=248)

翻译人员: Zhiting Chen 校对人员: Geoff Chen最早的怀孕检测可以追溯到 公元前 1350 年的古埃及。根据埃及的说法，你只需要尿在小麦和大麦种子上， 然后等待。如果其中任何一个发芽了， 恭喜，你怀孕了！如果小麦发得快些，那就是女孩儿， 如果大麦发得快些，那就是男孩儿。在 1963 年，一个小研究 从新实践了这个实验发现测孕的准确率高达 70% 。尽管这个测试无法准确预知 孩子的性别。科学家们认为这个实验能够奏效因为怀孕的女性尿液里 还有更高的雌性激素，它能够使得种子更快发芽。我们很容易觉得这个古老的方法 理所应当，因为现代怀孕测试能够在几分钟内 给出高准确度的结果。它是怎么运作的呢？非处方的怀孕检测 都是设计为检测出一项指标：一种叫 HCG 的荷尔蒙。孕早期人体会产生 HCG随后开始了电话游戏告诉身体那个月 不要流出子宫内的薄膜。怀孕的过程HCG 能够帮助形成胎盘，胎盘能够将母亲体内的 营养物质传送给胎儿。怀孕测试开始 尿液覆盖露出来的试纸。当尿液流到吸收剂纤维，它将会跨越三个不同的区域， 每个区域都有很重要的任务。当它到达反应区，Y 字形状的蛋白质也就是抗体 会抓住任何识别到的 HCG。贴在这些抗体上的 是一种容易取得的酶这种酶能够激活染料分子， 这种染色分子在后面至关重要。然后尿液选择所有 AB1 酶把它们带到测试区， 最终结果会出现在这里。这个区域有更多的 Y 字抗体在它的五个面都会黏住 HCG。科学家们称这种测试为 三明治试验。如果有 HCG，它会被夹在 AB1 酶和 AB2 酶之间，然后黏在测试区，让附带着的染色激活酶发挥作用创造一个可视的图案。如果没有 HCG，尿液和酶 就这样流过去了。最后，还有最后一站， 控制区。在每个成功地试验中，这个步骤将会认定 前面的测试很好地完成了。无论是 AB1 酶从未发现 HCG，或者是在第一个反应区里 有太多的 AB1 酶了，所有在反应区里带来的 AB1 酶 都应该在这里结束刺激更多的染色反应。因此，如果没有图案， 那就说明这个测试是失败的。这些测试还是值得信赖的， 但也有可能失败。比如说，错误的阴性反应可能会发生如果 HCG 没有足够多以至能被检测出来。移植后，HCG 水平每两到三天就会双倍增长，所以也可能是过早了。同时，饮料也会冲淡尿液样本，这就是为什么医生建议 早上一起床就做这个测试。另一方面，错误的阳性反应也可能 来源于其它的 HCG，像是试管受精针剂、怀孕异位，或是某种癌症像是子宫癌 或是睾丸癌，这种情况下这些测试会显示 某位男士怀孕了。女士们想要确认怀孕最好的方法 是去看医生。医生也在寻找 HCG，但是医生用的测试会更加敏锐和量化，他们能够判定你血液中 HCG 的准确水平。当你等待怀孕测试结果的时候短短几分钟感觉像是永恒。但在那短暂的时间里， 你见证了医学的力量。那个小小的试纸 让你问一个问题，实行一个制式化的实验，分析结果 测试你的假设。最好的是，你永远不用等待下一个丰收。

**P249 2015-07-02 Why tragedies are alluring - David E. Rivas**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=249)

The story goes something like this: a royal, rich or righteous individual, who otherwise happens to be a lot like us, makes a mistake that sends his life, and the lives of those around him, spiraling into ruin. Sound familiar? This is the classic story pattern for Greek tragedy. For thousands of years, we've spun spellbinding tales that fit this pattern, and modern storytellers around the world continue to do so. Three critical story components influenced by Aristotle's "Poetics" help us understand the allure. First, the tragic hero should be elevated in rank and ability, but also relatable. Perhaps he is a king, or extraordinary in some other way. But because you and I are neither unusually good nor unusually bad, neither is the hero. And he has one particular tragic flaw, or hamartia, something like ambition, tyranny, stubbornness, or excess pride that causes him to make a critical mistake. And from that mistake comes disaster and downfall. As an example of these elements in action, let's look to Sophocles's "Oedipus Rex," about a man who doesn't know he was adopted, and is warned by an oracle that he's destined to murder his father and marry his mother. In trying to escape this fate, he kills a man who won't get out of his way at a crossroad. He then cleverly answers the riddle of the monstrous Sphynx, freeing the Kingdom of Thebes from a plague. He marries the widowed queen and becomes king. But after he finds out that the murdered man was his father, and the queen he married is his mother, Oedipus gouges out his eyes and retreats into the wilderness. At the beginning of his story, Oedipus is elevated in ability, and he's elevated in rank. He's neither unusually evil nor saintly. He's relatable. Notice the height of the fall. Once a king, but now homeless and blind. It's more tragic, after all, if a king falls from a tall throne than if a jester falls off his step stool. Oedipus's tragic flaw is hubris, or excessive pride, and it causes him to attempt to avoid the fate prophesied for him, which is exactly what makes it happen. He's a particularly unlucky soul because his mistake of killing his father and marrying his mother is done in complete ignorance. Of course, these narrative principles transcend classic Greek tragedy. In Shakespeare's canon, we see Hamlet's indecisiveness lead to a series of bad decisions, or perhaps non-decisions, that culminate in the death of almost every character in the play, and Macbeth's ambition catapults him to the top before sending him careening to his grave. Even modern pop culture staples like "Game of Thrones" and "The Dark Knight" resonate with the tropes Aristotle identified over 2000 years ago. So what's the point of all of this suffering? According to Aristotle, and many scholars since, a good tragedy can evoke fear and pity in the audience: Fear of falling victim to the same or similar catastrophe, and pity for the height of the hero's downfall. Ideally, after watching these tragic events unfold, we experience catharsis, a feeling of relief and emotional purification. Not everyone agrees why this happens. It may be that empathizing with the hero allows us to experience and release strong emotions that we keep bottled up, or maybe it just lets us forget about our own problems for a little while. But regardless of how you feel when you watch poor Oedipus, never has there been a more salient reminder that no matter how bad things get, at least you didn't kill your father and marry your mother.

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翻译人员: Chen Ro 校对人员: Cissy Yun故事一般都是这样开始的：一个和我们相似，却有着皇家血统的， 或是富有的，又或是有正义感的人,犯了一个错误，使他自己和他周围人的生活都被卷入不幸的毁灭听起来熟悉吧？这是古希腊悲剧的经典故事架构在后来的几千年中，我们根据这种故事结构编造了更多引人入胜的故事，现如今，世界各地的故事作者们也是如此来创作根据亚里士多德的《修辞学》， 一个故事有三个决定性的组成部分，这三个部分可以帮助我们理解这些故事的诱惑力首先，一个悲剧里的英雄人物应该是有着很高的地位和能力但是也要让观众有认同感或许他是一个国王，又或者是一个在其他方面极其杰出的人物但是因为你和我都并非极度善良亦不是超出一般的邪恶，所以这个英雄人物也不是他有着一个特别的，具有悲剧性的弱点，或缺陷，比如说有野心，专制，倔强，或者是自负这缺陷使他犯下非常严重的错误紧接着灾难和衰败就会随着这个错误而来举一个结合这些元素的例子我们一起看看苏菲克里斯的作品《俄狄浦斯王》这个故事是关于一个不知道自己是被领养的人被一个预言警告，说他未来注定会谋杀他的父亲并且与他的生母结婚这个人在试图逃脱他的命运的过程中，杀了一个在交叉路口不给他让路的人，然后他很聪明的回答了凶暴的斯芬克斯的谜语，拯救了在灾难中的底比斯王国。他与守寡的王后结婚，并成了国王但是后来他发现他谋杀的那个男人就是他的父亲而与他结婚的王后正是他的母亲俄狄浦斯将自己的双眼挖出后隐居深林在他的故事开始时，俄狄浦斯是一个很有能力和地位的人他并非恶魔也不成圣贤他是可以让观众有认同感的注意他处境前后的落差曾经的国王，现在却是无家可归又失明相比之下，一个国王从皇位上跌落谷底比一个小丑从他的高脚凳上摔下来要悲剧的多了俄狄浦斯的悲剧性的弱点是傲慢，或者说是自负，这令他试图避免命运为他设计的轨道恰恰是他的尝试使他的命运无可避免他是一个尤为不幸的灵魂因为他所犯的错误，比如杀了他的父亲和与他的母亲结婚都是在他完全不知真相的情况下做的当然，这些叙述的原则远不止于古典希腊悲剧在莎士比亚的作品中，哈姆雷特的犹豫不决导致了他一系列糟糕的决定或者是没有作为最后使得几乎每一个剧中的人物都以死亡收场麦克白的野心使他走到人生的高点但又紧接着把他推向他自己的坟墓。即便是现代流行文化的主要产品， 像是美剧《权力的游戏》和电影《黑暗骑士》也和亚里士多德两千年前所确定的比喻修辞手法相互呼应那么，这些苦难的经历到底有什么意义呢？根据亚里士多德和很多其他学者的说法一部好的悲剧可以唤起观众内心的恐惧和怜悯之情：恐惧沦落为与主角那样经历相同或 相似苦难的受害者和怜悯一位英雄从高处衰败的落差理想地，在这些悲剧情节呈现在我们面前时我们能够体验“精神发泄”一种安慰和情感上的净化结合起来的感觉不是每个人都对“精神发泄”发生的原因保持一致的看法这可能是由于对英雄人物的同情使我们允许自己释放和感受 自己储蓄已久的强烈情感又或许是观看悲剧 使我们能短暂地忘记自己的苦恼但是无论你在看可怜的俄狄浦斯时感受到了什么从来没有过比这还显著的提醒：不论事情已经糟糕到了什么地步至少你没有杀了自己的父亲又和自己的母亲结了婚

**P250 2015-07-07 What is a calorie - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=250)

We hear about calories all the time. How many calories are in this cookie? How many are burned by 100 jumping jacks, or long distance running, or fidgeting? But what is a calorie, really, and how many of them do we actually need? Calories are a way of keeping track of the body's energy budget. A healthy balance occurs when we put in about as much energy as we lose. If we consistently put more energy into our bodies than we burn, the excess will gradually be stored as fat in our cells, and we'll gain weight. If we burn off more energy than we replenish, we'll lose weight. So we have to be able to measure the energy we consume and use, and we do so with a unit called the calorie. One calorie, the kind we measure in food, also called a large calorie, is defined as the amount of energy it would take to raise the temperature of one kilogram of water by one degree Celsius. Everything we consume has a calorie count, a measure of how much energy the item stores in its chemical bonds. The average pizza slice has 272 calories, there are about 78 in a piece of bread, and an apple has about 52. That energy is released during digestion, and stored in other molecules that can be broken down to provide energy when the body needs it. It's used in three ways: about 10% enables digestion, about 20% fuels physical activity, and the biggest chunk, around 70%, supports the basic functions of our organs and tissues. That third usage corresponds to your basal metabolic rate, a number of calories you would need to survive if you weren't eating or moving around. Add in some physical activity and digestion, and you arrive at the official guidelines for how many calories the average person requires each day: 2000 for women and 2500 for men. Those estimates are based on factors like average weight, physical activity and muscle mass. So does that mean everyone should shoot for around 2000 calories? Not necessarily. If you're doing an energy guzzling activity, like cycling the Tour de France, your body could use up to 9000 calories per day. Pregnancy requires slightly more calories than usual, and elderly people typically have a slower metabolic rate, energy is burned more gradually, so less is needed. Here's something else you should know before you start counting calories. The calorie counts on nutrition labels measure how much energy the food contains, not how much energy you can actually get out of it. Fibrous foods like celery and whole wheat take more energy to digest, so you'd actually wind up with less energy from a 100 calorie serving of celery than a 100 calorie serving of potato chips. Not to mention the fact that some foods offer nutrients like protein and vitamins, while others provide far less nutritional value. Eating too many of those foods could leave you overweight and malnourished. And even with the exact same food, different people might not get the same number of calories. Variations in things like enzyme levels, gut bacteria, and even intestine length, means that every individual's ability to extract energy from food is a little different. So a calorie is a useful energy measure, but to work out exactly how many of them each of us requires we need to factor in things like exercise, food type, and our body's ability to process energy. Good luck finding all of that on a nutrition label.

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翻译人员: Zhiting Chen 校对人员: Rex Hou我们时常听到卡路里。这个曲奇里有多少卡路里？100个开合跳能燃烧多少卡路里，长跑呢？坐立不安？那到底什么是卡路里呢？ 我们到底需要多少卡路里？卡路里能够跟踪身体能量收支。当我们摄入和消耗的能量相当的时候 就达到了健康的平衡。如果我们摄入的能量远远高于 身体消耗的能量，多出的部分会渐渐转化为 脂肪储存在细胞内，然后我们变胖了。如果我们燃烧的能量比存入的多， 我们就会减少体重。因此我们需要测量 我们消耗使用的能量，于是我们用卡路里来测量。我们们在食物中测量的， 一卡路里，也称为一个大卡路里，它被定义为让一千克水温度升温一摄氏度所需的能量。我们吸收的所有东西 通过测量它化学键里储存的能量。都能用卡路里衡量：每块匹萨含有272卡路里，面包含有78卡路里，苹果有大概52卡路里。能量在消化过程中释放，储存在其他的分子中它们在身体需要的时候 转化为能够消耗的能量。能量有3种消耗方式：10%左右用于消化，20%左右满足身体活动消耗，而最大的一部分，占约70%，用来支持我们器官和机体组织的 基本功能运作。第三个用处对应基础代谢率，表示你不吃不喝不活动的情况下生存所需的卡路里量。考虑物理活动和消化的因素，那就得出了官方指南中所说一般人每天所需的卡路里量：女性需要2000卡路里， 男性则需要2500.这些数据是基于诸如平均体重， 活动量，肌肉量这样的因素估计得来的难道每人每天都要2000卡路里吗？并不一定。如果你从事消耗量巨大的活动，像是环法自行车赛，你的身体每天能消耗高至9000卡路里。孕妇所需的卡路里也比普通人多一些，老人通常有较慢的新陈代谢率，能量消耗更慢，所需的更少。然而你在开始计算卡路里前 应该了解一些事。营养成分表上标注的卡路里含量， 是指这些食物自身所含有的能量，并不是你能从中获得的能量。像是芹菜和全麦这样的纤维食物 需要更多的能量去消化，因此你从含100卡路里的芹菜中 真正能摄取的能量是少于含100卡路里的薯片的。同时有些食物提供营养物质 像是蛋白质和维他命，而其他的一些食物提供 很少的营养价值。吃太多的这类食物会让你体重超重并且营养不良。即使是同样的食物，不同的人摄取到的卡路里也是不同的。因为个体差异，比如酶水平，肠道细菌，甚至是肠子的长度，都能令每个个体 从食物中提取能量的能力产生少许差异。因此，卡路里是有用的能量测量指标，但如果想要准确知道 我们所需多少卡路里我们要考虑活动量，食物种类，和我们身体摄取能量的能力。快去看看营养成分表吧！

**P251 2015-07-10 Inside the minds of animals - Bryan B Rasmussen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=251)

Your dog loves to curl up on the couch, but so do you, so you shoo him off and settle in for a cozy evening. After all, you're the human around here. You're an intelligent being, not a simple creature of instinct. You can plan and dream, and oh- Did your dog just outsmart you and feel happy about it? Or was he just following his instincts? Is there even a difference? What is he thinking? Well, it depends on what we mean by "thinking" and the criteria we use to evaluate it. Aristotle and Descartes both use the criteria of instinct and intelligence to divide animals from humans. Aristotle believed that humans possess reason, while animals could only follow brute instincts for survival and reproduction. Almost 2000 years later, Descartes suggested a more extreme version of that idea, arguing that animals following instincts were indistinguishable from robots responding mechanically to stimuli in their environments. But the consensus against animal intelligence began to unravel with Darwin's Theory of Evolution. Darwin hypothesized that intelligence could evolve from simpler instincts. He had observed earthworms making choices about how to drag oddly shaped leaves into their boroughs, and was struck that a human might employ similar means to solve a similar problem. And if, as he thought, humans are descended from simpler creatures, then perhaps our minds lie at the far end of a continuum, differing from theirs in degree, but not in kind. Recent experiments showing that many species can solve complex problems confirm Darwin's initial hypothesis. Elephants use objects to reach inaccessible places. Crows make their own tools, and can use water displacement to get a reward. Octopuses can open jars after watching others do so, and can even remember the process months later. Such tasks involve considering aspects of a problem separately from the immediate situation, and retaining the strategy for later use. Still, while animals can solve complex problems, how do we know what, or even that, they are thinking? Behaviorists, such as Pavlov and Thorndike, argue that animals that appear to think are usually only responding to reward or punishment. This was the case with Clever Hans, a horse with the amazing ability to tap out answers to math problems. But it turns out Hans wasn't especially good at math, but at reading his unwitting trainer's subtle nonverbal cues for when to stop tapping. So Hans couldn't count, but does that mean he wasn't thinking? After all, he could interpret nuanced social messages, a quality he shared with many other non-human animals. Elephants recognize each other after years apart, and even seem to mourn their dead. Bees communicate using a special waggle dance to indicate the location and quality of a food source to other bees. Chimpanzees engage in complex deception schemes, suggesting not only do they think, but they understand that others do, too. And then there is Alex the Grey Parrot, who could use human language to distinguish the colors and shapes of absent objects, and even understand abstract concepts, like bigger and smaller. That sounds a lot like intelligence, and not just the work of mindless machines. But while a non-human animal can solve problems and even communicate, for humans, thinking also involves consciousness, the ability to reflect on our actions, not simply to perform them. So far, none of our studies tell us if having the intelligence to outsmart us means that our dog can also feel good about doing so. What we really want to know is what is it like to be a dog, or an octopus, or a crow? Philosophers of mind call this The Hard Problem, because while you and I can report what it feels like to be a human, nobody speaks horse. Even a talking parrot, like Alex, couldn't tell us how he feels about the colors he could name. And what if consciousness comes in different forms? Would we even recognize the consciousness of bees? For that matter, how can we know for sure that other people have consciouness? Perhaps they're just well-functioning zombies. Regardless, animal minds continue to test the limits of our understanding and how we frame them may reveal more about our minds than theirs.

**P251 2015-07-10 Inside the minds of animals - Bryan B Rasmussen**

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翻译人员: Huiying Ma 校对人员: Ying Li你和家中的小狗都喜欢蜷窝在沙发上于是你赶走小狗，自己享受舒适的夜晚毕竟，你才是这里的人类你是有智慧、并不单靠本能的高等动物，你可以计划和梦想，那你的小狗会比你聪明还沾沾自喜？又或者它只是按照自己的本能行事？这样有什么分别么？它正在想什么呢？恩，这个要取决于我们如何定义“思考”以及我们用来评价的标准亚里士多德和笛卡尔使用本能和智慧作为评价标准来区分动物和人类亚里士多德认为人类是理性的而动物只能是靠本能繁衍生息大约2000年以后笛卡尔提出了一个更加极端的想法动物依赖本能行动和机器人机械的对其周围环境做出的反应是一样的但这种反对动物有智慧的想法被达尔文的进化论所推翻达尔文认为智慧就是从简单的本能所发展过来的他发现，蚯蚓不断学习如何把奇形怪状的树叶拉回巢穴，其实人类也会采取相似的手段解决类似的问题如果正如他所想，人类是从简单生物进化而来那么，很有可能人类的思想是源自远古的动物但是在程度上有些分别，不是一模一样最近的实验表明很多物种都可以解决复杂的问题这些验证了达尔文最初的假设大象懂得使用物件，伸向摸不到的地方乌鸦会制造自己的工具并懂得利用排水法来获得奖赏。八爪鱼会效仿他人打开盖子而且甚至在若干月后仍记得这个过程这个任务需要考虑到问题的方方面面和立即做出的情况不同且需要留作后用可是，即使动物能够解决复杂的问题那么我们是怎么知道的呢？行为学家如巴布罗夫和桑代克动物开始思考仅仅是因为它们对奖赏或是惩罚的反应有一种匹叫聪明汉斯它精通计算，用马蹄踏地来回答数学问题但事实证明，汉斯并不是数学奇才而在于它善于读懂训练师非语言形式的微妙暗示知道什么时候停下来所以汗斯并不会计算，但是这就意味着它没有在思考么？别忘了，它能够理解这种微妙的社会信息这是一种和其他非人类的动物一样的特质在分开若干年后，大象仍然能够辨别出彼此甚至能够哀悼死去的大象蜜蜂通过一种特殊的摇摆舞进行交流告诉同伴食物的位置和质量黑猩猩能够参与复杂的欺骗计划这表明了它们不但能够思考，而且知道他人也懂得还有一只黑色英语鹦鹉艾利克斯它可以运用人类的语言去辨别出不在眼前的颜色和形状甚至能够理解抽象的概念，比如更大和更小这听起来似乎是很有智慧并不只没有思想的工作机器当一个非人类的动物可以解决问题，甚至是交流时对人类来说，思考也包括 意识。这种能力反应在我们的行为上，而不是简简单单的执行目前为止没有任何研究证明如果狗比我们聪明，它们也会感受到愉悦我们真正想要知道是，作为一只狗，会是怎样一种感觉或者一只八爪鱼或者一只乌鸦精神哲学家称之为意识的难题因为大家都可以形容人类是怎样一种感觉而没有人可以说马是怎样一种感觉即使是一只会说话的鹦鹉，比如艾利克斯也不能告诉我们它对于它所说的颜色是怎样一种感觉如果意识以不同的形式表现出来我们还能够认出蜜蜂的意识么？其实，我们是如何知道别人的意识呢？或者他们只是功能卓越的僵尸而已毕竟我们对于认识动物的智慧，仍然有限，而我们对它们的定义，也更多体现了我们的思想。

**P252 2015-07-14 Where did English come from - Claire Bowern**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=252)

When we talk about English, we often think of it as a single language but what do the dialects spoken in dozens of countries around the world have in common with each other, or with the writings of Chaucer? And how are any of them related to the strange words in Beowulf? The answer is that like most languages, English has evolved through generations of speakers, undergoing major changes over time. By undoing these changes, we can trace the language from the present day back to its ancient roots. While modern English shares many similar words with Latin-derived romance languages, like French and Spanish, most of those words were not originally part of it. Instead, they started coming into the language with the Norman invasion of England in 1066. When the French-speaking Normans conquered England and became its ruling class, they brought their speech with them, adding a massive amount of French and Latin vocabulary to the English language previously spoken there. Today, we call that language Old English. This is the language of Beowulf. It probably doesn't look very familiar, but it might be more recognizable if you know some German. That's because Old English belongs to the Germanic language family, first brought to the British Isles in the 5th and 6th centuries by the Angles, Saxons, and Jutes. The Germanic dialects they spoke would become known as Anglo-Saxon. Viking invaders in the 8th to 11th centuries added more borrowings from Old Norse into the mix. It may be hard to see the roots of modern English underneath all the words borrowed from French, Latin, Old Norse and other languages. But comparative linguistics can help us by focusing on grammatical structure, patterns of sound changes, and certain core vocabulary. For example, after the 6th century, German words starting with "p," systematically shifted to a "pf" sound while their Old English counterparts kept the "p" unchanged. In another split, words that have "sk" sounds in Swedish developed an "sh" sound in English. There are still some English words with "sk," like "skirt," and "skull," but they're direct borrowings from Old Norse that came after the "sk" to "sh" shift. These examples show us that just as the various Romance languages descended from Latin, English, Swedish, German, and many other languages descended from their own common ancestor known as Proto-Germanic spoken around 500 B.C.E. Because this historical language was never written down, we can only reconstruct it by comparing its descendants, which is possible thanks to the consistency of the changes. We can even use the same process to go back one step further, and trace the origins of Proto-Germanic to a language called Proto-Indo-European, spoken about 6000 years ago on the Pontic steppe in modern day Ukraine and Russia. This is the reconstructed ancestor of the Indo-European family that includes nearly all languages historically spoken in Europe, as well as large parts of Southern and Western Asia. And though it requires a bit more work, we can find the same systematic similarities, or correspondences, between related words in different Indo-European branches. Comparing English with Latin, we see that English has "t" where Latin has "d", and "f" where latin has "p" at the start of words. Some of English's more distant relatives include Hindi, Persian and the Celtic languages it displaced in what is now Britain. Proto-Indo-European itself descended from an even more ancient language, but unfortunately, this is as far back as historical and archeological evidence will allow us to go. Many mysteries remain just out of reach, such as whether there might be a link between Indo-European and other major language families, and the nature of the languages spoken in Europe prior to its arrival. But the amazing fact remains that nearly 3 billion people around the world, many of whom cannot understand each other, are nevertheless speaking the same words shaped by 6000 years of history.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=252)

翻译人员: Qiran Zhang 校对人员: Gabriella Hu当我们谈到英语，我们常常想到 它是一种语言但是那些遍布世界各国不同的方言呢它们彼此间有什么相似之处或者说和乔叟（英国诗人）笔下的诗句有什么相似之处呢它们和《贝奥武夫》（一部古英语史诗）里让人看不懂的单词又有什么共同之处呢答案就是英语和大多数语言一样在数代运用这门语言的人中进化随着时间的流逝经历了重大的改变如果还原这些变化我们可以将现代英语追溯到它古老的源头虽然现代英语，和源于拉丁语的罗曼斯语比如法语和西班牙语有很多单词是相似的但是这其中绝大部分的单词起初并不属于英语而是在1066年诺曼入侵英格兰时才开始变为英语的当说法语的诺曼人征服英格兰成为那里的统治阶级时他们的语言也深深影响了英格兰为英格兰当地的本土英语增添了大量法语和拉丁语词汇现如今，我们称那时的英语为“古英语”《贝奥武夫》就是用这种古英语写成的古英语也许让人看起来觉得陌生但如果你懂一些德语，就会更加容易辨认它了这是因为古英语属于德语的日耳曼语系起初是在5世纪和6世纪被盎格鲁人，萨克逊人和朱特人带入不列颠群岛他们所讲的日耳曼方言就是我们今天所知道的盎格鲁撒克逊方言8世纪到11世纪时的维京入侵者又将更多古诺尔斯语加入到了英语之中因为有太多从法语，拉丁语，古诺尔斯语和其他语言中借来的词汇所以也许很难从中找出现代英语的源头但比较语言学可以通过专注于语法结构声音变化的模式以及某些核心词汇来帮助我们找出源头例如说，在6世纪之后德语中以“p”开头的单词的发音全都系统地转换成了“pf”而与之相对应的古英语却没有发生变化在其他方面，那些具有“sk”发音的瑞典语词汇在英语中变成了“sh”的发音英语词汇中还是有很多单词具有“sk”发音比如“裙子”（skirt）和“头骨”（skull）但是它们是从古诺尔斯语中直接借鉴来的这种借鉴发生的时间在从“sk”到“sh”的转换之后这些例子告诉我们正如很多罗曼斯语言来源于拉丁语英语，瑞典语，德语，以及很多其他语言都来源于它们共同的祖先“古日耳曼语”这种语言在公元前500年被广泛使用由于这种历史古老的语言从未被转化成文字我们只能通过比较它的衍生语言来重建它而这可能要归功于这些衍生语言变化的一致性我们甚至可以用同样的办法再往前跨一步追溯到古日耳曼语来源于古印欧语这种古印欧语来自6000年前的东欧大草原也就是今天的乌克兰和俄罗斯地区这就是重建的印欧语系的祖先囊括了历史上欧洲以及西南亚很大一部分地区所出现的所有语言尽管需要多费点儿功夫，我们仍从不同的印欧语系分支里有关联的词汇中找到系统的相似或者一致之处如果将英语和拉丁语相比较我们会发现拉丁语中以“d”开头的单词，英语却以“t”开头拉丁语中以“p”开头的单词，在英语中却变成了“f”而有些英语的“远亲”，包括北印度语，波斯语以及波斯语，则被转换成了现在的大不列颠英语古印欧语本身源于一种深知更加古老的语言不幸的是，这种语言实在太古老目前还没有历史和考古学证据能让我们了解它很多谜团都还无法被解开比如印欧语系及其他语系会不会与在先于它们出现在欧洲的语言特性有某种关联但这仍然改变不了一个令人不可思议的事实，那就是全世界近30亿人尽管他们中的一些人听不懂彼此所说的语言但他们却说着历经6000年历史淬炼的相同的词汇

**P253 2015-07-17 How blood pressure works - Wilfred Manzano**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=253)

If you lined up all the blood vessels in your body, they'd be 95,000 kilometers long and everyday, they carry the equivalent of over 7,500 liters of blood, though that's actually the same four or five liters recycled over and over, delivering oxygen, and precious nutrients like glucose and amino acids to the body's tissues. All that blood exerts a force on the muscular walls of the blood vessels. That force is called blood pressure, and it rises and falls with the phases of the heartbeat. It's highest during systole, when the heart contracts to force blood through the arteries. This is your systolic blood pressure. When the heart is at rest between beats, blood pressure falls to its lowest value, the diastolic pressure. A typical healthy individual produces a systolic pressure between 90 and 120 millimeters of mercury, and diastolic pressure between 60 and 80. Taken together, a normal reading is a bit less than 120 over 80. The blood traverses the landscape of the body through the pipes of the circulatory system. In any plumbing system, several things can increase the force on the walls of the pipes: the properties of the fluid, extra fluid, or narrower pipes. So if the blood thickens, a higher pressure is needed to push it, so the heart will pump harder. A high-salt diet will lead to a similar result. The salt promotes water retention, and the extra fluid increases the blood volume and blood pressure, and stress, like the fight or flight response, releases hormones, like epinephrine and norepinephrine that constrict key vessels, increasing the resistance to flow and raising the pressure upstream. Blood vessels can usually handle these fluctuations easily. Elastic fibers embedded in their walls make them resilient, but if your blood pressure regularly rises above about 140 over 90, what we call hypertension, and stays there, it can cause serious problems. That's because the extra strain on the arterial wall can produce small tears. When the injured tissue swells up, substances that respond to the inflammation, like white blood cells, collect around the tears. Fat and cholesterol floating in the blood latch on, too, eventually building up to form a plaque that stiffens and thickens the inner arterial wall. This condition is called atherosclerosis, and it can have dangerous consequences. If the plaque ruptures, a blood clot forms on top of the tear, clogging the already narrowed pipe. If the clot is big enough, it can completely block the flow of oxygen and nutrients to cells downstream. In vessels that feed the heart, that will cause a heart attack, when oxygen-deprived cardiac muscle cells start to die. If the clot cuts off blood flow to the brain, it causes a stroke. Dangerously clogged blood vessels can be widened by a procedure called an angioplasty. There, doctors thread a wire through the vessel to the obstructed site, and then place a deflated balloon catheter over the wire. When the balloon is inflated, it forces the passageway open again. Sometimes a rigid tube called a stent is placed in a vessel to held hold it open, letting the blood flow freely to replenish the oxygen-starved cells downstream. Staying flexible under pressure is a tough job for arteries. The fluid they pump is composed of substances that can get sticky and clog them, and your typical healthy heart beats about 70 times a minute, and at least 2.5 billion times during an average lifetime. That may sound like an insurmountable amount of pressure, but don't worry, your arteries are well suited for the challenge.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=253)

翻译人员: Yuanqing Edberg 校对人员: Sue Chen如果把你身体内的血管都排成一条，它们有95，000 千米那么长。每天，它们携带7，500升血液，虽然那实际上是四到五升一遍一遍的重新循环，以传递氧气和珍贵的营养，比如葡萄糖，氨基酸等到身体的组织。这些血液加在一起， 对血管壁施加了一种强力。那种力量就叫做血压。血压随着心跳升高或降低。血压在心脏收缩的时候是最高的。当心脏收缩迫使血液通过动脉。这就是你的收缩压。当心脏在跳动间歇期间，血压降到最低的数值，这就是舒张压。典型的健康的个体的收缩压在90到120 毫米汞柱之间，舒张压在60到80之间。两者合在一起，正常的读数是 介于80到120.血液穿过整个身体，是通过循环系统的血管。在任何液流系统，都会有几项因素使管壁受压增高：液体的特性，多余的液体，或狭窄的管腔。如果血液变得粘稠，血压需要升高来把它推送出去， 那么心脏会跳得更厉害。高盐饮食会导致类似的症状。盐促进水潴留，额外的液体增加了血容量和血压，还有压力， 比如搏斗或搏斗似的反应，会释放荷尔蒙，如肾上腺素 或去甲肾上腺素它们能收缩主要的血管，增加流动的阻力并且升高血压。血管通常能够很容易地处理这样的波动。血管壁里的弹性纤维使得血管富有弹性，但是你的血压增高多余140/90，我们就把它叫做高血压，如果一直持续，可引起严重的问题。那是因为额外的血管壁 的压力能引起很小的泪泡，当受伤的组织肿胀起来，炎症反应的物质，如白细胞会聚集在泪泡周围。脂肪和胆固醇在血液中漂浮，停留，最终会形成粥样块状物使得动脉血管内壁僵硬和变厚。这种情况就叫做动脉粥样硬化，这能产生危险的后果。如果粥样块状物破裂， 血块在已成形的块状物顶部成型堵住已经狭窄的管腔。如果血块够大，它能够堵住氧分和营养 传送到下面的细胞当这发生在心脏血管中，就会引起心肌梗塞，没有氧分的时候心肌细胞开始死亡。如果栓塞堵住了大脑的血流，就引起了中风。危险的栓塞血管可以被通过血管成形术的手术扩大。医生在血管中放置一条细管到栓塞的地方，然后在细管上放置一个未充气的气球导管当气球充气的时候，它会强迫同道再次打开。有时一条硬性管道叫做支架会放入血管使其张开，让血液自由地流动来补充下面管道里缺氧的细胞。在压力下保持弹性对动脉是一种艰难的工作。它们泵出的液体是由一些能够粘连并堵住它们的物质组成，通常你的心跳在70次每分钟，在平均寿命中至少跳上250亿次这听起来像不可逾越的一堆压量，但是别担心，你的动脉为此挑战而装备完好。

**P254 2015-07-17 The Akune brothers - Siblings on opposite sides of war - Wendell Oshi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=254)

There are many stories that can be told about World War II, from the tragic to the inspring. But perhaps one of the most heartrending experiences was that of the Akune family, divided by the war against each other and against their own identities. Ichiro Akune and his wife Yukiye immigrated to America from Japan in 1918 in search of opportunity, opening a small grocery store in central California and raising nine children. But when Mrs. Akune died in 1933, the children were sent to live with relatives in Japan, their father following soon after. Though the move was a difficult adjustment after having been born and raised in America, the oldest son, Harry, formed a close bond with his grand uncle, who taught him the Japanese language, culture and values. Nevertheless, as soon as Harry and his brother Ken were old enough to work, they returned to the country they considered home, settling near Los Angeles. But then, December 7, 1941, the attack on Pearl Harbor. Now at war with Japan, the United States government did not trust the loyalty of those citizens who had family or ancestral ties to the enemy country. In 1942, about 120,000 Japanese Americans living on the West Coast were stripped of their civil rights and forcibly relocated to internment camps, even though most of them, like Harry and Ken, were Nisei, American or dual citizens who had been born in the US to Japanese immigrant parents. The brothers not only had very limited contact with their family in Japan, but found themselves confined to a camp in a remote part of Colorado. But their story took another twist when recruiters from the US Army's military intelligence service arrived at the camp looking for Japanese-speaking volunteers. Despite their treatment by the government, Harry and Ken jumped at the chance to leave the camp and prove their loyalty as American citizens. Having been schooled in Japan, they soon began their service, translating captured documents, interrogating Japanese soldiers, and producing Japanese language propaganda aimed at persuading enemy forces to surrender. The brothers' work was invaluable to the war effort, providing vital strategic information about the size and location of Japanese forces. But they still faced discrimination and mistrust from their fellow soldiers. Harry recalled an instance where his combat gear was mysteriously misplaced just prior to parachuting into enemy territory, with the white officer reluctant to give him a weapon. Nevertheless, both brothers continued to serve loyally through the end of the war. But Harry and Ken were not the only Akune brothers fighting in the Pacific. Unbeknownst to them, two younger brothers, the third and fourth of the five Akune boys, were serving dutifully in the Imperial Japanese Navy, Saburo in the Naval Airforce, and 15-year-old Shiro as an orientation trainer for new recruits. When the war ended, Harry and Ken served in the allied occupational forces and were seen as traitors by the locals. When all the Akune brothers gathered at a family reunion in Kagoshima for the first time in a decade, it was revealed that the two pairs had fought on opposing sides. Tempers flared and a fight almost broke out until their father stepped in. The brothers managed to make peace and Saburo and Shiro joined Harry and Ken in California, and later fought for the US Army in Korea. It took until 1988 for the US government to acknowledge the injustice of its internment camps and approve reparations payments to survivors. For Harry, though, his greatest regret was not having the courage to thank his Japanese grand uncle who had taught him so much. The story of the Akune brothers is many things: a family divided by circumstance, the unjust treatment of Japanese Americans, and the personal struggle of reconciling two national identities. But it also reveals a larger story about American history: the oppression faced by immigrant groups and their perseverance in overcoming it.

**P254 2015-07-17 The Akune brothers - Siblings on opposite sides of war - Wendell Oshi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=254)

翻译人员: Jack Qiu 校对人员: Tianchang Luo有许多可书的二战故事，既有悲壮也有励志。但或许最荡气回肠的故事之一是有关阿久跟家族的故事。他们一家被战争所分隔。阿久跟一郎和他的妻子于1918年从日本移民至美国寻找机遇在加州中部开了一家小杂货店并抚养9个孩子。但是在1933年九跟夫人去世时，孩子们被寄在日本的亲戚家里，很快他们的父亲也回到了日本。尽管这次环境的转变很困难尽管在美国土生土长，长子哈利，与他的大伯关系很好。大伯教会了他日语， 日本文化以及价值观念。然而，在哈里和他弟弟 肯到了能够工作的年龄，他们回到了生养他们的国家。在洛杉矶附近安顿下来。但是，在1941年12月7号， 珍珠港事件爆发美国与日本开战，美国政府对那些与敌国有血缘关系的美国公民并不信任。1942年约有12万美籍日本人 居住在美国西海岸被政府剥夺了他们的公民权利。被迫转移到囚禁营，尽管大部分人与建和哈里一样， 都是第二代日裔美国人。他们的父母是日本移民出生于美国的居民或双重国籍的居民。两兄弟不仅与他们 在日本的家人联系受限制而且他们发现自己被禁锢在 科罗拉多边远地区的一个集中营里。但他们的命运却峰回路转当来自美军情报局的征兵处来到囚禁营里寻找日语志愿者。尽管美国政府对他们不公对待，哈利和建抓住机会离开了囚禁营并证明了他们是美国公民的忠心。因为在日本接受教育，他们的工作很快上手，进行扣押文件翻译审问日本士兵，并制造意在说服敌军投降的日语宣传口号两兄弟的工作对战事的贡献无量，对日军的方位和人数提供了关键的战术信息。但是他们仍然受到同伴的歧视和不信任。哈里回想起有一回他的搏击装备在 降落在敌军地带前被神秘的调换了，而白人军官不情愿给他一支武器。尽管如此，两兄弟始终 忠诚的为自己的国家服务直到战争结束。但是哈里和建并非阿久跟家族 在太平洋作战的唯一两兄弟。他们有所不知的是，他们的两个弟弟，阿久跟家5兄弟中的 第三第四个儿子，正在日本皇家海军服役。三弟在海军航空兵服役，15岁的四郎为培训师 培训新征入伍的士兵。战争结束后，哈里和建因为盟军效力而被当地的日本人视为叛徒。当阿久跟家的兄弟时隔一载于鹿儿岛再聚一堂的时候，两对兄弟在战场上各自为敌。火气上升差点大打出手知道他们的父亲介入。兄弟之间能够和解三郎和四郎与哈里和建一起回到加州，在后来并肩为在韩国为美军效力。知道1988年美国政府才承认囚禁营的非正义对待并同意给生还者赔偿。对哈里来说，最大的遗憾就是没有勇气感谢培养他的日本大伯。阿久跟兄弟的故事展现了许多东西：一个家庭被环境分离，对美籍日本人的不公平对待，以及和解双重国籍的个人奋斗但它同时揭示了美国历史更大的一面：外来移民群在美国面对的压迫 以及他们克服种种压迫的毅力。

**P255 2015-07-17 The scientific origins of the Minotaur - Matt Kaplan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=255)

Far beneath the palace of the treacherous King Minos, in the damp darkness of an inescapable labryinth, a horrific beast stalks the endless corridors of its prison, enraged with a bloodlust so intense that its deafening roar shakes the Earth. It is easy to see why the Minotaur myth has a long history of being disregarded as pure fiction. However, there's a good chance that the Minotaur and other monsters and gods were created by our early ancestors to rationalize the terrifying things that they saw in the natural world but did not understand. And while we can't explain every aspect of their stories, there may be some actual science that reveals itself when we dissect them for clues. So, as far as we know, there have never been human-bull hybrids. But the earliest material written about the Minotaur doesn't even mention its physical form. So that's probably not the key part of the story. What the different tellings do agree upon, however, is that the beast lives underground, and when it bellows, it causes tremendous problems. The various myths are also specific in stating that genius inventor Daedalus, carved out the labyrinth beneath the island of Crete. Archeological attempts to find the fabled maze have come up empty handed. But Crete itself has yielded the most valuable clue of all in the form of seismic activity. Crete sits on a piece of continental crust called the Aegean Block, and has a bit of oceanic crust known as the Nubian Block sliding right beneath it. This sort of geologic feature, called a subduction zone, is common all over the world and results in lots of earthquakes. However, in Crete the situation is particularly volatile as the Nubian Block is attached to the massive buoyant continental crust that is Africa. When the Nubian Block moves, it does not go down nearly as easily or as steeply as oceanic crust does in most other subduction zones. Instead, it violently and abruptly forces sections of the Mediterranean upwards in an event called uplift, and Crete is in uplift central. In the year 2014, Crete had more than 1300 earthquakes of magnitude 2.0 or higher. By comparison, in the same period of time, Southern California, a much larger area, experienced a mere 255 earthquakes. Of course, we don't have detailed seismic records from the days of King Minos, but we do know from fossil records and geologic evidence that Crete has experienced serious uplift events that sometimes exceeded 30 feet in a single moment. Contrast this for a moment with the island of Hawaii, where earthquakes and volcanic activity were tightly woven to legends surrounding Pele, a goddess both fiery and fair. Like the Minotaur, her myths included tales of destruction, but they also contained elements of dance and creation. So why did Hawaii end up with Pele and Crete end up with the Minotaur? The difference likely comes down to the lava that followed many of Hawaii's worst earthquakes. The lava on Hawaii is made of basalt, which once cooled, is highly fertile. Within a couple of decades of terrible eruptions, Islanders would have seen vibrant green life thriving on new peninsulas made of lava. So it makes sense that the mythology captured this by portraying Pele as creator as well as a destroyer. As for the people of Crete, their earthquakes brought only destruction and barren lands, so perhaps for them the unnatural and deadly Minotaur was born. The connections between mythical stories and the geology of the regions where they originated teach us that mythology and science are actually two sides of the same coin. Both are rooted in explaining and understanding the world. The key difference is that where mythology uses gods, monsters and magic, science uses measurements, records and experiments.

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翻译人员: Simon Sun 校对人员: Sharon Sun在阴险的米诺斯国王的宫殿深处，在不可逃脱的迷宫的潮湿黑暗中，一个恐怖的怪兽在无尽的监狱走廊中徘徊，它对血的渴求强到它的怒吼可以撼动地球。很容易看到米诺陶尔德神话有被认作为纯虚构的长远历史。但是，很有可能米诺陶尔与那些我们早期祖先创造以用来合理化那些他们在自然世界中看到的但又不能够理解的恐怖事情的神与怪兽。虽然我们不能够解释这些故事的所有方面，但是会有一些真实的科学可以解释它们，当我们把它们拆分为线索时。就我们所知， 世界上从未有人牛同体的混血生物存在。但是最早的关于米诺陶尔的文字材料并没有描述它的物理存在。所以，外表并不是这个故事的核心部分。然而所有的版本都对得上的是那只怪兽生活在地下，当它吼叫时，它会引起非常大的问题。每个版本的神话 都展现了天才故事家Daedalus想象了那个克里特岛底下的迷宫。考古学家尝试寻找那个神话中存在的迷宫并没有找到什么。但是克里特岛本身产生了很多有价值的线索从地震活动来看。克里特岛在一个叫做Aegean Block的地壳上，并且覆盖了部分Nubian Block海洋地壳刚好在它底下的位子。这种被称之为潜没的地理构造，在全球都很常见，并且会造成大量的地震。并且，克里特岛的情况尤其不稳定，因为Nubian Block贴在了非洲的巨大的浮动地壳上。当Nubian Block运动的时候，它不能轻松地向下滑动或者像别的潜没区域的海洋地壳一样陡得滑动。它而是剧烈地并且突然地将地中海向上翘动，被称作“上升”，而克里特岛刚好在“上升”中心。在2014年，克里特岛发生了超过1300次震级不低于2.0的地震。对比下，在同样的时期，南加州这个大得多的区域只发生255次地震。当然，我们没有米诺斯国王时期的地震数据，但是我们确实可以从化石与地理纪录看出克里特岛经历了很多次单次超过30英尺的“上升”。和夏威夷岛比比：夏威夷岛的地震和火山活动和Pele的神话紧紧串联在一起，Pele是一个燃烧着得美丽的女神。就像米诺陶尔， 她的神话包含了毁灭的故事，但是它们也包含了舞蹈和创造的元素。所以为什么夏威夷创造了Pele 而克里特岛创造了米诺陶尔？这区别可能来自于夏威夷岛最剧烈的地震中流出的岩浆。夏威夷的岩浆由玄武岩组成， 该岩一旦冷却，会非常肥沃。在剧烈爆发的几十年内，岛民会看到生机勃勃的绿色植被生长在岩浆新组成的群岛上。所以这就说得通为什么神话将Pele同时描述成创造者与毁灭者。对于克里特岛人民来说，他们的地震只会带来毁灭与贫瘠的土地，所以对他们来说虚构猛兽米诺陶尔诞生了。神话故事与它们起源的地区的地理环境之间的联系告诉我们神话与科学事实上是一个硬币的两面。两者都为了解释与理解这个世界而生。关键区别在于，神话使用神，怪兽与魔法，而科学使用测量，纪录与实验。

**P256 2015-07-20 Who am I A philosophical inquiry - Amy Adkins**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=256)

Throughout the history of mankind, three little words have sent poets to the blank page, philosophers to the Agora, and seekers to the oracles: "Who am I?" From the ancient Greek aphorism inscribed on the Temple of Apollo, "Know thyself," to The Who's rock anthem, "Who Are You?" philosophers, psychologists, academics, scientists, artists, theologians and politicians have all tackled the subject of identity. Their hypotheses are widely varied and lack significant consensus. These are smart, creative people, so what's so hard about coming up with the right answer? One challenge certainly lies with the complex concept of the persistence of identity. Which you is who? The person you are today? Five years ago? Who you'll be in 50 years? And when is "am"? This week? Today? This hour? This second? And which aspect of you is "I"? Are you your physical body? Your thoughts and feelings? Your actions? These murky waters of abstract logic are tricky to navigate, and so it's probably fitting that to demonstrate the complexity, the Greek historian Plutarch used the story of a ship. How are you "I"? As the tale goes, Theseus, the mythical founder King of Athens, single-handedly slayed the evil Minotaur at Crete, then returned home on a ship. To honor this heroic feat, for 1000 years Athenians painstakingly maintained his ship in the harbor, and annually reenacted his voyage. Whenever a part of the ship was worn or damaged, it was replaced with an identical piece of the same material until, at some point, no original parts remained. Plutarch noted the Ship of Theseus was an example of the philosophical paradox revolving around the persistence of identity. How can every single part of something be replaced, yet it still remains the same thing? Let's imagine there are two ships: the ship that Theseus docked in Athens, Ship A, and the ship sailed by the Athenians 1000 years later, Ship B. Very simply, our question is this: does A equal B? Some would say that for 1000 years there has been only one Ship of Theseus, and because the changes made to it happened gradually, it never at any point in time stopped being the legendary ship. Though they have absolutely no parts in common, the two ships are numerically identical, meaning one and the same, so A equals B. However, others could argue that Theseus never set foot on Ship B, and his presence on the ship is an essential qualitative property of the Ship of Theseus. It cannot survive without him. So, though the two ships are numerically identical, they are not qualitatively identical. Thus, A does not equal B. But what happens when we consider this twist? What if, as each piece of the original ship was cast off, somebody collected them all, and rebuilt the entire original ship? When it was finished, undeniably two physical ships would exist: the one that's docked in Athens, and the one in some guy's backyard. Each could lay claim to the title, "The Ship of Theseus," but only would could actually be the real thing. So which one is it, and more importantly, what does this have to do with you? Like the Ship of Theseus, you are a collection of constantly changing parts: your physical body, mind, emotions, circumstances, and even your quirks, always changing, but still in an amazing and sometimes illogical way, you stay the same, too. This is one of the reasons that the question, "Who am I?" is so complex. And in order to answer it, like so many great minds before you, you must be willing to dive into the bottomless ocean of philosophical paradox. Or maybe you could just answer, "I am a legendary hero sailing a powerful ship on an epic journey." That could work, too.

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翻译人员: Can Liu 校对人员: MQ L在人类的历史长河中，短短的三个字曾使诗人翻开新的篇章，使哲学家聚众讨论，使有信仰的探索者去寻求神谕。这三个字就是：“我是谁？”从刻在阿波罗神庙的古希腊警句：“了解你自己。”到现代摇滚乐队 The Who 的摇滚名曲“你是谁？”哲学家、心理学家、学者、科学家、艺术家、神学家、政治家都曾为这个有关身份的问题绞尽脑汁。他们的猜想各不相同，差异很大， 而且在要点上缺乏共识。这些可都是些聪慧绝伦，思维天马行空之人，得到一个正确的答案怎么会这么难呢？这其中一个很大的挑战就在于身份一致性这个观念的复杂特质：哪个你才是“我是谁”这个问题中真正讨论的“谁”？是今天的你？五年前的你？抑或是五十年后的你？而“我是谁”中的“是”又说的是什么时间段的“是”呢？是指这一周你的状态？今天的状态？这一个小时的状态？还是说只有眼前这一秒？还有，你的哪一个部分才是真正的“你”呢？你的肉体？你的思想和情感？还是你做出的实际行动？这些抽象的逻辑问题如一滩浑水， 让我们难以把握解决问题的船舵。那么，用希腊历史学家普鲁塔克的“船的故事“ 来说明这件事可能是比较合适的。他本人就曾用这个故事阐释过这个问题的复杂性。你为什么是“我”？故事是这样的： 传说中创立了雅典的雅典王，忒修斯，单枪匹马地在克里特屠杀了弥诺陶洛斯， 也就是那个邪恶的人身牛头怪物，然后乘船船而归。为了纪念这一壮举，雅典人一千年来不辞辛苦地在港口维护着他的船，然后每年都用他的船重新完成他的航行。只要船的一个部分出现了损坏，雅典人就会用一样的材料做出一块相同的来把它替换下来。到最后，船上没有一块是原来的部分了。普鲁塔克认为，忒特斯的这艘船，就是一个哲学悖论的范例。它体现了身份一致性这个难题。如果一件东西的每个部分都被替换了，它怎么还会是同一件东西呢？让我们想象一下有这么两艘船：船A是忒勒斯停泊在雅典的那艘，船B则是一千年后由雅典人航行的那艘。那么很简单，我们的问题就是，船A等于船B吗？有的人会说，一千年来，忒勒斯的船只有这一艘。而且对它做的改造是逐渐进行的，在任何一个时间点，他都是那艘传奇式的船。即使船A与船B已经完全没有相同的部分，但他们具有数目的同一性， 也就是说，它们是唯一且一样的。所以，船A等于船B。然而，另外一些人则会说，忒勒斯可从来没在船B上待过。而恰恰是他在某一艘船上待过，才使得那一艘船弥足珍贵。如果没有他，那这艘船就不存在。所以，即使两艘船具有数目的同一性，它们却不具有性质上的同一性。所以，船A不等于船B但让我们想象一下下面这个问题：如果，每当船上一块旧的部分被替换下来，都有一个人把它们全部收集起来 然后重新用它们造出原来的那艘船呢？当这艘船完工的时候，毫无疑问，将存在两艘实体的船：一艘停泊在雅典的海岸，另一艘在某个家伙的后院。两艘船都可以号称：“忒勒斯的船”。但只有一艘可以是真正的那艘。那么那一艘才是呢？而且更重要的是， 这跟你自己有什么关系呢？你，就像忒勒斯的船，是由一些不断变化的部分组成的：你的肉体、心灵、情感、身体状况， 甚至是你的怪癖。它们时刻在变化， 然而在某种令人诧异且不符合逻辑的的程度上， 它们是不变的。你也还是一样的你。这就是为什么“我是谁“这个问题如此复杂的原因之一。可是为了回答它，你必须像那些古圣先贤一样，愿意潜入深不可测的哲学悖论的海洋。或者，也许你只需要回答：”我是一个传奇式的英雄， 在伟大的航行中驾驶着一艘伟大的船。“这也算是一个答案。

**P257 2015-07-23 The benefits of good posture - Murat Dalkilinç**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=257)

Has anyone ever told you, "Stand up straight!" or scolded you for slouching at a family dinner? Comments like that might be annoying, but they're not wrong. Your posture, the way you hold your body when you're sitting or standing, is the foundation for every movement your body makes, and can determine how well your body adapts to the stresses on it. These stresses can be things like carrying weight, or sitting in an awkward position. And the big one we all experience all day every day: gravity. If your posture isn't optimal, your muscles have to work harder to keep you upright and balanced. Some muscles will become tight and inflexbile. Others will be inhibited. Over time, these dysfunctional adaptations impair your body's ability to deal with the forces on it. Poor posture inflicts extra wear and tear on your joints and ligaments, increases the likelihood of accidents, and makes some organs, like your lungs, less efficient. Researchers have linked poor posture to scoliosis, tension headaches, and back pain, though it isn't the exclusive cause of any of them. Posture can even influence your emotional state and your sensitivity to pain. So there are a lot of reasons to aim for good posture. But it's getting harder these days. Sitting in an awkward position for a long time can promote poor posture, and so can using computers or mobile devices, which encourage you to look downward. Many studies suggest that, on average, posture is getting worse. So what does good posture look like? When you look at the spine from the front or the back, all 33 vertebrae should appear stacked in a straight line. From the side, the spine should have three curves: one at your neck, one at your shoulders, and one at the small of your back. You aren't born with this s-shaped spine. Babies' spines just have one curve like a "c." The other curves usually develop by 12-18 months as the muscles strengthen. These curves help us stay upright and absorb some of the stress from activities like walking and jumping. If they are aligned properly, when you're standing up, you should be able to draw a straight line from a point just in front of your shoulders, to behind your hip, to the front of your knee, to a few inches in front of your ankle. This keeps your center of gravity directly over your base of support, which allows you to move efficiently with the least amount of fatigue and muscle strain. If you're sitting, your neck should be vertical, not tilted forward. Your shoulders should be relaxed with your arms close to your trunk. Your knees should be at a right angle with your feet flat on the floor. But what if your posture isn't that great? Try redesigning your environment. Adjust your screen so it's at or slightly below eyelevel. Make sure all parts of your body, like your elbows and wrists, are supported, using ergonomic aids if you need to. Try sleeping on your side with your neck supported and with a pillow between your legs. Wear shoes with low heels and good arch support, and use a headset for phone calls. It's also not enough to just have good posture. Keeping your muscles and joints moving is extremely important. In fact, being stationary for long periods with good posture can be worse than regular movement with bad posture. When you do move, move smartly. Keep anything you're carrying close to your body. Backpacks should be in contact with your back carried symetrically. If you sit a lot, get up and move around on occassion, and be sure to exercise. Using your muscles will keep them strong enough to support you effectively, on top of all the other benefits to your joints, bones, brain and heart. And if you're really worried, check with a physical therapist, because yes, you really should stand up straight.

**P257 2015-07-23 The benefits of good posture - Murat Dalkilinç**

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翻译人员: Xiaowei Dong 校对人员: Gabriella Hu有没有人曾经告诉过你: 不要弯腰驼背亦或是因为你在家庭晚餐的时候 肩背佝偻而训斥你吗但所谓忠言逆耳，他们并没有错姿势，也就是你掌控自己身体的方式 例如坐姿和站姿不仅是你肢体做出每个动作的基础也能决定你的身体能承受多大压力这些压力可能来自于重物的搬运或者不正确的坐姿还有一项每天都在影响我们的: 万有引力如果你的姿势不标准你的肌肉需要更紧绷来保持身体的直立与平衡一些肌肉将会变得紧绷而且僵硬还有一些会被拘束从而让人不自在随着时间流逝，这些功能失调将会减弱你身体对外来压力的抵抗性不良的姿势会给你的韧带和关节 增加额外负担，从而撕裂它们也会增加事故发生的可能性同时让某些器官 比如肺 的工作效率降低研究证明不正确的姿势可导致的症状有: 脊柱侧凸神经紧张性头痛以及背疼尽管不良姿势这并不是这些症状的唯一诱因姿势甚至可以影响你的精神状态以及你对痛觉的敏感度所以保持好的姿势是很必要的但最近保持好姿势越来越难了长时间别扭的坐姿会进一步加重不良姿势电脑和手机的使用也会有同样效果因为电子产品会促使你向下看很多研究表明，通常来讲 人们的姿势越来越糟糕所以正确的姿势看起来是什么样的呢当你从前方或者后方观察脊椎时所有的33根脊椎骨看起来应该在同一条直线上从侧面观察，脊柱应该有三个曲线一个在脖子处 一个在肩膀处 还有一个小弯曲在背部这个S曲线不是与生俱来的婴儿的脊椎只有一个弧度，就像字母C一样。其他的弯曲通常会在12-18个月发育成型与肌肉力量的增长同步这些弯曲帮助我们直立 并帮助我们分担一部分来自于走路和跳跃的压力如果它们被排成一条直线。当你站立时你能够画上一条直线从你的肩膀正前方经过臀部的正后方穿过膝盖的前方直到你脚踝前方几英寸这让你的重心正好在你的支撑面的正上方让你能够更有效率的移动同时减少了肌肉的绷紧与疲劳如果你正坐着，你的脖子应当是竖直的而不是向前倾斜你的双肩应当放松 双臂靠近躯干你的膝盖应在正确的角度 且脚掌平放接触地面不过万一你的姿势没有那么好呢试着重新设定你所处的环境调整你的屏幕 使其刚好或略低于你的平视视线确保你身体的每一个部分比如肘和腕关节 都有支撑物必要的时候使用人体工程学的辅助设备试着侧睡并让脖子得到支撑以及双腿之间夹一个枕头穿低跟或能支撑足弓的鞋并用耳麦接电话但是，仅仅拥有好的姿势是不够的保持关节和肌肉的持续运动是非常重要的事实上，长时间以正确的姿势保持静止不动甚至比用不好的姿势做寻常运动更糟糕所以要明智的移动保持你所搬运的人或物靠近你的身体。背包需要对称地紧贴在背上如果你长时间坐着， 每隔一段时间起身在周围走动一下另外一定要锻炼经常锻炼肌肉让它们保持强健， 以便于让它们更有效地为你服务另外这对你的关节，骨骼，大脑以及心脏都有好处而且如果你实在比较困扰 你可以去找理疗师做检查因为，是的， 你真的应该站直

**P258 2015-07-23 When to use apostrophes - Laura McClure**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=258)

Is it a flying comma, or a quotation mark chopped in half? Either way, you may already be well-versed in how to use the apostrophe, but here's a quick refresher on its usage. The apostrophe can be used in three ways: to mark possession, to mark contraction, to mark the plural of single letters. Most of the time, if you see an apostrophe hovering helpfully near a word, it's trying to mark possession or contraction. First, let's look at how the apostrophe marks possession. As you can see, the placement of this punctuation mark can really change the meaning of a sentence. "Those robots in the sand are my sister's." "Those robots in the sand are my sisters.'" "Those robots in the sand are my sisters." When showing possession, the apostrophe belongs next to the noun that owns or possesses something. The noun can be singular or plural. Proper nouns work, too. So if Lucy needs to get her robots under control before they cause mayhem, those dangerous creatures would be "Lucy's robots." But what if Lucy was Lucas? Would we write "Lucas' robots" or "Lucas's robots"? And what if Lucas gave his robots to the Robinsons family? Would it be "The Robinsons' robots," or "The Robinsons's robots"? The truth is, even grammar nerds disagree on the right thing to do. The use of 's after a proper noun ending in s is a style issue, not a hard and fast grammar rule. It's a conundrum without a simple answer. Professional writers solve this problem by learning what's considered correct for a publication, and doing that. The important thing is to pick one style and stick with it throughout a piece of writing. One more wrinkle. Certain pronouns already have possession built in and don't need an apostrophe. Remembering that will help you avoid one of the trickiest snags in English grammar: its vs. it's. "It's" only take an apostrophe when it's a contraction for "it is" or "it has." If you can replace "it's" with one of those two phrases, use the apostrophe. If you're showing possession, leave it out. Otherwise, contractions are pretty straightforward. The apostrophe stands in for missing letters, and lets common phrases squash into a single word. In rare cases, you can have a double contraction, though those generally aren't accepted in writing, with the exception of dialogue. So it's possessive, it's often followed by s's, and it's sometimes tricky when it comes to its usage. It's the apostrophe.

**P258 2015-07-23 When to use apostrophes - Laura McClure**

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翻译人员: Xinyu Luo 校对人员: Cissy Yun这是一个“飞在半空中”的逗号， 还是半个引号？不论哪一种 你都可能已经精通撇号的用法但这里有一个快速的 关于其用法的复习课程撇号有三种用法表示个人所有物表示缩略词表示单一字母的复数形式很多时候，如果你看见一个撇号 在某个单词的旁边这个撇号表示个人所有物 或表示缩略词首先，让我们来看一下撇号怎样表示个人所有物正如你所看到的 这个标点符号所在的位置可以改变整个句子的意思“那些在沙子里的机器人属于我的姐姐” Those robots in the sand are my sister's.“那些在沙子里的机器人属于我的姐姐们” Those robots in the sand are my sisters.'”那些在沙子里的机器人是我的姐姐们“ Those robots in the sand are my sisters.当表示所有物时撇号在表示所有者的名词的旁边名词可以是单数，也可以是复数也可以是专有名词因此，如果露西(Lucy)想在她的机器人们 造成大混乱前将他们控制住这些“危险的生物”就是“露西的机器人” ("Lucy's robots")那么如果露西(Lucy)叫卢卡斯(Lucas)呢？我们应该写 "Lucas' robots"还是"Lucas's robots"?以及，如果露西(Lucy)将她的机器人们 送给了罗宾孙一家 (the Robinsons) 呢？我们应该写 "The Robinsons' robots" 还是"The Robinsons's robots?事实是，哪怕语法狂们对此都有所争议撇号加“s” ('s)在一个以s结尾的专有名词后的用法 和个人写作风格有关并不是一个很严格的语法规则这是一个很难回答的问题专业作家们通过学习某一出版物的标准来解决这个问题重要的是选择一种格式并在整篇作品中保持这一种格式还有一个小问题一些代词已经有了“所有物”的意思因此不需要撇号记住这一点 可以帮助你解决一个英语语法中最棘手的问题its和it's的区别"It's"是一个缩略词 表示“它是”(it is)或“它有(it has)如果你想表达这两种意思你可以使用撇号如果你想表示所有物 不要用撇号其他情况下，撇号相当简单易懂撇号可以代替省略的单词使一个词组缩略成一个单词在一些少见的情况中 你可以有两个缩略处（使用两个撇号）这种写法通常不能出现在正式的写作中除了表示对话因此 表示所有格 通常后面会有一个“s”用法有时候比较难的那便是撇号

**P259 2015-07-27 Solid, liquid, gas and … plasma - Michael Murillo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=259)

Have you ever seen static electricity cause a spark of light? What is that spark? What about lightning, the Northern Lights, or the tail of a comet? All of those things, and many others, in fact 99.9% of the universe, are made of plasma. Plasma is a state of matter drastically different from the more familiar forms. Take ice, for example. Ice, a solid, melts to become water, a liquid, which, when heated, vaporizes into steam, a gas. Continued heating of the steam at a high enough temperature causes the water molecules in it to separate into freely roaming hydrogen and oxygen atoms. With a little more heat, the ionization process occurs and the negatively charged electrons escape the atoms, leaving behind positively charged ions. This mixture of freely roaming negative and positive charges is plasma, and at a high enough temperature, any gas can be made into one. These freely moving charged particles behave very differently from the particles in other types of matter. When a doorknob, a solid, has static electricity on it, it doesn't look or behave any differently. And with the exception of a compass or other magnetic object, we rarely see matter respond to a magnetic field. But put a plasma in an electric field or magnetic field, and you'll get a very different reaction. Because plasmas are charged, electric fields accelerate them, and magnetic fields steer them in circular orbits. And when the particles within plasma collide, or accelerated by electricity or magnetism, light is generated, which is what we see when we look at plasmas like the Aurora Borealis. Plasmas aren't just beautiful, celestial phenomena, though. Imagine a tiny cube made of normal gas with a very high voltage across it. The resulting electric field pushes some of the electrons off the atoms and accelerates them to high speeds causing the ionization of other atoms. Imbedded impurities in the tiny cube of gas cause it to gain and release a precise amount of energy in the form of ultraviolet radiation. Attached to each tiny cube, a fluorescent material glows with a specific color when ultraviolet light at just the right intensity reaches it. Now, make a rectangle out of a million of these tiny cubes, each separately controlled by sophisticated electronics. You may be looking at one now. This is called a plasma TV. Plasmas also have implications for health care. Plasma chemists create highly specific plasmas that can destroy or alter targeted chemicals, thereby killing pathogenic organisms on food or hospital surfaces. Plasmas are all around us, in forms that are both spectacular and practical. And in the future, plasma could be used to permanently rid landfills of their waste, efficiently remove toxins from our air and water, and provide us with a potentially unlimited supply of renewable clean energy.

**P259 2015-07-27 Solid, liquid, gas and … plasma - Michael Murillo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=259)

翻译人员: Sanqiang Xiao 校对人员: Gabriella Hu你曾经见过静电引起的火花吗？这个火花是什么呢？闪电又是什么呢？北极光又或者是彗尾呢？事实上，所有这些现象以及宇宙中其他类似现象中99.9%都是由等离子体产生的等离子体是物质的一种状态与我们所熟悉的其他物质状态极其不同以冰为例固态冰受热融化为液态水液态水受热蒸发为水蒸气继续加热水蒸气至足够高的温度会使其中的水分子分解为可以自由移动的氢原子和氧原子再给予少量的热量 离子化过程就发生了带负电的电子逃离原子从而留下带正电的离子这种能够自由移动的，带有正负电荷的 离子混合物就是等离子体在足够高的温度下 任何气体都能转变为等离子体这些自由移动的带电粒子与组成其他物质状态的粒子的行为很不一样当一个固态的门把手携带了静电它并不会有太大的不同除了指南针和其他磁体我们很少看到物质受到磁场的影响但是如果等离子体被置于电场或者磁场之中它们会产生非常不同的反应因为等离子体中的离子带有电荷电场会对它们进行加速而磁场会驱使它们形成圆周轨道当等离子体中的粒子发生碰撞或者被电场或磁场加速时光就产生了这也就是我们所观察等离子体时所看到的，比如北极光但是等离子体不仅仅是绚丽的天空现象想象一下，一个装有正常气体的小方块 被高电压贯穿高电压产生电场电场驱使电子从原子脱离 然后使电子具有很高的速度并使其他原子也离子化气体中夹杂的杂质会使气体以紫外线辐射的方式吸收和释放一定量的能量每个小立方体的表面上附着有荧光物质当紫外线以适当的强度激发它们时荧光物质就会发出特定颜色的光现在我们用一百万个这样的小立方体组成一个长方形每个立方体都由复杂的电子元件控制着这就是等离子电视你现在可能正在看它等离子体对人体健康也有积极影响等离子化学家制造特定的等离子体这种等离子体能够消除或者替换目标化学物从而杀死食物中或医院里各种表面上的病原体等离子体无处不在它既壮观绚丽又真实存在未来，等离子体能够使我们永久地摆脱垃圾填埋它能有效地清除空气和水中的毒素为我们提供一种潜在的用之不竭的可再生的清洁能源

**P260 2015-07-30 How does a jellyfish sting - Neosha S Kashef**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=260)

You're swimming in the ocean when something brushes your leg. When the tingling sets in, you realize you've been stung by a jellyfish. How do these beautiful, gelatinous creatures pack such a painful punch? Jellyfish are soft because they are 95% water and are mostly made of a translucent gel-like substance called mesoglea. With such delicate bodies, they rely on thousands of venom-containing stinging cells called cnidocytes for protection and prey capture. Even baby jellyfish, the size of a pencil eraser, have the ability to sting. Larval jellyfish, ephyrae, look like tiny flowers pulsating in the sea. As they grow, they become umbrella-shaped with a bell at the top and descending tentacles around the margin. The largest species of jellyfish, the lion's mane, has tentacles that can extend more than 100 feet, longer than a blue whale. These tentacles contain most of the stinging cells, although some species have them on their bells, too. Venom is ejected via a nematocyst, a whip-like hollow tubule, which lies coiled under high osmotic pressure. When mechanical or chemical stimuli activate an external trigger, the lid of the cell pops open and sea water rushes in. This forces a microscopic barbed harpoon to shoot out, penetrate and inject venom into its victim. Nematocyst discharge can occur in less than a millionth of a second, making it one of nature's fastest biomechanical processes. Nematocysts can continue to fire even after a jellyfish has died, so it's important to remove lingering tentacles stuck to the skin. Rinsing with vinegar will usually render undischarged nematocysts inactive. Seawater can also help remove residual nematocysts. But don't use fresh water because any change in salt balance alters the osmotic pressure outside of the cnidocyte and will trigger the nematocyst to fire. That's why urinating on the affected area, a common folk remedy, may do more harm that good, depending on the composition of the urine. Most jellyfish stings are a painful nuisance, but some can be deadly. An Indo-Pacific box jelly, also called a sea wasp, releases venom which can cause contraction of the heart muscles and rapid death in large doses. There's an anti-venom, but the venom is fast-acting, so you'd need immediate medical intervention. Despite the impressive power in their tentacles, jellies aren't invincible. Their stinging cells are no match for the armor of thick-skin predators, like the leatherback turtle and ocean sunfish. These predators both have adaptations that prevents slippery jellyfish from escaping after they are engulfed: backwards pointing spines in the turtle's mouth and esophagus and recurved teeth behind the sunfish's cheeks. Even tiny lobster slipper larvae can cling to the bell of a jellyfish and hitch a ride, snacking on the jelly while they preserve their own energy for growth. Small agile fish use the jellies as moving reefs for protection, darting between tentacles without ever touching them. Nudibranchs, which are sea slugs covered in protective slime, can actually steal the jelly's defenses by eating the cnidocytes and transferring them to specialized sacks for later use, as weapons against their own predators. Even humans might benefit from the sting of a jellyfish one day. Scientists are working on manipulating cnidocytes to deliver medicine, with nematocysts rarely 3% of the size of a typical syringe needle. So, the next time you're out in the ocean, be careful. But also, take a second to marvel at its wonders.

**P260 2015-07-30 How does a jellyfish sting - Neosha S Kashef**

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翻译人员: Gabriella Hu 校对人员: Xinwei Li当你在海洋中游泳，有东西擦到了你的腿，等你感觉到刺痛时，这才知道你是被水母蛰伤了这些美丽的，凝胶状的生物是怎样藏有如此重击呢？水母的质感很软，因为它们95%都是水而且大部分是由一种叫中胶层的半透明凝胶体物质组成的有如此娇嫩柔弱的身体，它们依靠上千个含毒液的刺细胞来保护自己以及捕猎甚至连一块铅笔橡皮大小的水母宝宝，都可以蜇人幼小的水母形似小花朵在大海中跳动着随着它们一点点成长，它们会呈现出雨伞状，顶部就是伞盖体周边有向下垂的触角最大的一种水母，狮鬃水母，它的触角能够长达100英尺，比蓝鲸还要长大多数刺细胞都在它的触角中，有些品种的水母在它们的伞盖体上也有刺细胞毒液的注射是通过刺丝囊，一个鞭状的空心小管，它在高渗透压下是盘曲着的当外界机械性或化学性的刺激触发它之后，细胞盖便会打开，海水就会涌进来这促使一个微小的鱼叉状刺丝发射了出来，刺破它的目标并注入毒液刺丝囊能在一百万分之一秒内发射毒液，是自然界中最快的生物力学过程之一刺丝囊能够在水母死后持续发射毒液，所以一定要将缠在皮肤上的触角清除用醋冲洗通常会使刺丝囊停止发射毒液海水也有助于清洗残留的刺丝囊但是千万不要用淡水冲洗，因为一旦破坏了水盐平衡，刺丝囊外的渗透压力就会改变，将会触发刺丝囊继续释放毒液这就是为什么用尿液冲洗伤口，一个广为流传的民间偏方，由于其组成成分可能会使伤口更加疼痛大多数水母蛰伤都是些痛苦的麻烦事但是有些蛰伤却是致命的印度太平洋箱型水母，俗称海黄蜂，释放的毒液可以导致心肌收缩，大剂量则会导致猝死虽然有抗毒血清，但是毒液见效很快，所以伤者必须立即就医尽管它们的触角很强大，水母并不是无敌的它们的刺细胞无法对抗一些捕食者坚硬的盔甲，比如棱皮龟和翻车鱼这些捕食者都有对抗水母的武器，防止它们被吞食之后逃脱：乌龟口中和食道中向后倾倒的棘刺还有翻车鱼腮后面弯曲的牙齿连幼小的虾蛄都可以粘在水母的伞盖体上搭顺风车，一边吃水母上的胶，一边保留能量生长敏捷的小鱼把水母当成移动的珊瑚礁来保护自己，在触角之间穿梭，却丝毫不碰到它们裸鳃类物种，一些用粘液保护自己的海蛞蝓，甚至可以吃掉刺丝囊，夺走水母的防御功能，把它们转移到专门的囊中以待后用，作为对付它们敌人的武器连人类在未来也有可能从水母蜇人的能力中获利科学家们正在实验试图操控刺丝囊来运送药物，因为刺丝囊只有普通注射器针头3%的大小所以，下次你去海边的时候，一定要小心同时，也不妨感叹一下它的神奇

**P261 2015-08-03 The physics of playing guitar - Oscar Fernando Perez**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=261)

Hendrix, Cobain and Page. They can all shred, but how exactly do the iconic contraptions in their hands produce notes, rhythm, melody and music. When you pluck a guitar string, you create a vibration called a standing wave. Some points on the string, called nodes, don't move at all, while other points, anti-nodes, oscillate back and forth. The vibration translates through the neck and bridge to the guitar's body, where the thin and flexible wood vibrates, jostling the surrounding air molecules together and apart. These sequential compressions create sound waves, and the ones inside the guitar mostly escape through the hole. They eventually propagate to your ear, which translates them into electrical impulses that your brain interprets as sound. The pitch of that sound depends on the frequency of the compressions. A quickly vibrating string will cause a lot of compressions close together, making a high-pitched sound, and a slow vibration produces a low-pitched sound. Four things affect the frequency of a vibrating string: the length, the tension, the density and the thickness. Typical guitar strings are all the same length, and have similar tension, but vary in thickness and density. Thicker strings vibrate more slowly, producing lower notes. Each time you pluck a string, you actually create several standing waves. There's the first fundamental wave, which determines the pitch of the note, but there are also waves called overtones, whose frequencies are multiples of the first one. All these standing waves combine to form a complex wave with a rich sound. Changing the way you pluck the string affects which overtones you get. If you pluck it near the middle, you get mainly the fundamental and the odd multiple overtones, which have anti-nodes in the middle of the string. If you pluck it near the bridge, you get mainly even multiple overtones and a twangier sound. The familiar Western scale is based on the overtone series of a vibrating string. When we hear one note played with another that has exactly twice its frequency, its first overtone, they sound so harmonious that we assign them the same letter, and define the difference between them as an octave. The rest of the scale is squeezed into that octave divided into twelve half steps whose frequency is each 2^(1/12) higher than the one before. That factor determines the fret spacing. Each fret divides the string's remaining length by 2^(1/12), making the frequencies increase by half steps. Fretless instruments, like violins, make it easier to produce the infinite frequencies between each note, but add to the challenge of playing intune. The number of strings and their tuning are custom tailored to the chords we like to play and the physiology of our hands. Guitar shapes and materials can also vary, and both change the nature and sound of the vibrations. Playing two or more strings at the same time allows you to create new wave patterns like chords and other sound effects. For example, when you play two notes whose frequencies are close together, they add together to create a sound wave whose amplitude rises and falls, producing a throbbing effect, which guitarists call the beats. And electric guitars give you even more to play with. The vibrations still start in the strings, but then they're translated into electrical signals by pickups and transmitted to speakers that create the sound waves. Between the pickups and speakers, it's possible to process the wave in various ways, to create effects like distortion, overdrive, wah-wah, delay and flanger. And lest you think that the physics of music is only useful for entertainment, consider this. Some physicists think that everything in the universe is created by the harmonic series of very tiny, very tense strings. So might our entire reality be the extended solo of some cosmic Jimi Hendrix? Clearly, there's a lot more to strings than meets the ear.

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翻译人员: Gabriella Hu 校对人员: Wang MingYang亨德里克斯，科本和佩奇（均为传奇吉他手）他们都能速弹，不过他们手上的标志性玩意儿具体是如何产生音符，节奏，旋律和音乐。当你拨弦时，你造出了一个振动，叫驻波。弦上的某些点，叫做波节，完全不动，而其它点——波腹，来回振动。这个振荡通过琴颈和琴桥传递到琴身，琴身的细而有弹性的木头振动，将周围的空气分子搅动得聚集又分开。这些连续的挤压产生了声波，吉他内部的声波大部分从洞中散播出来。它们最终传播到你的耳中，耳朵将它们翻译为电脉冲，你的大脑将它们转为声音。声音的音调由压缩的频率决定。快速振动的弦会让压缩聚得更拢造成高音调的声音，慢速的振动产生低音调声音。四个因素影响弦震动的频率：长度，张力，密度和厚度普通的吉他弦长度都相同并且有相似的张力，但是密度和粗细不同粗一些的琴弦振动得越慢，弹出的音符音调低你每次拨动琴弦的时候，你其实是在创造好几个驻波其中有第一个基波，能决定音高，但是也有叫做泛音的波，它的频率是第一个波的好几倍所有的这些驻波结合在一起就组成一个复杂的波， 创造出浓厚的声音改变拨动琴弦的方式能影响你创造的泛音如果你在中间拨动琴弦，你听到的只有基波和奇数组的泛音的波弦的中间有反节点如果你在琴桥拨动琴弦， 你听到的主要是偶数组的泛音的波和弦声我们所熟悉的西方音乐中的音阶 就是基于琴弦振动时的泛音当我们听到一个音符的振动频率 正好是另一个音符的两倍时，它的第一个泛音，它们听上去如此和谐， 我们给它们分配了相同的字母并且把它们之间的距离叫做一个八度音阶中剩余的音符都在一个八度中间分成十二个半音它们的频率比前一个音符高2^(1/12)倍这个因素决定品之间的距离每个品把琴弦的长度分成2^(1/12)，使频率随着每个半音增加没有品的乐器，比如小提琴，可以在每个音符之间有无数个不同的频率，但是给把握音调带来困难琴弦的数量和它们的调音都是根据我们想要弹奏的和弦和我们的手的结构特制的吉他的形状和材料都不同，它们都可以根据振动的性质和声音改变同时拨动两个或者更多的琴弦可以让你创造新的音波和其他的音效比如，当你同时弹奏两个频率相似的音符时，它们共同创造一个振幅不停地起落的声波，创造一种像脉动一样的效果， 吉他手把这个叫做节拍电子吉他可以创造的效果更多振动从琴弦开始，接下来拾音器把它们转换成电子信号然后传送到扬声器， 最后变成声波从拾音器到扬声器，有好多种方式处理声波，去创造出失真，过速，“娃娃器”，延音，镶边，等等的效果如果你觉得音乐中的物理原理只是为了娱乐而已，再仔细想想有些物理学家认为宇宙中的一切事物都是由一系列和声的“能量弦”组成的难道我们的现实世界只是宇宙版吉米·亨德里克斯 （美国著名歌手）的扩展的独奏吗？显然，弦不只有我们所听到的那么简单

**P262 2015-08-05 Buffalo buffalo buffalo - One-word sentences and how they work - Emma**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=262)

You may think you know the words that sit plainly in black on your page, but don't be fooled. Some words are capable of taking on different guises, masquerading as nouns, verbs and adjectives that alter their meanings entirely. This seeming superpower is called lexical ambiguity. It can turn words and sentences into mazes that mess with our minds. For example, consider the following: Buffalo buffalo Buffalo buffalo buffalo buffalo Buffalo buffalo. That may sound like nonsense, but it's actually a grammatically correct sentence. How? Well, Buffalo is proper noun, a noun, and a verb. It refers to an animal also known as a bison, an American city, and it can also mean to bully. These different interpretations create a sequence of words that is grammatically correct as it stands, though it helps to add in a few implied phrases and punctuation marks to reveal what's really going on. Buffalo buffalo are bison from the city of Buffalo, and this sentence has three groups of them. Group A, which is bullied by Group B, bullies Group C. In other words, bison from Buffalo that other bison from Buffalo bully also bully bison from Buffalo. If you let each buffalo perform its role, the meaning becomes apparent. What if the bunch of bullying buffalo decides to cross the ocean? Not just on any ship, but a ship-shipping ship shipping shipping-ships? That sentence sounds just as outrageous, but there's logic to the babble. Ship can mean a vessel and to transport. When we sub in those meanings, a clearer picture emerges. Here we have a huge ship-carrying vessel transporting ships that themselves are designed to carry goods across the sea. A ship-shipping ship, shipping shipping-ships. How about some entertainment on board this unusual vessel to offset the scuffling buffalo? Consider the can-can. Can-can can-can can can can can can-can. Here, the word can comes in many guises. There's can-can, the flamboyant dance, can, that means able to, and can, figuratively meaning to outperform. By sticking in a comma and including the implied meanings, this sentence becomes clearer. Can-can dances that can-can dances are able to outperform, can also outperform other can-can dances. You wouldn't necessarily use any of these sentences in a conversation. They're just too ridiculous. Yet they serve as an extreme example on just how tangled everyday language can be. Lexical ambiguities sail into our speech and writing all the time, spreading confusion and misunderstanding wherever they can-can.

**P262 2015-08-05 Buffalo buffalo buffalo - One-word sentences and how they work - Emma**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=262)

翻译人员: Yuezhu Cheng 校对人员: Sanqiang Xiao你也许认为你知道你纸上清晰的黑字是什么意思但不要被骗了有些字能够换上不一样的面孔伪装成名词、动词和形容词就能完全改变他们的意思这种看似强大的能力叫做词汇歧义它可以将单词和句子变成让我们头脑混乱的迷宫比如说，思考一下这句话：水牛水牛水牛水牛水牛水牛水牛水牛这听起来就像胡言乱语但这其实是一句语法正确的句子怎么会呢？因为英文的“水牛”是一个专有名词，一个名词和一个动词它代指一种又叫做野牛的动物又代指美国城市布法罗也能表示动词欺负这些不同的解释创造出了一连串词按这种样子是语法正确的加上隐含短语及标点能够更好地理解其真实含义“水牛水牛”指的是布法罗的水牛这个搭配在句中出现了三遍被第二组欺负的第一组欺负第三组也就是说，被一群布法罗水牛欺负的布法罗水牛欺负另外一群布法罗水牛如果你让每个“水牛”发挥它的角色，句意就很明了了要是这群恶霸水牛决定漂洋过海呢？不是一艘普通的船而是一条运船的船运航船呢？这句话听起来同样无法理解，但看似胡言乱语其实也有逻辑“船”可以指船舶和运输当我们把这些意思代进去，一幅清晰的画面就显现出来了我们有一条巨大的运船的轮船它运输那些被设计用来跨洋运输货物的船那么它就是一条运船的船运航船要不要在这条非同寻常的船上找点有意思的东西来弥补乱斗的水牛带来的不快呢？想想“可以可以”“可以可以”“可以可以”可以可以可以可以“可以可以”这里，“可以”这个词以各种伪装出现“可以可以”，是指康康舞，一种浮夸的舞蹈“可以”，意思是能够在比喻意义上说，还可以指超过通过加上一个逗号，并且考虑到暗指意这个句子就清楚一些了被另一种康康舞超过的康康舞能够超过其他的康康舞你在对话中未必会用到任何这些句子它们都太荒谬了但它们可以作为一种极端的例子来表现日常语言可以有多么复杂词汇歧义总是出现在我们的讲话和写作之中造成困惑和误解，只要它们可以-可以

**P263 2015-08-07 Can you solve the bridge riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=263)

Taking that internship in a remote mountain lab might not have been the best idea. Pulling that lever with the skull symbol just to see what it did probably wasn't so smart, either, but now is not the time for regrets because you need to get away from these mutant zombies fast. With you are the janitor, the lab assistant, and the old professor. You've gotten a headstart, but there's only one way to safety: across an old rope bridge spanning a massive gorge. You can dash across in a minute, while the lab assistant takes two minutes. The janitor is a bit slower and needs five minutes, and the professor takes a whole ten minutes, holding onto the ropes every step of the way. By the professor's calculations, the zombies will catch up to you in just over 17 minutes, so you only have that much time to get everyone across and cut the ropes. Unfortunately, the bridge can only hold two people at a time. To make matters worse, it's so dark out that you can barely see, and the old lantern you grabbed on your way only illuminates a tiny area. Can you figure out a way to have everyone escape in time? Remember: no more than two people can cross the bridge together, anyone crossing must either hold the lantern or stay right next to it, and any of you can safely wait in the dark on either side of the gorge. Most importantly, everyone must be safely across before the zombies arrive. Otherwise, the first zombie could step on the bridge while people are still on it. Finally, there are no tricks to use here. You can't swing across, use the bridge as a raft, or befriend the zombies. Pause the video now if you want to figure it out for yourself! Answer in: 3 Answer in: 2 Answer in: 1 At first it might seem like no matter what you do, you're just a minute or two short of time, but there is a way. The key is to minimize the time wasted by the two slowest people by having them cross together. And because you'll need to make a couple of return trips with the lantern, you'll want to have the fastest people available to do so. So, you and the lab assistant quickly run across with the lantern, though you have to slow down a bit to match her pace. After two minutes, both of you are across, and you, as the quickest, run back with the lantern. Only three minutes have passed. So far, so good. Now comes the hard part. The professor and the janitor take the lantern and cross together. This takes them ten minutes since the janitor has to slow down for the old professor who keeps muttering that he probably shouldn't have given the zombies night vision. By the time they're across, there are only four minutes left, and you're still stuck on the wrong side of the bridge. But remember, the lab assistant has been waiting on the other side, and she's the second fastest of the group. So she grabs the lantern from the professor and runs back across to you. Now with only two minutes left, the two of you make the final crossing. As you step on the far side of the gorge, you cut the ropes and collapse the bridge behind you, just in the nick of time. Maybe next summer, you'll just stick to the library.

**P263 2015-08-07 Can you solve the bridge riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=263)

翻译人员: zongyu guo 校对人员: Gabriella Hu去深山实验室实习也许不是一个好主意拉下画着骷髅头的控制杆 仅仅为了看看会发生什么大概也不是什么明智之举但现在可不是后悔的时候因为你得赶紧摆脱这群变异的僵尸与你同行的还有：门卫、助理和老教授你们甩开了僵尸，但前方只有一条路横跨大峡谷的古老的吊桥你过桥需要一分钟助理需要两分钟门卫慢一点，需要五分钟教授需要整整十分钟因为他每走一步都紧紧抓住绳索教授计算出来仅仅在17分钟之后，僵尸就会追上你们因此只有这么多时间 让所有人过桥并剪断绳索不幸的是，吊桥只能承载两个人的重量更糟糕的是天昏地黑，眼前伸手不见五指而你一路提着的灯只能照亮一小块地方你能想出一个方案，让所有人及时逃脱吗请记住：吊桥只能承载两个人的重量任何人在桥上时必须 要么提着灯，要么紧挨着灯任何人都可在峡谷两侧的黑暗中安全等待最重要的是，所有人必须 在僵尸到达之前安全通过吊桥否则，当僵尸走上桥时，有人还在上面最后，这里不能使用任何花招不能荡过去不能把桥用作木筏不能和僵尸做朋友请马上暂停视频 如果你想自己寻找答案答案揭晓：3答案揭晓：2答案揭晓：1起初似乎无论怎么安排都得超出一两分钟，但可行的方案是存在的最关键的想法是 最小化最慢的两个人所浪费的时间这可通过让他们一起过桥来实现因为需要有人提着灯返回所以得让速度最快的人来完成这个任务综上，你和助理提着灯快跑过桥虽然你必须为她而放慢一点脚步但两分钟后，你俩都过桥了速度最快的你提着灯跑回去现在仅仅过了三分钟目前为止，一切顺利现在最耗时的部分来了教授和门卫接过灯一起过桥这用了他们十分钟因为门卫必须为教授放慢脚步教授嘴里咕哝着 也许当初他不该给僵尸夜视能力当他们过桥后，时间只剩下四分钟可你仍困在危险的一侧然而让我们回忆一下 就会知道助理在另一侧已经等候多时了她是一行人中第二快的所以她从门卫手中接过灯跑过桥回到你那现在只剩两分钟，你俩最后一次过桥你一踏上峡谷的另一侧就剪断绳索，摧毁身后的吊桥这样时间刚好赶上或许，明年夏天，你只愿泡在图书馆里

**P264 2015-08-11 A poetic experiment - Walt Whitman, interpreted by three animators -**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=264)

As an experiment, we gave recordings of the same Walt Whitman poem to 3 different animators. Each interpreted the text with no knowledge of what the others were creating Here's the result. "A Noiseless Patient Spider" by Walt Whitman Interpretation #1 by Jeremiah Dickey, Medium: Paint on Glass "A noiseless patient spider, I mark'd where on a little promontory it stood isolated, Mark'd how to explore the vacant vast surrounding, It launch'd forth filament, filament, filament, out of itself, Ever unreeling them, ever tirelessly speeding them. And you O my soul where you stand, Surrounded, detached, in measureless oceans of space, Ceaselessly musing, venturing, throwing, seeking the spheres to connect them, Till the bridge you will need be form'd, till the ductile anchor hold, Till the gossamer thread you fling catch somewhere, O my soul." Interpretation #2 by Biljana Labovic, Medium: Video "A noiseless patient spider, I mark’d where on a little promontory it stood isolated, Mark’d how to explore the vacant vast surrounding, It launch’d forth filament, filament, filament, out of itself, Ever unreeling them, ever tirelessly speeding them. And you O my soul where you stand, Surrounded, detached, in measureless oceans of space, Ceaselessly musing, venturing, throwing, seeking the spheres to connect them, Till the bridge you will need be form’d, till the ductile anchor hold, Till the gossamer thread you fling catch somewhere, O my soul." Interpretation #3 by Lisa LaBracio, Medium: Scratchboard "A noiseless patient spider, I mark’d where on a little promontory it stood isolated, Mark’d how to explore the vacant vast surrounding, It launch’d forth filament, filament, filament, out of itself, Ever unreeling them, ever tirelessly speeding them. And you O my soul where you stand, Surrounded, detached, in measureless oceans of space, Ceaselessly musing, venturing, throwing, seeking the spheres to connect them, Till the bridge you will need be form’d, till the ductile anchor hold, Till the gossamer thread you fling catch somewhere, O my soul."

**P264 2015-08-11 A poetic experiment - Walt Whitman, interpreted by three animators -**

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翻译人员: Qing Zhao 校对人员: Elsa Shen作为一次实验，我们将一首沃尔特·惠特曼的诗的录音， 交给了三位动画绘制人在创作时， 每位绘制人对其他两人的创作内容保持不知情，让我们来看看最后的效果。《一只沉默而耐心的蜘蛛》 沃尔特·惠特曼演绎版本一 绘制者：杰里米·迪基 表现手法：玻璃画“一只沉默而耐心的蜘蛛，我留意到它孤孤单单地站立在小海岬上，留意到它怎样勘查着四周浩瀚无垠的空虚，它向外发射丝，丝，丝， 从它自己身上射出的丝，不断地延展它的丝，更不知疲倦地加快速度。而你——我的灵魂啊，你又站立在何处，在无边的海洋里被环绕，被摆脱，无休止地冥想、冒险、投掷、寻求可以连结的界面，直到那座你需要的桥被架起， 直到你那有延性的锚被固定，直到你抛出的纤丝抓住某个地方， 我的灵魂啊。”演绎版本二 绘制者：比利安娜·拉博维奇 表现手法：录影“一只沉默而耐心的蜘蛛，我留意到它孤孤单单地站立在小海岬上，留意到它怎样勘查着四周浩瀚无垠的空虚，它向外发射丝，丝，丝， 从它自己身上射出的丝，不断地延展它的丝，更不知疲倦地加快速度。而你——我的灵魂啊，你又站立在何处，在无边的海洋里被环绕，被摆脱，无休止地冥想、冒险、投掷、寻求可以连结的界面，直到那座你需要的桥被架起， 直到你那有延性的锚被固定，直到你抛出的纤丝抓住某个地方， 我的灵魂啊。”演绎版本三 绘制者：丽莎·拉布拉赛欧 表现手法：刮拓版画“一只沉默而耐心的蜘蛛，我留意到它孤孤单单地站立在小海岬上，留意到它怎样勘查着四周浩瀚无垠的空虚，它向外发射丝，丝，丝， 从它自己身上射出的丝，不断地延展它的丝，更不知疲倦地加快速度。而你——我的灵魂啊，你又站立在何处，在无边的海洋里被环绕，被摆脱，无休止地冥想、冒险、投掷、寻求可以连结的界面，直到那座你需要的桥被架起， 直到你那有延性的锚被固定，直到你抛出的纤丝抓住某个地方， 我的灵魂啊。”

**P265 2015-08-14 Could we actually live on Mars - Mari Foroutan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=265)

So, you're thinking of moving to Mars. Have you picked out a spot for your new home? No? Well, I'm here to help. First things first, here are some of the things you'll need to bring to The Red Planet: a high tolerance for cold, loneliness, and radiation; a lifetime supply of breathable air and food; a multibillion dollar spaceship; a desire to just get away from it all; and water. You're definitely going to need water. So what sort of real estate are you looking for? How about a mansion in the maze-like Noctis Labyrinthus? A hideaway in the Happy Face Crater? A fortress on the Face Mesa? An oceanview? Uh, bad news on the last one. You're about 4 billion years late. We're pretty sure that Mars used to have oceans, lakes, rivers, the whole package. But over time, almost all of it froze beneath the surface, or evaporated off into space. There's probably still some trapped beneath the seasonally expanding and contracting carbon dioxide ice caps, though. So what might Mars look like today if it had surface water? That, of course, depends on how much we're talking about, but maybe something like this. The relatively flat northern hemisphere is below the average elevation, so it would become one giant ocean, while the crater-ridden southern hemisphere would stay mostly high and dry. That difference between hemispheres is a bit bizarre, and we don't know why it's like that. The southern half is probably much older, judging by features like the number of craters, and the evidence of increased volcanic activity in the north. Okay, so who knows? Maybe one day Mars will have oceans again, but for now, what we've got is essentially one giant dusty desert. In fact, it's similar enough to deserts on Earth, that we've been able to learn a great deal about Mars on our home planet. For instance, Martian sand dunes form and behave similarly to our sand dunes, though the Martian versions often grow twice as large thanks to a gravitational pull that's about a third as strong as ours. And Mars has some features you won't see on Earth, like tars, which are crestless sand dunes up to fifteen meters tall, whose formations we have yet to understand. You're probably wondering, "What do you get when you combine a planet-wide desert with an atmosphere that, like ours, is subject to wind-generating pressure differentials, dust storms?" These will be your main weather hazards on the Red Planet. They play a large part in making the planet red by distributing rusted iron particles across the surface and into the air. Thanks to the low gravity and lack of moisture, these dust storms can last for months and cover the planet. So, you might want to build your home as high as possible. Well, look no further. This is Olympus Mons, the largest volcano in the Solar System. Even if Mars had a breathable atmosphere, you'd find the views from the 25 kilometer summit breathtaking. Or are volcanos not your thing? Then how about Valles Marineris, the largest canyon in the Solar System? It's so wide that from one side, the opposite rim would be below the curve of the horizon. Still, you'll catch some spectacular blue sunsets in the normally red sky, which gets its color from the dust absorbing most of the blue light, and the way sunlight is scattered by the atmosphere. Have you got spirit, curiosity, or are you just looking for opportunity? Then stop stalling and make the move to Mars today. Mars: Redder than Ever.

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翻译人员: Aiting Ye 校对人员: 高 荣嘉假设你在考虑移民去火星。想好把家安置到哪里了吗？还没？没关系，让我帮你想想吧。先说点重要的事。在去往这个红色星球之前， 你需要做好如下几点准备：对寒冷、寂寞和辐射的超强抵抗力；够一辈子用的空气和食物；一架造价几十亿美元的宇宙飞船；一颗能抛弃所有的强大内心；以及水。水，是你绝对需要的东西。那么，你到底需要什么样的房子呢？建在类似诺克提斯那种迷宫中的别墅？或者在“笑脸撞击坑”中的 一处隐蔽居所？还是"火星之脸“山区上的一座城堡？亦或是一套海景房？呃，最后这一条有点困难。40亿年前才是最好的时机。我们非常肯定火星上 曾经有过海洋，湖泊，河流，与水相关的一切。但随着时间的推移， 绝大部分水资源已冻结在地表下，或者蒸发到宇宙中了。可能依然有一部分水存留在周期性扩张和收缩的 二氧化碳冰盖下面。如果如今火星表面还有水的话， 将会是什么样子呢？当然这要基于火星地表 会有多少的水资源存在，或许情况是这样的：地势相对平坦， 平均海拔较低的北半球将会是汪洋大海，而在火山口聚集的南半球，则大部分处在高海拔、干燥的状态下。南北半球之间的差异实属奇怪，而且我们都不知道为什么会那样。通过一些特征，例如火山口的数量以及 北半球火山活动的加剧，我们推断南半球相对更为古老一些。好吧，但谁知道呢？也许将来海洋会在火星上再次出现呢，但目前，火星本质上还只是 一个巨大且布满灰尘的沙漠。实际上，火星跟地球上的沙漠非常相似，我们可以通过研究 地球上的沙漠来了解火星。例如，火星沙丘的形成和运动跟地球上的沙丘情况是相似的，可是火星沙丘的体积 通常是地球上的两倍，因为火星引力只是地球上的三分之一。同时，火星也有些不同于地球的特征。例如“Tar”，一种高达15米的无顶沙丘，我们至今都不知道它们形成的原因。也许你正在思考，“在一个布满沙漠且大气环境易受 风力大小影响的星球上，会见到什么样的情形，沙尘暴吗？”这将是这颗红色星球上 最主要的气象灾害。沙尘暴将氧化后的铁颗粒 从地表吹向空气中，从而导致整个星球看上去是红色的。再加上较弱的引力以及缺少水分，沙尘暴可以持续数月之久， 并且蔓延至整个星球。所以你还是得把房子建得越高越好。嘿，看这里。这就是奥林帕斯山，太阳系中最大的火山。即使你能在火星上呼吸，当你站在25公里高的顶峰处观赏美景时， 也绝对会窒息的。或许你不喜欢火山？那么太阳系中最大的峡谷， “水手号峡谷”如何呢？“水手号峡谷”实在太大了，大到你在一头都看不到 另一头的峡谷边缘。与此同时，你还能在红色天际中 欣赏到壮观的蓝色日落，正是因为大气中的尘埃吸收了 大部分的蓝光，再加上大气层对太阳光线的散射作用， 才有了这样的美景。你现在感到兴奋，好奇了吗？ 或者你正在寻找机会？不要犹豫了， 现在就向火星进发吧。火星：没有最红，只有更红。

**P266 2015-08-17 Bring TED to the classroom with TED-Ed Clubs**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=266)

These are sounds. Sounds are our way of communication. Our way of understanding. Have you ever thought that your voice sounds much better in the bath? What is the extent of teachers' rights? What if you could become something like an animal? Is that possible? What separates those who primarily have an idea and those who want to bring it to life is simple. A society assumes that that is the story of every black man walking the Earth. It is assumed that that is my story, before I even begin to tell it. Because everything I've just told you so far is a lie and I just made it all up. My talk is actually about the art of lying and convincing people that what you're saying is true. We've developed technologies to give ourselves more and more pleasure. We're turning into a world like the "Brave New World" of Aldous Huxley . This is Ted-ED and this is what we do.

**P266 2015-08-17 Bring TED to the classroom with TED-Ed Clubs**

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翻译人员: Guohui He 校对人员: Lipeng Chen这是声音，是我们交流的声音，是我们认知的方式。你有没想过，你的声音在洗澡时更好听。教师的权利有多大?如果你变成动物会怎样? 可能吗?将仅仅有想法的人和实现想法的人区别开来很简单。社会假设这就是每个黑人的故事。在我讲述我的故事之前, 我已经被先入为主了。因为我刚才所说的全是谎言，全是我自己编的。我的演讲是关于谎言的艺术，以及说服他人自己没有说谎。我们发展科技，以获得越来越多的愉悦。我们进入了赫胥黎笔下的"美丽新世界"。这就是Ted-ED。这就是我们所做的。

**P267 2015-08-21 How smart are dolphins - Lori Marino**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=267)

In 1985, three researchers on a dolphin-studying expedition got a little bored. To lighten things up, one pretended to be Poseidon by placing a seaweed garland on his head and then throwing it into the ocean. Moments later, a dolphin surfaced with the seaweed crowning her head. Sure, this could have been a coincidence, but it's also entirely possible that the dolphin was mimicking the scientist. That's because dolphins are one of the smartest animals species on Earth. So exactly how smart are they? Like whales and porpoises, dolphins belong to the group of aquatic mammals known as cetaceans who comprise 86 different species, and share a common link with ungulates, or hoofed animals. Originally land mammals, the first cetaceans entered the water about 55 million years ago as large predators with sharp teeth. Then, a shift in ocean temperatures about 35 million years ago reduced the availability of prey. One group of cetaceans who survived this distruption, the odontocetes, wound up smaller with less sharp teeth, but also larger and more complex brains that allowed for complex social relationships, as well as echolocation to navigate and communicate. Jump ahead to the present, and modern dolphins' brains are so large that their encephalization quotient, their brain size compared to the average for their body size, is second only to humans. Dolphins have evolved to survive through their ability to form complex social networks that hunt, ward off rivals, and raise offspring together. For example, one group of Florida dolphins practices a sophisticated form of cooperation to hunt fish. A dolphin designated as "the net-maker" kicks up mud while another gives the signal for the other dolphins to simultaneously line up and catch the escaping fish. Achieving a goal like this requires deliberate planning and cooperation, which, in turn, requires some form of intentional communication. Dolphins pass down their communication methods and other skills from generation to generation. Different dolphin populations exhibit variations in greetings, hunting strategies, and other behaviors. This sort of cultural transmission even extends to tool use. One group of bottlenose dolphins off the Australian coast nicknamed The Dolphin Sponge Club, has learned how to cover their rostrums with sponges when rooting in sharp corals, passing the knowledge from mother to daughter. Dolphins have even demonstrated language comprehension. When taught a language based on whistles and hand gestures, they not only understood what the signals meant, but that their order had meaning: the difference between bringing the ball to the hoop and bringing the hoop to the ball. So they were able to process two of the main elements of human language: symbols that stand for objects and actions, and syntax that governs how they are structured. Dolphins are also one of the few species who pass the mirror test. By recognizing themselves in mirrors, they indicate physical self-awareness, and research shows they can recognize not just their bodies, but also their own thoughts, a property called metacognition. In one study, dolphins comparing two sounds could indicate a same, different, or uncertain response. Just like humans, they indicated uncertainty more often with difficult trials, suggesting they're aware of what they know, and how confident they feel about that knowledge. But some of the most amazing things about dolphins are their senses of empathy, altruism, and attachment. The habit of helping injured individuals extends across the species barrier as evidenced by the many accounts of dolphins carrying humans to the surface to breathe. And like us, dolphins mourn their dead. When we consider all the evidence, we may wonder why humans still hunt dolphins for meat, endanger them through fishing and pollution, or imprison them to perform tricks. The ultimate question may not be whether dolphins are intelligent and complex beings, but whether humans can empathize with them enough to keep them safe and free.

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翻译人员: Wendy Wu 校对人员: Cissy Yun1985年，海豚研究探险队三个研究员觉得有点无聊为了放松一下， 他们其中一个假装成海神波塞冬，在头上放了一个海草花环， 然后把花环扔进海里。一会儿，一只海豚头上顶着海草花环 浮出水面，当然，这可能是巧合，但这也完全可能是 这只海豚在模仿科学家。因为，海豚是地球上 最聪明的物种之一。它们到底有多聪明？像鲸鱼和鼠海豚，海豚属于水生哺乳动物的一类，称为鲸目动物，其中有86种不同的物种，海豚和有蹄类动物也有关联。它们最初是陆地上的哺乳动物，第一只鲸目动物 大约在5500万年前进入水中，它们长出利齿，成为大型捕食者。在大约3500万年前，海洋温度突变，可获得的猎物大量减少。鲸目类的一组在这场灾难中幸存下来，齿鲸，它们外形变小， 牙齿也不那么锋利，同时它们的脑部变大变复杂，这让它们可以形成复杂的社会关系，还能通过回声定位来导航和交流。发展到现在，按照现代海豚的脑部大小， 它的脑系数，即脑大小占身体大小的平均比例，是仅次于人类的。海豚为了生存不断进化，拥有应付复杂社交网络的能力，一起捕猎，逃脱捕杀，养育后代例如，一群佛罗里达海豚演练出一套精妙的合作方式来捕鱼。一只海豚被设计成“织网者”， 不断引起骚动，同时另一只海豚发送信号给其他海豚，以同时形成一条线，捕获逃跑的鱼。要达成像这样的目标， 需要周密的计划和合作，而且，需要有目的的交流。海豚的沟通方式和其他技能代代相传。不同的海豚种群有不同的问候方式，不同的捕猎策略和其他行为习惯。这种文化的传递甚至包括工具使用。远离澳大利亚海岸的一群瓶鼻海豚，被昵称为海豚海绵俱乐部，它们懂得用海绵包裹它们的喙， 在锋利的珊瑚礁中觅食，这个知识由母亲传授给女儿。海豚甚至展示出了语言理解能力。当传授它们基于哨音和手势的语言，他们不仅可以理解信号的意思，还可以理解顺序：把球放在铁环上 不同于把铁环放在球上。所以他们能够处理 人类语言中两种主要的元素代表物体和动作的符号，和管理结构的语法。海豚也是少有的 能够通过镜像测试的物种之一。它们认出镜中的自己， 证明有身体自我认知能力，研究还表明 它们不仅可以认出自己的身体，还可以认出自己的思考， 这种能力叫做元认知。在一个研究中， 海豚比较两种声音，它能够反馈出是相同、 不同或无法肯定。就像人类一样，它们在困难的测试中 更经常反馈“不确定”，表明它们可以认识到自己知道什么，以及它们对自己认知的自信度。但海豚最神奇的地方是它们的同理心， 利他主义和互相支持。它们帮助受伤个体的习惯 跨越了物种间的界限，在许多例子中，我们都看到海豚托人浮出水面呼吸。也和我们一样， 海豚也为死去的同伴哀悼。想到所有这些，我们可能要问， 为什么人类还要捕杀海豚来食用？为什么要用捕捞和污染让它们身陷险境？为什么要囚禁他们表演杂耍？根本的问题不在于海豚是否是聪明和复杂的生物，而是人类是否能够理解它们的感受， 让它们安全和自由。

**P268 2015-08-24 How false news can spread - Noah Tavlin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=268)

There's a quote usually attributed to the writer Mark Twain that goes, "A lie can travel halfway around the world while the truth is putting on its shoes." Funny thing about that. There's reason to doubt that Mark Twain ever said this at all, thus, ironically, proving the point. And today, the quote, whoever said it, is truer than ever before. In previous decades, most media with global reach consisted of several major newspapers and networks which had the resources to gather information directly. Outlets like Reuters and the Associated Press that aggregate or rereport stories were relatively rare compared to today. The speed with which information spreads now has created the ideal conditions for a phenomenon known as circular reporting. This is when publication A publishes misinformation, publication B reprints it, and publication A then cites B as the source for the information. It's also considered a form of circular reporting when multiple publications report on the same initial piece of false information, which then appears to another author as having been verified by multiple sources. For instance, the 1998 publication of a single pseudoscientific paper arguing that routine vaccination of children causes autism inspired an entire antivaccination movement, despite the fact that the original paper has repeatedly been discredited by the scientific community. Deliberately unvaccinated children are now contracting contagious diseases that had been virtually eradicated in the United States, with some infections proving fatal. In a slightly less dire example, satirical articles that are formatted to resemble real ones can also be picked up by outlets not in on the joke. For example, a joke article in the reputable British Medical Journal entitled "Energy Expenditure in Adolescents Playing New Generation Computer Games," has been referenced in serious science publications over 400 times. User-generated content, such as wikis, are also a common contributer to circular reporting. As more writers come to rely on such pages for quick information, an unverified fact in a wiki page can make its way into a published article that may later be added as a citation for the very same wiki information, making it much harder to debunk. Recent advances in communication technology have had immeasurable benefits in breaking down the barriers between information and people. But our desire for quick answers may overpower the desire to be certain of their validity. And when this bias can be multiplied by billions of people around the world, nearly instantaneously, more caution is in order. Avoiding sensationalist media, searching for criticisms of suspicious information, and tracing the original source of a report can help slow down a lie, giving the truth more time to put on its shoes.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=268)

翻译人员: Tian Wu 校对人员: MQ L有一句名言常被引用据说是作家马克.吐温说的「当谎言已经绕遍大半个地球时真相才刚穿鞋准备出发而已呢」讽刺的是到底马克.吐温到底有没有说过这句话 至今仍没个定论从而证明了这句名言的道理不管这句名言是谁说的它都真切道出了当今社会的情况几十年前 掌握全球性影响力的媒体是几家主流的报纸商和广播公司它们有直接获得第一手资料的渠道专门收集、重新报导新闻的 新闻通讯社如当今的路透社和美联社在过去时十分少见的当今资讯传播的速度之快大大促成了「循环报导」这种现象的发生举例来说 A出版商报导了一个错误消息B出版商重抄了这则报导然后A又引用B 作为消息的来源另一种循环报导则是多家出版商都引述报导一篇有误的资讯让后来其他写作者 以为此篇文章被许多其他的出版物引用例如，1998年，一篇打着科学名义 实则为伪科学的文章出版指出对幼儿例行施打疫苗 会导致自闭症文章一出版 马上引发一波反疫苗的抗争但其实自始至终科学界都对原文的内容存疑反疫苗声浪导致许多孩童未受接种疫苗甚至因此染上了早在美国绝迹的传染病其中不乏会致死的严重病疫以上是比较极端的例子有些讽刺文章 写得煞有其事，能以假乱真竟蒙骗过出版商 被拿来当正式的材料一篇刊登在英国医学期刊上的讽刺文章「青少年花在新世代电脑游戏的精力」竟被许多正规的科学出版刊物引用不下400次使用者可以自由撰写內容的网站如维基百科也是导致循环报导的元凶之一越来越多作者依赖像维基这类的网页快速获取资讯一些未经证实的讯息 也因此流入了出版刊物中而这些存于出版刊物中的错误 又再次被维基百科的使用者引述让真相更扑朔迷离当今通讯科技的进步大大帮助了人們打破资讯与人之间的鸿沟我们一心想快速得到答案却往往忽视了真相的重要性当偏见可以一传十、十传百眨眼间影响全世界无数人的时候我们就该更谨慎评估资讯了不要轻信喜欢夸大其辞的媒体多看看别人对启人疑窦之资讯的评论追查报导的来源 可以暂缓谎言蔓延的速度给真相多一点时间 追过错误资讯

**P269 2015-08-24 Why do some people go bald - Sarthak Sinha**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=269)

What do Charles Darwin, Michael Jordan, and Yoda have in common? They, like many other historical and fictive individuals, are bald, in some cases by their own choice. For centuries, a shining dome has been a symbol of intelligence, but despite this, many balding people still wish their hair would return. Scientists have long pondered, "Why do some people lose their hair, and how can we bring it back?" The full-headed among us have about 100,000 to 150,000 hairs on our scalps, and scientists have discovered two things about this dense thicket. Firstly, the sprouting hair we see is mostly made up of keratin, the protein leftover from dead cells that are forced upwards as new cells grow beneath them. Secondly, the structures that drive hair growth are called hair follicles, a network of complex organs that forms before we're born, and grows hair in an everlasting cycle. This cycle has three main phases. The first is anagen, the growth phase, which up to 90% of your hair follicles are experiencing right now, causing them to push up hair at a rate of one centimeter per month. Anagen can last for two to seven years, depending on your genes. After this productive period, signals within the skin instruct some follicles to enter a new phase known as catagen, or the regressing stage, causing hair follicles to shrink to a fraction of their original length. Catagen lasts for about two to three weeks and cuts blood supply to the follicle, creating a club hair, meaning it's ready to be shed. Finally, hairs enter telogen, the resting phase, which lasts for ten to twelve weeks, and affects about 5-15% of your scalp follicles. During telogen, up to 200 club hairs can be shed in a day, which is quite normal. Then, the growth cycle begins anew. But not all heads are hairy, and, in fact, some of them grow increasingly patchy over time in response to bodily changes. 95% of baldness in men can be attributed to male pattern baldness. Baldness is inherited, and in people with this condition, follicles become incredibly sensitive to the effects of dihydrotestosterone, a hormonal product made from testosterone. DHT causes shrinkage in these overly sensitive follicles, making hair shorter and wispier. But loss isn't sudden. It happens gradually, along a metric known as the Norwood Scale, which describes the severity of hair loss. First, hair recedes along the temples, then hair on the crown begins to thin in a circular pattern. At the highest rating on the scale, these balding areas meet and expand dramatically, eventually leaving only a ring of sparse hair around the temples and the back of the head. Genetics isn't all that drives hair loss. Long periods of stress can release signals that shock follicles and force them into the resting phase prematurely. Some women experience this after childbirth. Follicles might also lose the ability to go into anagen, the growth phase. People going through chemotherapy treatment temporarily experience this. But while balding may look permanent, scientific investigation has revealed the opposite. Below the skin's surface, the roots that give rise to our hair actually remain alive. Using this knowledge, scientists have developed drugs that shorten the resting phase, and force follicles into anagen. Other drugs combat male pattern baldness by blocking the conversion of testosterone to DHT so that it doesn't affect those sensitive follicles. Stem cells also play a role in regulating the growth cycle, and so scientists are investigating whether they can manipulate the activity of these cells to encourage follicles to start producing hair again. And in the meantime, while scientists hone their hair-reviving methods, anyone going bald, or considering baldness, can remember that they're in great company.

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翻译人员: Diane Liu 校对人员: Yulin Li查尔斯·达尔文、迈克尔·乔丹和尤达有什么共同点？他们就像许许多多历史人物和 虚构人物一样——都秃顶，有的时候是他们自己选择要秃顶的。从古至今，闪亮的圆头顶都是智慧的象征，但是尽管如此， 很多秃顶的人还是希望他们的头发还能长回来。科学家们思考良久，“为什么有些人脱发， 我们又能怎样再让头发长出来呢？”长满头发的人的头皮上大概有10万到15万根头发，对于这片厚厚的灌木丛， 科学家有了两个新发现。首先，我们看到的长出的头发中 有很大一部分是由角质组成的。角质就是因为新细胞在它们之下生长而被向上推的死细胞中剩余的蛋白质，其次，使头发生长的结构叫发囊。发囊是复杂器官组成的一个网络它在我们出生之前就形成了， 并且使头发不断生长。这个周期有3个阶段，第一个阶段是毛发生长初期，即生长阶段。多达90%的发囊正处于毛发生长初期，使他们以每月1厘米的速度把头发向上推。根据基因的不同， 毛发生长初期可以持续2到7年。在这段高产时期之后，皮肤里的信号命令一些发囊进入一个新的阶段。这个阶段叫做毛发生长中期， 或者倒退期。倒退期使发囊缩小至他们原来长度的一小段，这个阶段持续2到3周，并且切断毛囊的供血，使其形成一个杵状毛，这意味着头发已经准备好要脱落了。最后，头发进入毛发生长终期，即休止期，休止期持续10至12周，并且影响到你5%到15%的头皮毛囊。在毛发生长终期， 多达200根杵状毛会在一天之内脱落，这是十分正常的。然后，生长周期又重新开始，但是， 不是所有的头都是长满头发的，实际上， 随着时间的推移， 有些人逐渐长出了斑状这是对身体变化做出的反应。男性中95%的脱发是由于男性型秃。秃顶是遗传的，有男性型秃的人，他们的发囊会变得对 二氢睾酮 异常敏感，二氢睾酮 是从睾酮中产生的激素。二氢睾酮（DHT）导致这些过于敏感的毛囊缩小，使头发变得又短又细。但是脱发不是忽然发生的它根据一个度量标准逐渐发生，这个度量叫诺伍德分型， 它描述脱发的严重程度。首先，头发沿着太阳穴脱落，然后， 头顶上的头发一圈一圈地变稀疏。在这个分型的最高级，这些秃顶的部分相互连接然后大幅扩张，最后只剩下太阳穴周边一圈稀少的头发，和后脑勺的头发。基因不是导致脱发的唯一原因。长期的压力会释放刺激毛囊的信号，并且使他们提早进入休止期。一些产后妇女会经历这个阶段。发囊也有可能失去能力， 无法进入毛发生长初期，即生长期。接受化疗的人会暂时经历这个阶段。但是，脱发也许看起来是永久性的，科学研究揭示了与其相悖的一面。在表皮下，使我们头发生长的发根实际上保持着活性。运用这个知识，科学家们发明了可以缩短休止期的药物，从而迫使发囊进入毛发生长初期。其他治疗男性型秃顶的药物，通过限制睾酮转变成二氢睾酮的方法来实现这样，敏感的发囊就不会受到影响。干细胞也起到调整生长周期的作用，所以，科学家们正在研究他们 是否可以控制这些细胞的活动，从而促使这些毛囊从新开始长出头发。同时，当科学家在研究头发再生的方法时，秃顶的者思考秃顶的人， 可以记得他们有那些聪明秃顶的人相伴

**P270 2015-09-01 The ancient origins of the Olympics - Armand D'Angour**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=270)

Thousands of years in the making, what began as part of a religious festival honoring the Greek god Zeus in the rural Greek town of Olympia has today become the greatest show of sporting excellence on Earth. The inception date in 776 BC became the basis for the Greek's earliest calendar, where time was marked in four-year increments called olympiads. What could it be? Why, it's the Olympic games, of course. Competition fosters excellence, or so thought the Ancient Greeks. In addition to sporting events, contests were held for music, singing, and poetry. You can read about them all yourself in classical literary works, like Homer's "Iliad" and Virgil's "Aeneid." Even mythical heroes appreciate a good contest every now and then, wouldn't you say? For the first thirteen games, the Ancient Greek Olympics featured just one event, the two hundred yard dash. But over time, new exciting contests, like boxing, chariot and mule racing, and even a footrace where the competitors wore a full suit of armor enticed many hopeful champions into the Olympic stadium. The combined running, jumping, wrestling, javelin throwing, and hurling the discus events known as the pentathlon inspired world-class competition, and the pankration, a no holds barred fight where only biting and eye-gouging were prohibited, ensured the toughest men were victorious. And victorious they were. Nobody tops the local baker Coroebus, who 776 BC became the very first Olympic champion. And we'll never forget Orsippus of Megara, the 720 BC Olympic victor tore away his loincloth so he could race unimpeded, inaugurating the Ancient Greek tradition of competing in the nude. Now there's a winning streak, if ever we've seen one. But all good things must end. In 391 AD, the Christian Roman Emperor Theodosius banned pagan practices, so the world soon bid a fond farewell to the Olympic games. But just like those early pankration athletes, you can't keep a good one down, and 1500 years later in 1896, the modern Olympic games kicked off in Athens, Greece. Today, the Summer and Winter Olympics bring international world-class athletes together by the thousands, uniting fans by the billions for the world's foremost sporting competition. Citius, Altius, Fortius. Three cheers for the Olympics.

**P270 2015-09-01 The ancient origins of the Olympics - Armand D'Angour**

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翻译人员: Xinwei Li 校对人员: Gabriella Hu几千年历史发展至今，原本源自希腊奥林匹亚的乡村城镇为了纪念希腊神宙斯而建立的宗教节日，如今已经演变成为世界上 最为精彩的体育运动表演。公元前776年第一次举办节日的那天奠定了希腊古典日历的基础，标定了每四年为一周期的奥林匹克周期。那是什么呢？当然就是奥林匹克运动会了。竞技孕育卓越， 至少古希腊人就是这么认为的。除了运动赛事，比赛项目还包括音乐，声乐和诗歌。你可以在古典文学作品中读到这些内容，比如荷马的《伊利亚特》， 还有维吉尔的《埃涅阿斯纪》。甚至连神话中的英雄们有时候 也会喜欢这样精彩的比赛的，不是吗？起初的十三场比赛中，古希腊的奥林匹克只有一项重要赛事， 那就是200码短跑。但是随着时间的推移， 那些新鲜而刺激的比赛，比如拳击，马车、骡车竞赛，甚至还有让参赛者全副武装的竞走都吸引了许多充满信心的战士们 来到奥林匹克体育场。结合了跑步，跳远，角力，掷标枪，掷铁饼这些项目，也就是我们所知的五项全能， 创造出了世界级的比赛而古希腊搏击，一种除了撕咬和挖眼睛外毫无禁忌的打斗，保证最强健的选手才能获胜。而这些强者也确实胜利了。没有人能打败当地名叫克洛伊的面包师，他是公元前776年第一位奥林匹克运动会的冠军。我们也永远不会忘记麦加拉人奥西普斯，公元前720年那位为跑的更畅快 而解了自己腰带的冠军，开创了古希腊比赛中裸体参赛的先例。当时还有连胜纪录，虽然很少能够见到。然而从没有不败的胜者。公元391年，基督教罗马皇帝狄奥多西一世 严禁异教徒活动，于是奥林匹克运动会很快与世界告别了。但就像那些古时的搏击运动员，强者是无法永远压制的，于是在1500年后的1896年，现代奥运会在希腊雅典召开。如今，夏季和冬季奥运会把数以千计的世界级运动员 从世界各地聚集到一起，也把成千上万的运动迷集结到 这最顶级的体育赛事中。更快，更高，更强。奥林匹克的三大口号。

**P271 2015-09-02 How misused modifiers can hurt your writing - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=271)

This just in: "Thief robs town with world's largest chocolate bunny." Wait, so are we talking about this, or this? That's a classic case of a misplaced modifier, a common grammatical mistake that can dramatically change the meaning of a sentence. And lest you think this is a bit far-fetched, confusing headlines like this appear all the time. Modifiers are words, phrases, and clauses that add information about other parts of a sentence, which is usually helpful. But when modifiers aren't linked clearly enough to the words they're actually referring to, they can create unintentional ambiguity. That happens because the modifying words, in this case, "with world's largest chocolate bunny," modify the wrong thing, the robber's actions instead of the town. To correct this particular sentence, we simply rephrase to make it clearer what the modifying phrase is talking about. "Town with world's largest chocolate bunny robbed by thief." Now, at least it's clear that the thief wasn't armed with a giant chocolate animal. Sometimes, modifying words, phrases, or clauses don't appear to be modifying anything at all. That's called a dangling modifier. "Having robbed the bank in record time, it was possible to make off with the town's chocolate rabbit as well." The modifying phrase in this sentence seems unrelated to anything else, and so we're clueless about who the chocolate-loving criminal could possibly be. Giving the modifier something to modify will solve the problem. Then there's another group called the squinting modifiers because they're stuck between two things and could feasibly refer to either. Often, these modifiers are adverbs, like the one in this sentence: "Robbers who steal chocolate bunnies rapidly attract the outrage of onlookers." "Rapidly" is the modifier, here, but what's not clear is whether it's referring to the speed of the chocolate thievery, or how quickly it alerts the furious onlookers. To clarify, we can either put the modifier closer to its intended phrase, which works in some cases, or we can entirely reword the sentence so that the modifier no longer squints, but clearly applies to only one part. "Chocolate bunny-thieving robbers rapidly attract the outrage of onlookers." Justice will eventually come to the chocolate thief, but in the meantime, our task is to avoid verbal ambiguity by making it clear which parts of the sentences modifiers belong to. That way, we can at least maintain grammatical law and order.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=271)

翻译人员: Yuezhu Cheng 校对人员: yurui xie最新消息：”窃贼洗劫了城镇（有/用）世界上最大巧克力兔子“等等，我们是在讨论这个？还是这个？这是一个修饰语错置的经典案例这是一种常见的语法错误可以戏剧性地改变句意恐怕你会有点不相信但像这种引发歧义的标题总会出现修饰语可以是词、短语和从句它们为句子的其他部分增添信息通常来说很有用但如果修饰语与它真正修饰的词连接不清晰的话就会造成无意歧义这种情况会发生是因为修饰语在这个例子里就是“（有/用）世界上最大的巧克力兔子”修饰的对象错了，就是窃贼的行为而不是城镇为了改正这句话，我们可以改变一下措辞来使修饰的短语更为清晰改述为“有着世界上最大的巧克力兔子的城镇被窃贼洗劫”现在这句话就明了多了而不是说窃贼带着一只巨大的巧克力兔子有时候，修饰词、短语或从句好像并没有修饰任何东西这叫做悬垂修饰语“在飞速洗劫了银行之后，还能偷走镇上的巧克力兔子”这句话中的修饰短语似乎并没有与任何东西相连所以我们不知道这个喜爱巧克力的窃贼会是谁给修饰语一个修饰对象就会解决这个问题还有一种叫做岐形修饰语因为它们被卡在两样东西之中，修饰哪一个都讲得通通常，这些修饰语是副词，就像这句里的：“这个窃贼偷巧克力兔子很快引起了旁观者的愤怒”“很快”在这里是修饰语但不清楚是指偷巧克力很快呢还是说很快引起了愤慨的旁观者的警觉为了使之清晰，我们可以把修饰语放得离修饰对象近一点有些情况这样是可行的或者我们可以改述这句话，从而修饰语不偏向双方还是明确地指代一个部分“偷巧克力兔子的窃贼很快激起了旁观者的愤怒。”正义最终会使巧克力窃贼受到惩罚但同时我们的任务是通过使句中的修饰对象清晰从而避免歧义这样一来，我们至少能保持原有的语法规则和次序

**P272 2015-09-03 When to use 'me', 'myself' and 'I' - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=272)

Me, myself, and I. You may be tempted to use these words interchangeably because they all refer to the same thing, but in fact, each one has a specific role in a sentence. "I" is a subject pronoun, "me" is an object pronoun, and "myself" is a reflexive or intensive pronoun. So what does that reveal about where each word belongs? Let's start with the difference between subject and object. Imagine the subject as the actor in a sentence and the object as the word that is acted upon. "I invited her but she invited me." The object can also be the object of a preposition. "She danced around me, while he shimmied up to me." In some languages, like Latin and Russian, most nouns have different forms that distinguish subjects from objects. However, in English, that's only true of pronouns. But so long as you know how to distinguish subjects from objects, you can figure out what belongs where. And when you encounter a more complicated sentence, say one that involves multiple subjects or objects, and you're not sure whether to use "I" or "me," just temporarily eliminate the other person, and once again distinguish subject from object. Here's another. You wouldn't say, "Me heard gossip," but sub in "I" and you're good to go. Then what about "myself?" This grand character is often substituted for "me" and "I" because it seems more impressive. "Please tell Jack or myself" may sound elegant, but in fact, "me" is the right pronoun here. So where should you use "myself"? In its function as a reflexive pronoun, "myself" only works if it's the object of a sentence whose subject is "I." "I consider myself the most important pronoun at this year's party." "Myself" can also add emphasis as an intensive pronoun. "I, myself, have heard others agree." The sentence works without it, but that extra pronoun gives it oomph. To check if "myself" belongs in a sentence, simply ensure that there's also an "I" that it's reflecting or intensifying. So that's "me," "myself," and "I," ever ready to represent you, yourself, and you.

**P272 2015-09-03 When to use 'me', 'myself' and 'I' - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=272)

翻译人员: fengshuang gao 校对人员: Gabriella HuMe, myself, 和 I. (英语里“我”的三种语法形式)你可能不由自主地”混用“这三个词因为它们都代表同一个意思但事实上，每一个词在句子中都有特别的（语法）功能“I” 是主格代词，“me”是宾格代词，“myself” 是反身代词或强势代词那么他们的这些形式反映了 它们应该各属于（句子）的那个部分呢？让我们从主语和宾语的区别开始。把一个句子里的主语想象为（动作的）实施者则宾语是（动作的）承受者。“我邀请了她（宾格“her”）但她（主格“she”）邀请了我。”宾格也可以是介词的宾语形式。”当他对着我摇摆时，她绕着我跳舞“ ("对着"，"to";“绕着","around”是介词， 后接“我”的宾语形式“me” ——译注)在某系语言中，比如拉丁语和俄语，大多数名词有不同的变格来区分宾语和主语。然而在英语中，只有代词有变格。但只要你知道如何区分宾语和主语，你可以分出哪个格式属于什么地方。当你遇到一个更复杂的句子的时候，比如说一个涉及了多个主语和宾语的句子，你不知道该用 “I” 还是“me”，只要暂时删掉其它人，然后再一次区分主宾。接着是下一个例子。你不能说，“我（宾格“me”）听到了一个谣言” 用“I”代替“me”就对了。那么“myself”又是什么呢？这个长长的词总是代替“me” 和 “I”因为看起来似乎更醒目。“请告诉Jack或我（myself）” 听起来可能很优雅，但事实上，“me” 在这里才是正确的代词。那么你应该在哪里用“myself”呢？作为反身代词，“myself” 只能做以“I”做主语的句子的宾语。“我（I）认为我（myself）是本年度宴会上最重要的代词。”“Myself”还可作为强势代词加强语气。“我（I），我本人（myself）还听到了其它人的同意。”这个句子没有“myself” 也正确，但那个多余的代词给了它更重的语气。检查 “Myself”是否属于一个句子，只要简单确保它是一个 “I” 的反应或强调。所以这就是我， "me", "myself", 和 "I",已可以代表你，"you", "youself", 和 "you" 的情形

**P273 2015-09-10 Do animals have language - Michele Bishop**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=273)

All animals communicate. Crabs wave their claws at each other to signal that they're healthy and ready to mate. Cuttlefish use pigmented skin cells called chromatophores to create patterns on their skin that act as camouflage or warnings to rivals. Honeybees perform complex dances to let other bees know the location and quality of a food source. All of these animals have impressive communication systems, but do they have language? To answer that question, we can look at four specific qualities that are often associated with language: discreteness, grammar, productivity, and displacement. Discreteness means that there is a set of individual units, such as sounds or words, that can be combined to communicate new ideas, like a set of refrigerator poetry magnets you can rearrange to create different phrases. Grammar provides a system of rules that tells you how to combine those individual units. Productivity is the ability to use language to create an infinite number of messages. And displacement is the ability to talk about things that aren't right in front of you, such as past, future, or fictional events. So, does animal communication exhibit any of these qualities? For crabs and cuttlefish, the answer is no. They don't combine their signals in creative ways. Those signals also don't have to be in a grammatical order, and they only communicate current conditions, like, "I am healthy," or "I am poisonous." But some animals actually do display some of these properties. Bees use the moves, angle, duration, and intensity of their waggle dance to describe the location and richness of a food source. That source is outside the hive, so they exhibit the property of displacement. They share that language trait with prairie dogs, which live in towns of thousands, and are hunted by coyotes, hawks, badgers, snakes, and humans. Their alarms calls indicate the predator's size, shape, speed, and, even for human predators, what the person is wearing and if he's carrying a gun. Great apes, like chimps and gorillas, are great communicators, too. Some have even learned a modified sign language. A chimpanzee named Washoe demonstrated discreteness by combining multiple signs into original phrases, like, "Please open. Hurry." Coco, a female gorilla who understands more than 1000 signs, and around 2000 words of spoken English referred to a beloved kitten that had died. In doing so, she displayed displacement, though it's worth noting that the apes in both of these examples were using a human communication system, not one that appeared naturally in the wild. There are many other examples of sophisticated animal communication, such as in dolphins, which use whistles to identify age, location, names, and gender. They can also understand some grammar in a gestural language researchers use to communicate with them. However, grammar is not seen in the dolphin's natural communication. While these communication systems may have some of the qualities of language we've identified, none display all four. Even Washoe and Coco's impressive abilities are still outpaced by the language skills of most three-year-old humans. And animals' topics of conversation are usually limited. Bees talk about food, prairie dogs talk about predators, and crabs talk about themselves. Human language stands alone due to the powerful combination of grammar and productivity, on top of discreteness and displacement. The human brain can take a finite number of elements and create an infinite number of messages. We can craft and understand complex sentences, as well as words that have never been spoken before. We can use language to communicate about an endless range of subjects, talk about imaginary things, and even lie. Research continues to reveal more and more about animal communication. It may turn out that human language and animal communication aren't entirely different but exist on a continuum. After all, we are all animals.

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翻译人员: Alex Ho 校对人员: Jiawei Ni所有的动物都会相互交流。螃蟹相互间挥舞钳子表明它们健康并准备交配。乌贼使用叫色素体的皮肤色素细胞在它们的皮肤上创造图案形成伪装，用来迷惑或警示敌人。蜜蜂通过表演复杂的舞蹈来让其他的蜜蜂知道 食物源的位置和质量。所有的动物都有一流的交流系统，但它们有语言吗？为了回答这个问题，我们来看下跟语言相关的4个特质:分离性，语法性，创造性，和时空性。分离性是指一组独立的单元，比如声音或者词语，能够被组合在一起传达新的想法。就像贴在冰箱门上的诗词磁条可以通过重组来创建不同的词汇。语法性提供了一套规则让你知道如何组合那些独立单元。创造性是运用语言来创造无限量信息的能力。时空性是谈论那些不在眼前事物，比如过去，未来或者虚构事件。那么，这些动物交流时 会展现出其中任何的特质吗？就螃蟹和乌贼而言，答案是不会。它们不会以创新的方式 来衔接这些信号。那些信号没有必要 按照语法的顺序排列，它们只交流现状，比如，“我很健康”，或者“我有毒”。但有一些动物们会展现出这些特性。蜜蜂们在舞蹈中通过摇摆舞的 位置变动，角度，时长和强度来描述食物源的位置和富裕程度。食物源位于蜂巢之外，所以它们展现出了时空性。它们分享了跟土拨鼠一样的语言特征，土拨鼠住在数千个城镇中，是土狼，老鹰， 獾，蛇 和人类的猎物。它们的警报展现了捕猎者的 大小，体型，速度，甚至包括人类狩猎者的穿着，以及是否带着枪。类人猿，比如黑猩猩和大猩猩， 也很善于交流。甚至有一些学会了改进后的手语。一只名叫Washoe的黑猩猩， 通过将不同的手势转换成原始的词组，展现了其分立性，像“快打开门”。Coco,一只能明白1000多种手势，和大约2000个 英语口语词汇的雌猩猩，提到了一只刚死去的可爱小花猫。她的这种表现显示出了时空性，但值得注意的是类人猿 在这两个案例中用的是人类的交流体系，而并不是任何天然形成的特性。动物们还有很多复杂交流的案例，比如海豚，同过吹口哨来辨别年龄， 位置，姓名和性别。它们也懂一些研究人员用来与之交流的语法。然而，在海豚的自然交流中 是不存在语法的。虽然这些交流体系中会体现出一些我们所知的语言特性，但并不包含全部四个。即便Washoe和Coco 拥有一流的语言能力，也不如大多数3岁孩子的语言技巧。动物们对话的内容通常都很有限。蜜蜂谈论食物，土拨鼠讨论捕食者，螃蟹讨论它们自己。人类的语言就显得独树一帜了，这源于对语法和创造性的 强大组合能力，和领先的分离性和时空性。人类的大脑能够利用有限的元素创造无限量的信息。我们能够加工和理解复杂的句式，以及我们从没说过的词语。我们能运用语言交流无限量的主题，讨论想象的事物，甚至说谎。研究还在不断揭露更多的 关于动物交流的信息。或许能证明人类的语言和动物的交流并非完全不同， 而是存在于同一个交集区。毕竟，我们都是动物。

**P274 2015-09-11 The mathematical secrets of Pascal’s triangle - Wajdi Mohamed Ratemi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=274)

This may look like a neatly arranged stack of numbers, but it's actually a mathematical treasure trove. Indian mathematicians called it the Staircase of Mount Meru. In Iran, it's the Khayyam Triangle. And in China, it's Yang Hui's Triangle. To much of the Western world, it's known as Pascal's Triangle after French mathematician Blaise Pascal, which seems a bit unfair since he was clearly late to the party, but he still had a lot to contribute. So what is it about this that has so intrigued mathematicians the world over? In short, it's full of patterns and secrets. First and foremost, there's the pattern that generates it. Start with one and imagine invisible zeros on either side of it. Add them together in pairs, and you'll generate the next row. Now, do that again and again. Keep going and you'll wind up with something like this, though really Pascal's Triangle goes on infinitely. Now, each row corresponds to what's called the coefficients of a binomial expansion of the form (x+y)^n, where n is the number of the row, and we start counting from zero. So if you make n=2 and expand it, you get (x^2) + 2xy + (y^2). The coefficients, or numbers in front of the variables, are the same as the numbers in that row of Pascal's Triangle. You'll see the same thing with n=3, which expands to this. So the triangle is a quick and easy way to look up all of these coefficients. But there's much more. For example, add up the numbers in each row, and you'll get successive powers of two. Or in a given row, treat each number as part of a decimal expansion. In other words, row two is (1x1) + (2x10) + (1x100). You get 121, which is 11^2. And take a look at what happens when you do the same thing to row six. It adds up to 1,771,561, which is 11^6, and so on. There are also geometric applications. Look at the diagonals. The first two aren't very interesting: all ones, and then the positive integers, also known as natural numbers. But the numbers in the next diagonal are called the triangular numbers because if you take that many dots, you can stack them into equilateral triangles. The next diagonal has the tetrahedral numbers because similarly, you can stack that many spheres into tetrahedra. Or how about this: shade in all of the odd numbers. It doesn't look like much when the triangle's small, but if you add thousands of rows, you get a fractal known as Sierpinski's Triangle. This triangle isn't just a mathematical work of art. It's also quite useful, especially when it comes to probability and calculations in the domain of combinatorics. Say you want to have five children, and would like to know the probability of having your dream family of three girls and two boys. In the binomial expansion, that corresponds to girl plus boy to the fifth power. So we look at the row five, where the first number corresponds to five girls, and the last corresponds to five boys. The third number is what we're looking for. Ten out of the sum of all the possibilities in the row. so 10/32, or 31.25%. Or, if you're randomly picking a five-player basketball team out of a group of twelve friends, how many possible groups of five are there? In combinatoric terms, this problem would be phrased as twelve choose five, and could be calculated with this formula, or you could just look at the sixth element of row twelve on the triangle and get your answer. The patterns in Pascal's Triangle are a testament to the elegantly interwoven fabric of mathematics. And it's still revealing fresh secrets to this day. For example, mathematicians recently discovered a way to expand it to these kinds of polynomials. What might we find next? Well, that's up to you.

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翻译人员: Winnie Ling 校对人员: Di SUN这些看上去 可能只是一堆排列整齐的数字，实际上，它可是一个数学的宝藏。印度数学家称它为"须弥山之梯"。在伊朗，它是"海亚姆三角"。而在中国，它被称为"杨辉三角"。在大部分西方国家， 它叫”帕斯卡三角“。得名于法国数学家, 布莱斯 ·帕斯卡。这似乎有点不太公平。因为帕斯卡的发现比其他人更晚，但帕斯卡也对此做出了许多贡献。那么，是什么让世界各地的 数学家们对它如此感兴趣？简单地说，它充满了各种形式和秘密。首先，这是构造三角的形式。从 1 开始， 并假设两边各有一个看不见的 0，把相邻的数字加起来， 你就会得到下一行。现在，重复这样的操作，反复进行， 你最终会得到这样一个图形。实际上，帕斯卡三角是无限大的。它每一行的数字都对应 (x+y)^n 二项式展开的系数，其中 n 是行的序号，从 0 开始算。当 n=2时， 二项式展开你会得到x^2 + 2xy + y^2。那些系数，就是每一项变量前的数字，和帕斯卡三角对应行的数字相同。n=3 也是一样，展开得到这个。所以，这个三角能让我们 快速得到二项式的系数。然而，奥秘远远不止这些。比如说，把每一行的数字加起来，你会得到连续的2的次方。或者在某一行，把每一个数字 当成十进制的一部分。换句话说，第二行是 (1x1) + (2x10) + (1x100)，你会得到 121，也就是 11^2。那么，同理到第六行，看看会发生什么。总和是 1,771,561， 也就是 11^6，其他也一样。除此之外，也有一些几何的应用。看看那些对角线，开头两条并不是很有趣，全都是 1。接下来是正整数，也被称为自然数。而下一条对角线的数字，则被称为三角数。因为如果你用那些数量的点，可以把它们堆成等边三角形。下一条对角线是四面体数。同理，你可以把那些球堆成四面体。或者这样︰ 把所有的奇数画上阴影，当三角形还小，你还看不出什么。不过如果你加上成千上万行，你会得到一个分形， 也就是谢尔宾斯基三角形。这个三角形不仅是一个数学的艺术品，它还很有用，尤其是在组合学中的概率计算中。假设，你想要五个小孩,你想要知道拥有三个女孩和两个男孩 这样理想家庭的概率是多少。在二项展开式中，它对应的就是女孩加男孩的五次方。所以我们看第五行，第一个数字代表五个女孩的可能性，最后一个数字代表五个男孩的可能性。第三个数字就是我们要找的。这一行所有可能性的总和分之10，那就得到 10/32，或者31.25%。再者，如果你从十二个朋友中随机选出5人组成一个篮球队，一共可能有多少种五人组合呢？从组合学上看， 这个问题可以看成是从12中挑5，并可以用这个公式计算，或者你可以找到这个三角形的 第十二行第六项，就是你要的答案。帕斯卡三角的诸多形式，是数学元素优美交织的证明。到现在，它仍然揭示着新秘密。例如，数学家最近发现了一个展开这种多项式的方法。接下来我们还可能发现什么？这就看你了。

**P275 2015-09-14 The treadmill's dark and twisted past - Conor Heffernan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=275)

The constant thud underneath your feet, the constrained space, and the monotony of going nowhere fast. It feels like hours have gone by, but it's only been eleven minutes, and you wonder, "Why am I torturing myself? This thing has got to be considered a cruel and unusual punishment." Actually, that's exactly what it is, or was. You see, in the 1800s, treadmills were created to punish English prisoners. At the time, the English prison system was abysmally bad. Execution and deportation were often the punishments of choice, and those who were locked away faced hours of solitude in filthy cells. So social movements led by religious groups, philanthropies, and celebrities, like Charles Dickens, sought to change these dire conditions and help reform the prisoners. When their movement succeeded, entire prisons were remodeled and new forms of rehabilitation, such as the treadmill, were introduced. Here's how the original version, invented in 1818 by English engineer Sir William Cubitt, worked. Prisoners stepped on 24 spokes of a large paddle wheel. As the wheel turned, the prisoner was forced to keep stepping up or risk falling off, similar to modern stepper machines. Meanwhile, the rotation made gears pump out water, crush grain, or power mills, which is where the name "treadmill" originated. These devices were seen as a fantastic way of whipping prisoners into shape, and that added benefit of powering mills helped to rebuild a British economy decimated by the Napoleonic Wars. It was a win for all concerned, except the prisoners. It's estimated that, on average, prisoners spent six or so hours a day on treadmills, the equivalent of climbing 5,000 to 14,000 feet. 14,000 feet is roughly Mount Everest's halfway point. Imagine doing that five days a week with little food. Cubitt's idea quickly spread across the British Empire and America. Within a decade of its creation, over 50 English prisons boasted a treadmill, and America, a similar amount. Unsurprisingly, the exertion combined with poor nutrition saw many prisoners suffer breakdowns and injuries, not that prison guards seemed to care. In 1824, New York prison guard James Hardie credited the device with taming his more boisterous inmates, writing that the "monotonous steadiness, and not its severity...constitutes its terror," a quote many still agree with. And treadmills lasted in England until the late 19th century, when they were banned for being excessively cruel under the Prison's Act of 1898. But of course the torture device returned with a vengeance, this time targeting the unsuspecting public. In 1911, a treadmill patent was registered in the U.S., and by 1952, the forerunner for today's modern treadmill had been created. When the jogging craze hit the U.S. in the 1970s, the treadmill was thrust back into the limelight as an easy and convenient way to improve aerobic fitness, and lose unwanted pounds, which, to be fair, it's pretty good at doing. And the machine has maintained its popularity since. So the next time you voluntarily subject yourself to what was once a cruel and unusual punishment, just be glad you can control when you'll hop off.

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翻译人员: Andy Yip 校对人员: Cissy Yun你脚底不停的摩擦声，受限的空间，还有哪都去不了的单调感。你感觉时间正在飞速流逝， 但其实只过去了11分钟，你不禁好奇，“我为什么要这样折磨自己？”这难道不是残忍而不正常的惩罚么？实际上，这就是它为何存在的原因！在18世纪，跑步机是为了惩罚英国犯人而发明的。在当时，英国的监狱制度极其糟糕。死刑和驱逐出境是最常见的处罚，而那些被禁锢在肮脏牢房里的 犯人面临着漫长的孤独。所以那些由宗教团体，慈善家和像查尔斯狄更斯这样的名人 发起了一场社会运动，试图去改变这些悲惨的状况， 并帮助犯人从良。当他们的运动成功时，整个监狱系统都被改造了， 而跑步机作为帮助犯人重新提高生产力的新方式，也被引进。这是跑步机诞生的原始版本，英国工程师William Cubitt在1818年发明了它。犯人们踩着有着24条轮辐的巨大桨轮。当轮子转动的时候，犯人们不得不加快步伐以免摔倒，就像现代的步进机器。同时，轮子的转动使机器能够抽水，碾磨玉米，或者发电，这就是”跑步机“名字的起源。这些装置被当成是严格管教犯人的 一种绝妙方式，同时又能为发电厂增加收益，帮助重建被拿破仑战争摧毁的英国经济。这是全方位的胜利，除了对犯人们来说不是。据估计，犯人们每天平均花费大约6小时在跑步机上，等于走了1524到4267米。这距离相当于到珠穆朗玛峰的半山腰。想象一下，一周五天这样的 高强度运动而仅有少量食物。Cubit的想法很快传遍大英帝国和美国。在十年之内，英国约有50个监狱设置了跑步机，在美国，差不多也是这个数字。不出意料，这种缺乏营养支持的苦力劳作使很多犯人体力不支和受伤，而监狱看守对此并不关心。在1824年，纽约一名叫 James Hardie的监狱看守赞扬这些装置驯服了他粗暴狂躁的犯人，他写道：“是始终如一的单调乏味， 而不是多艰苦的劳作......使人觉得恐怖，”这句话依然为不少人赞同。而跑步机继续在英国被应用直到19世纪，因其导致的影响太过恶劣，在1898年颁布的《监狱法》中被禁止。但当然，这折磨人的装置最终强势回归了，这一次，它的主要目标是普通民众。在1911年， 跑步机在美国注册了发明专利，到1952年, 现代跑步机的雏形已经出现。当1970年，慢跑热席卷美国，跑步机又成为人们关注的焦点，作为一种简单方便的有氧健身法，也能减掉多余的脂肪，坦白讲，效果非常好。跑步机至今仍然大受欢迎。所以下一次你自愿臣服于这样一台曾被用来残忍的惩罚犯人的跑步机时，应该感到庆幸能决定什么时候离开。

**P276 2015-09-14 What makes the Great Wall of China so extraordinary - Megan Campisi a**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=276)

A 13,000 mile dragon of earth and stone winds its way through the countryside of China with a history almost as long and serpentine as the structure. The Great Wall began as multiple walls of rammed earth built by individual feudal states during the Chunqiu period to protect against nomadic raiders north of China and each other. When Emperor Qin Shi Huang unified the states in 221 BCE, the Tibetan Plateau and Pacific Ocean became natural barriers, but the mountains in the north remained vulnerable to Mongol, Turkish, and Xiongnu invasions. To defend against them, the Emperor expanded the small walls built by his predecessors, connecting some and fortifying others. As the structures grew from Lintao in the west to Liaodong in the east, they collectively became known as The Long Wall. To accomplish this task, the Emperor enlisted soldiers and commoners, not always voluntarily. Of the hundreds of thousands of builders recorded during the Qin Dynasty, many were forcibly conscripted peasants and others were criminals serving out sentences. Under the Han Dynasty, the wall grew longer still, reaching 3700 miles, and spanning from Dunhuang to the Bohai Sea. Forced labor continued under the Han Emperor Han-Wudi , and the walls reputation grew into a notorious place of suffering. Poems and legends of the time told of laborers buried in nearby mass graves, or even within the wall itself. And while no human remains have been found inside, grave pits do indicate that many workers died from accidents, hunger and exhaustion. The wall was formidable but not invincible. Both Genghis and his son Khublai Khan managed to surmount the wall during the Mongol invasion of the 13th Century. After the Ming dynasty gained control in 1368, they began to refortify and further consolidate the wall using bricks and stones from local kilns. Averaging 23 feet high and 21 feet wide, the walls 5500 miles were punctuated by watchtowers. When raiders were sighted, fire and smoke signals traveled between towers until reinforcements arrived. Small openings along the wall let archers fire on invaders, while larger ones were used to drop stones and more. But even this new and improved wall was not enough. In 1644, northern Manchu clans overthrew the Ming to establish the Qing dynasty, incorporating Mongolia as well, Thus, for the second time, China was ruled by the very people the wall had tried to keep out. With the empire's borders now extending beyond the Great Wall, the fortifications lost their purpose. And without regular reinforcement, the wall fell into disrepair, rammed earth eroded, while brick and stone were plundered for building materials. But its job wasn't finished. During World War II, China used sections for defense against Japanese invasion, and some parts are still rumored to be used for military training. But the Wall's main purpose today is cultural. As one of the largest man-made structures on Earth, it was granted UNESCO World Heritage Status in 1987. Originally built to keep people out of China, the Great Wall now welcomes millions of visitors each year. In fact, the influx of tourists has caused the wall to deteriorate, leading the Chinese government to launch preservation initiatives. It's also often acclaimed as the only man-made structure visible from space. Unfortunately, that's not at all true. In low Earth orbit, all sorts of structures, like bridges, highways and airports are visible, and the Great Wall is only barely discernible. From the moon, it doesn't stand a chance. But regardless, it's the Earth we should be studying it from because new sections are still discovered every few years, branching off from the main body and expanding this remarkable monument to human achievement.

**P276 2015-09-14 What makes the Great Wall of China so extraordinary - Megan Campisi a**

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翻译人员: Fan Qiujing 校对人员: Zhimin Lin一条13000英里的土石之龙蜿蜒于中国乡野之间它的历史几乎与其结构一样悠久曲折长城最初是多座泥土夯实的城墙由春秋战国时期的各个独立封建国家修筑以抵制中国北方游牧民族的侵略者 以及其它各国公元前221年，当秦始皇统一中国之时青藏高原和太平洋成为了国家的天然屏障但北方的山脉对于蒙古、土耳其及匈奴人的入侵依然非常薄弱为了抵御外敌秦始皇扩建了之前所筑建的小城墙巩固强化它们并加以连接城墙的结构起于西部的临洮止于东部的辽东合在一起它们被称为长城为了完成这项工程秦始皇征召了士兵和平民而这往往不是基于自愿在秦朝被记录下的成千上万的建造者中许多人都是被强征而去的农民另外一些则是服刑期的犯人汉朝时期，长城继续扩建延长至3700英里从敦煌延伸到渤海强制性劳动在汉武帝时期持续着因而城墙被视作受苦受害之地而臭名昭彰那一时期的诗歌与传说描述劳动者被掩埋于附近大规模墓地甚至是城墙之内然而城墙内并未发现人类尸骸墓坑表明那些劳动者大多死于意外，饥饿与疲劳长城令人生畏却非不可战胜成吉思汗和他的儿子忽必烈曾于13世纪蒙古侵入之际设法攻克城墙在1368年，明朝执政之后他们开始使用当地窑中烧制而成的砖与石头重新强化和加固长城长城平均高7米，宽6米5500英里的城墙中间隔着瞭望台一旦看到有侵入者瞭望台之间便会以升起的狼烟与风火传递信号直到援兵抵达城墙上的小孔让弓箭手能够射击侵入者而大孔则用于投掷石头或者其它东西但即便是这种全新改进过的城墙仍然不够好1644年，北方满族推翻明朝建立起清朝同时合并了蒙古因此，这是第二次中国被原想以墙抵御的外族统治随着帝国的边界扩展到长城以外这些工事失去了原本的目的没有了定期加固，城墙失修破损夯土被侵蚀砖和石头则被盗窃用作建筑材料但是长城的使命仍未结束第二次世界大战期间中国用部分城墙来抵御日本的侵略一部分城墙仍然被盛传用于军事训练然而今日，文化才是长城的主要目的作为地球上大型人工建筑之一长城于1987年被联合国教科文组织列为世界文化遗产长城起初建造用于防御外人进入中国如今每年都会迎接数百万游客实际上，大量涌入的游客已导致长城日益损坏致使中国政府启动保护措施它也经常被宣称为唯一一处可自太空看见的人造建筑不幸的是，这种说法不完全正确在地球地轨道上，各种建筑物如桥梁，高速公路以及机场均可看见而长城却若隐若现从月球上，则一点也看不到但无论如何，地球才是我们应该好好研究长城的地方因为每隔几年都会有新的部分被发现它们从主体部分扩展开去不断延伸着这见证人类成就的伟大奇迹。

**P277 2015-09-21 How memories form and how we lose them - Catharine Young**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=277)

Think back to a really vivid memory. Got it? Okay, now try to remember what you had for lunch three weeks ago. That second memory probably isn't as strong, but why not? Why do we remember some things, and not others? And why do memories eventually fade? Let's look at how memories form in the first place. When you experience something, like dialing a phone number, the experience is converted into a pulse of electrical energy that zips along a network of neurons. Information first lands in short term memory, where it's available from anywhere from a few seconds to a couple of minutes. It's then transferred to long-term memory through areas such as the hippocampus, and finally to several storage regions across the brain. Neurons throughout the brain communicate at dedicated sites called synapses using specialized neurotransmitters. If two neurons communicate repeatedly, a remarkable thing happens: the efficiency of communication between them increases. This process, called long term potentiation, is considered to be a mechanism by which memories are stored long-term, but how do some memories get lost? Age is one factor. As we get older, synapses begin to falter and weaken, affecting how easily we can retrieve memories. Scientists have several theories about what's behind this deterioration, from actual brain shrinkage, the hippocampus loses 5% of its neurons every decade for a total loss of 20% by the time you're 80 years old to the drop in the production of neurotransmitters, like acetylcholine, which is vital to learning and memory. These changes seem to affect how people retrieve stored information. Age also affects our memory-making abilities. Memories are encoded most strongly when we're paying attention, when we're deeply engaged, and when information is meaningful to us. Mental and physical health problems, which tend to increase as we age, interfere with our ability to pay attention, and thus act as memory thieves. Another leading cause of memory problems is chronic stress. When we're constantly overloaded with work and personal responsibilites, our bodies are on hyperalert. This response has evolved from the physiological mechanism designed to make sure we can survive in a crisis. Stress chemicals help mobilize energy and increase alertness. However, with chronic stress our bodies become flooded with these chemicals, resulting in a loss of brain cells and an inability to form new ones, which affects our ability to retain new information. Depression is another culprit. People who are depressed are 40% more likely to develop memory problems. Low levels of serotonin, a neurotransmitter connected to arousal, may make depressed individuals less attentive to new information. Dwelling on sad events in the past, another symptom of depression, makes it difficult to pay attention to the present, affecting the ability to store short-term memories. Isolation, which is tied to depression, is another memory thief. A study by the Harvard School of Public Health found that older people with high levels of social integration had a slower rate of memory decline over a six-year period. The exact reason remains unclear, but experts suspect that social interaction gives our brain a mental workout. Just like muscle strength, we have to use our brain or risk losing it. But don't despair. There are several steps you can take to aid your brain in preserving your memories. Make sure you keep physically active. Increased blood flow to the brain is helpful. And eat well. Your brain needs all the right nutrients to keep functioning correctly. And finally, give your brain a workout. Exposing your brain to challenges, like learning a new language, is one of the best defenses for keeping your memories intact.

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翻译人员: YIREN YANG 校对人员: 易帆 余回想一个生动的回忆，好了吗？好的，现在，想想三周前你午餐吃了什么？这个回忆可能就不是那么栩栩如生了吧，为什么会这样呢？为什么我们会记住一些事情， 而忘却另外一些事情？为什么记忆最终会一点一点地褪色？让我们首先来看一下，记忆是如何产生的。当你经历什么事情的时候，比如拨电话号码。这个体验会被转化成一种脑电波脉冲，这种脉冲快速地沿着神经网络前进。信息首先到达短期记忆处理中心，这是一个存储几秒钟到几分钟记忆的区域。然后，体验通过海马体等区域被转成长期记忆，最终保存到大脑几个记忆储存区域。大脑里的神经元在专门的站点连接，这些站点运用被称为突触的特殊的神经传递。如果两个神经元重复连接，一件重要的事情就会发生：这两个神经元之间的连接就会变得更加有效率，这个过程被称为长时程增强效应。它被认为是体验被储存到长期记忆中的原理，但是，怎么有些记忆会丢失呢？年龄是一个影响因素。随着我们年龄的增大， 神经元突触开始衰退和变弱，这影响了我们读取记忆的难易程度。科学家们有几个原理 解释了这种退化背后的原因。从真正的大脑萎缩开始，海马体每十年失去了5%的神经元，当时你80岁的时候，你一共失去了20%的神经元，这导致了神经传递产物的下降，比如，对学习和记忆至关重要的乙酰胆碱，这些改变可能影响了 人们读取那些存储的信息。年龄也影响了我们产生记忆的能力，当我们集中精力的时候， 当我们完全投入的时候，当信息对我们来说非常重要的时候， 深刻的记忆就会生成。当年纪变大，精神和身体的 健康问题就变得越来越多，干扰我们注意力的集中度，也因此成为了我们记忆的小偷。另一个引发记忆力问题的原因是长期的压力，当我们长期面对超负荷的工作和个人压力，我们的身体会报警。这个反应是源于我们身体为保证能在危机中生存而设计的生理机制，因为压力而产生的化学物质 帮助身体调动能量和增加警戒。但是，长期的压力让我们的 身体里的这些化学物质泛滥了，导致脑细胞的流失和 制造新脑细胞能力的衰弱，从而影响了我们记住新信息的能力。抑郁是另一个罪犯，40%的抑郁的人更容易有记忆力问题。低水平的激起兴奋神经传递的血清素，可能让抑郁的人更不关注新信息。抑郁的另一个症状， 是沉浸在过去悲伤的事件中出不来，这导致他们很难关注现在发生的事情，影响了存储短期记忆的能力。与抑郁紧密联系的“ 孤立 ” 是另一个记忆的小偷，一个哈佛大学公共健康学院的研究发现，在六年时间里， 拥有更高的社会融合能力的老人记忆衰退较慢。虽然确切的原因还不清楚，但专家推测，社会交往使我们的大脑得到了锻炼。就像肌肉力量的训练一样，我们必须使用我们的大脑， 不然就有可能失去它。不过不要绝望，你可以用下面的几个步骤，去帮助你的大脑保存记忆。首先，确保你坚持锻炼，增加血液回流大脑是有益的。然后好好吃饭，你的大脑需要所有的正确的营养物来保持功能正常。最后，给你的大脑一些锻炼，让你的大脑应对新的挑战， 比如学习一门新的语言，这是最好的保持你记忆力的方法之一。

**P278 2015-09-22 A curable condition that causes blindness - Andrew Bastawrous**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=278)

An estimated 20 million cases of blindness worldwide are caused by cataracts, a curable condition affecting the lens that focuses images onto the eye's retina. A cataract occurs when proteins in the lens lose their normal arrangement, clumping together in a way that causes discoloration or clouding, and eventually blocks most vision. Cataracts can be caused by eye injury, certain medications, ultraviolet radiation, diabetes, smoking, or some genetic disorders. But the most common cause is aging. In the United States, more than 50% of people over the age of 80 develop them. Cataracts were treated over 2,500 years ago in India, though similar procedures may have existed even earlier in Ancient Egypt and Babylon. The most common procedure, called couching, involved pressing a sharp instrument into the eye to loosen and push the clouded lens out of the way. Although this could increase the amount of light entering the eye, the lack of a lens would leave the patient's vision out of focus. Despite its low success rate, and high risk of infection or injury, couching is still performed in some parts of the world. Later procedures would also focus on removing the cloudy lens, for example, by making an opening in the cornea to pull out the lens along with the membrane capsule surrounding it. While the invention of eyeglasses allowed for some restoration of focus, they had to be extremely thick to help. Furthermore, such techniques still caused complications, like damaging the retina, or leaving the eye with uncomfortable stitches. But in the 20th century, something unexpected happened. Eye surgeon Sir Harold Ridley was treating World War II casualties when he noticed that acrylic plastic from a shattered aircraft cockpit had become lodged in a pilot's eyes without triggering an adverse reaction. This led him to propose surgically implanting artificial lenses into the eye to replace cataracts. And despite initial resistance, the method became standard practice by the 1980s. Since Ridley's discovery, the intraocular lens has undergone several improvements. Modern lenses can fit into the membrane capsule that the cataract is extracted from, leaving more of the eye's natural anatomy intact. And the ability to fine-tune the lens curvature allows the surgery to restore a patient's normal vision without the need for glasses. Of course, surgical techniques have also progressed. Microscopic procedures use small instruments or lasers to make precise incisions of one or two millimeters in the cornea, while an ultrasound probe breaks up and removes the cataracted lens with minimal trauma to the eye. Low-tech versions of this operation have made the surgery quick and inexpensive, helping it spread across the developing world. Places like Aravind Eye Hospital in India have pioneered high-volume, low-cost cataract surgery for as little as six dollars. Why then, with all these advances, are there still so many blind people in the world? The main issue is access to health care, with poor infrastructure and a shortage of doctors being a major barrier in many regions. But this is not the only problem. In many rural areas with poor education, blindness is often accepted as an inevitable part of aging, for which someone might not think to seek treatment. This is why information is crucial. Increased community awareness programs and the spread of mobile phones mean that many of those who might have remained blind for the rest of their lives due to cataracts are now reachable. And for them, a brighter future is in sight.

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翻译人员: Rebecca Wang 校对人员: Amy H. Fann全世界有将近两千万失明病例是由白内障引起白内障是可治愈的，与图像聚焦到视网膜上的晶状体相关的疾病白内障是因晶状体中的蛋白质失去正常构造引起晶体蛋白质开始结块，导致失色或浑浊最终挡住大部分视线眼部受伤个别药物紫外线辐射糖尿病吸烟或一些基因失序都可以引起白内障最常见的病因是年老在美国，百分之五十80岁以上的人有白内障印度2500年前就开始治疗白内障尽管类似的治疗手法可能更早之前就存在于古埃及和巴比伦最常用的治疗手法，绣法，是把一个尖的器具压进眼睛使浑浊的晶状体变松并将其推开尽管这样可以增加眼睛接收的光晶状体缺失会使患者视线失焦尽管成功率低，感染率和受伤率高世界的一些地方还在使用绣法这之后的治疗手法也都针对浑浊晶状体的移除比如说，在眼角膜开口，将晶状体和包裹在周围的表膜囊拉出尽管眼镜的发明可以恢复聚焦他们要特别厚才能有用而且，这些技术还会制造麻烦比如损坏视网膜或者让眼睛上有令人不舒服的缝线但在二十世纪，料想不到的事情发生了眼科医生 哈罗德 · 里德利 在治疗二次世界大战伤员时发现飞机驾驶员座舱碎片的丙烯酸塑料埋入了一个飞行员的眼睛却没有引发任何不良反应这让他提出用手术在眼睛里植入人工晶体来治疗白内障尽管开始有些阻力这个方法在1980年代成为了标准操作从里德利的发现开始眼内镜片已经经过了多次改良现代晶状体镜片可以放进取出白内障的表膜胶囊眼睛的大部分自身的结构不会受损能够精细的调整镜片的弧度使手术能够让患者恢复正常视力不再需要眼镜当然啦，手术技术也进步了微型手术使用小型器具或者激光在超声波探针打碎并移除白内障化眼角膜时在眼角膜上精准地切出一个一两微米的创口这只会对眼睛造成微乎其微的创伤低技术版的操作使得手术快且不贵这个手术因此得以传遍发展中的国家印度的亚拉眼科医院等地提倡最少之用六美金的高容量，低价格的白内障手术那为什么，有了这些先进技术世界上还有那么多盲人？主要的问题是因无法得到医疗低劣的基础建设和医生的紧缺成了许多地区最大的障碍但这还不是唯一的问题许多偏远地区缺乏教育失明被认为是变老不可避免的一部分所以人们就不会想要去接受治疗这就是为什么信息是极为重要的增长的社区意识和移动电话的普及意味着那些原本因为白内障可能从此一生都会失明的人现在可触及的范围之内对他们来说，前方的道路一片光明

**P279 2015-09-28 The race to sequence the human genome - Tien Nguyen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=279)

Packed inside every cell in your body is a set of genetic instructions, 3.2 billion base pairs long. Deciphering these directions would be a monumental task but could offer unprecedented insight about the human body. In 1990, a consortium of 20 international research centers embarked on the world's largest biological collaboration to accomplish this mission. The Human Genome Project proposed to sequence the entire human genome over 15 years with $3 billion of public funds. Then, seven years before its scheduled completion, a private company called Celera announced that they could accomplish the same goal in just three years and at a fraction of the cost. The two camps discussed a joint venture, but talks quickly fell apart as disagreements arose over legal and ethical issues of genetic property. And so the race began. Though both teams used the same technology to sequence the entire human genome, it was their strategies that made all the difference. Their paths diverged in the most critical of steps: the first one. In the Human Genome Project's approach, the genome was first divided into smaller, more manageable chunks about 150,000 base pairs long that overlapped each other a little bit on both ends. Each of these fragments of DNA was inserted inside a bacterial artificial chromosome where they were cloned and fingerprinted. The fingerprints showed scientists where the fragments overlapped without knowing the actual sequence. Using the overlapping bits as a guide, the researchers marked each fragment's place in the genome to create a contiguous map, a process that took about six years. The cloned fragments were sequenced in labs around the world following one of the project's two major principles: that collaboration on our shared heritage was open to all nations. In each case, the fragments were arbitrarily broken up into small, overlapping pieces about 1,000 base pairs long. Then, using a technology called the Sanger method, each piece was sequenced letter by letter. This rigorous map-based approach called hierarchical shotgun sequencing minimized the risk of misassembly, a huge hazard of sequencing genomes with many repetitive portions, like the human genome. The consortium's "better safe than sorry" approach contrasted starkly with Celera's strategy called whole genome shotgun sequencing. It hinged on skipping the mapping phase entirely, a faster, though foolhardy, approach according to some. The entire genome was directly chopped up into a giant heap of small, overlapping bits. Once these bits were sequenced via the Sanger method, Celera would take the formidable risk of reconstructing the genome using just the overlaps. But perhaps their decision wasn't such a gamble because guess whose freshly completed map was available online for free? The Human Genome Consortium, in accordance with the project's second major principle which held that all of the project's data would be shared publicly within 24 hours of collection. So in 1998, scientists around the world were furiously sequencing lines of genetic code using the tried and true, yet laborious, Sanger method. Finally, after three exhausting years of continuous sequencing and assembling, the verdict was in. In February 2001, both groups simultaneously published working drafts of more than 90% of the human genome, several years ahead of the consortium's schedule. The race ended in a tie. The Human Genome Project's practice of immediately sharing its data was an unusual one. It is more typical for scientists to closely guard their data until they are able to analyze it and publish their conclusions. Instead, the Human Genome Project accelerated the pace of research and created an international collaboration on an unprecedented scale. Since then, robust investment in both the public and private sector has led to the identification of many disease related genes and remarkable advances in sequencing technology. Today, a person's genome can be sequenced in just a few days. However, reading the genome is only the first step. We're a long way away from understanding what most of our genes do and how they are controlled. Those are some of the challenges for the next generation of ambitious research initiatives.

**P279 2015-09-28 The race to sequence the human genome - Tien Nguyen**

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翻译人员: Aiting Ye 校对人员: Yolanda Zhang我们身体每一个细胞里都有一组长达32亿组碱基对的遗传指令。要解读这些指令是一项无比艰巨的任务，但对我们了解自身有着深远的意义。1990年，由20个国际研究中心组成的合作团队开始着手完成这项全世界最浩大的生物工程。人类基因组项目预测这项基因测序工程需要长达15年的时间，耗资30亿美元。然而，在项目预计完成的7年前，一个叫做Celera的私人企业宣布他们可以用更少的资金， 在三年内就完成这一项目。这两个团队曾试图展开合作， 但是谈判最终因为对研究结果 在法律和伦理上的分歧而失败。于是他们之间的竞争开始了。尽管两个团队在基因测序方面 采用了同样的技术手段，他们测序的策略却截然不同。区别就在于以下关键几步：首先，人类基因组计划的方案是把整个基因图谱分为更小， 更易操作的片段，每个片段都由15万个碱基对组成，相邻片段首尾均存在小部分重叠。每个DNA片段都被注入到人工培育的细菌染色体中，并被复制，从而获得指纹谱图。指纹图谱可以向科学家们展现那些未知序列中的重叠部分。利用这些重叠的小片段作为线索，研究者们在染色体中对各个片段做记号，以获得一幅延续性的图谱，这个过程持续了六年之久。全世界所有对这些基因片段 进行测序的实验室都遵循着以下两项准则：研究成果属于全人类，并且对世界各国公开。所有实验中，基因片段都被任意分割为更小的，有重叠部分的1000个碱基对。随后，他们运用“桑格测序法” （注：双脱氧链终止法）将每个片段内的碱基进行逐一测序 （即A,T,C,G）。这一严格的图谱测序法被称作 “分级散弹枪测序法”，可以将错误组合风险降至最低，这些重复组合的基因有着巨大风险，例如人类基因组。人类基因组计划的这项 “宁稳妥，勿遗憾”的原则，与Celera公司的“全基因组散弹枪测序法” 形成鲜明对比。因为Celera公司完全跳过图谱阶段,在有些人看来这是一个有勇无谋的策略。他们将整个基因组直接切成许多小而重叠的片段。一旦这些小片段完成“桑格测序”，Celera公司会采取风险极高的方法，也就是用那些重叠部分来直接重组基因。可或许他们的策略并非是一场豪赌，因为猜猜看是谁首先完成 可以在网上免费获得的图谱呢？人类基因组计划研究中的第二项准则是，要将研究中所收集的资料在24小时之内公布于众。因此1998年，世界各国的科学家运用实践证明过的“桑格测序法”对各种遗传基因展开“疯狂”的测序。最终，经过3年艰苦漫长的 测序和重组，比赛有结果了。2001年二月的时候，双方同时发布了超过90%的人类基因组草图，都比原先预测的进度早了好几年。比赛打平了。人类基因组计划这种及时分享数据的做法并不常见。科学家们更倾向于在他们可以分析并且发布结果的时候再公布研究数据。然而，人类基因组计划的这种做法 加速了研究过程，并且促成了研究领域一项 空前的国际合作。自此，在公共和私人领域的 研究得到深入开发，使很多与基因相关的疾病 得以被检测出来，同时测序方法也被不断完善。如今，一个人的全部基因测序 只需要几天就能完成。但是，能够解读基因只是第一步而已。要了解大多数基因的功能 以及它们是如何被控制的，我们还有很漫长的路要走。这些工作将要交给我们下一代充满进取心的研究者来完成了。

**P280 2015-09-29 The incredible collaboration behind the International Space Station -**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=280)

Have you ever been gazing at a starry sky when suddenly a bright dot glided into view? If it wasn't blinking, then you've had the distinct pleasure of seeing one of mankind's greatest collaborative feats with your own eyes: The International Space Station. Roughly the size of six-bedroom house, and weighing more than 320 cars, the International Space Station is so large that no single rocket could have lifted it into orbit. Instead, it was assembled piece by piece while hurtling through space at 28,000 kilometers per hour, lapping the Earth once every 90 minutes. It all started when sixteen nations signed the Space Station Intergovernmental Agreement, laying out each partner's expected contributions to the ISS, from modules and maintenance to sharing information and finances. At an estimated 100 billion U.S. dollars, the Space Station would be the most expensive object ever built. The whole world watched as a Russian rocket launched the first module of the ISS into the sky. Zarya, meaning sunrise, was equipped with two solar panels and a propulsion system that had the important task of keeping the young station from crashing into the Earth by staying a safe 400 kilometers away. The U.S. Space Shuttle Endeavour followed two weeks later carrying Unity, a node module to which other modules could be connected, and an international six-person assembly crew. Then came Zvezda, which brought communications and living accommodations. Ever since the International Space Station's first tenants arrived, it's been continually occupied with more than 200 visitors spending an average of six months on board. Astronaut Samantha Cristoforetti holds the record for the longest single space flight by a woman at 199 days on the ISS. 2001 saw the arrival of Destiny, the first of four research modules, where astronauts spend approximately 36 hours a week conducting extraordinary experiments in microgravity. Their schedules are packed with exercise, two hours a day to fend off muscle atrophy, station maintenance and repair, and connecting with family or awe-inspired minds around the world. But they still find time for fun, with regular movie nights and even shooting the first music video in space. Destiny also controls the seven-jointed robotic Canadarm2. Capable of moving more than 100,000 kilograms, it's perfect for unloading new arrivals from shuttles. 2001 was a busy year for the Space Station with the addition of Quest, the main airlock for strolls outside, and Pirs, a pier for Russian spacecrafts to dock including the ever-ready emergency escape vehicle, Soyuz. Then, on February 1st, 2003, after delivering research modules to the ISS, the space shuttle Columbia exploded during reentry tragically killing the seven-member crew on board. After a four-year hiatus, work quickly picked up pace with the addition of more hubs, airlocks, docks, and an observation cupola for stunning 360-degree views of our world and beyond. Other critical components included platforms and trusses to support radiators that direct all the heat generated by the station's electronics into space and solar panels that are efficient enough to power 55 homes. It took ten years and over 30 missions, but finally, the International Space Station was complete, coinciding with the U.S. Space Shuttle Program's retirement. The Space Station continues to serve as an incredible model for international collaboration. This year, two people began a one-year stay on the ISS, allowing scientists to study the long-term physical and psychological effects of being in space, which would prove useful for increasingly ambitious space travel, like trips to Mars. Over its lifetime, we've learned an immense amount scientifically, but also about our capacity to work together and accomplish truly remarkable acts.

**P280 2015-09-29 The incredible collaboration behind the International Space Station -**

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翻译人员: Yunxi Shi 校对人员: Pin Yin当你凝望璀璨的星空时，是否见过一个亮点划过视线？若是这个亮点没有不停的闪烁，那么你太走运了，因为你看到的是人类最伟大的合作壮举之一--国际空间站。国际空间站约有六居室住宅那般大小，总重超过320辆汽车重量总和。任何一个火箭都无法独立把它发射进入轨道，只能通过组件在太空逐步组装。这期间它以时速28,000公里的速度飞行，每90分钟可绕地球转一圈。这一切源于16个国家共同签订的《空间站政府间协议》，协议中预安排了各参与国对空间站需做出的贡献，包括组件组装保养，信息共享及财政支持。空间站预算约为1000亿美元，可能是人类史上造价最贵的东西了。当俄罗斯火箭将空间站的第一个组件”曙光号“发射进入太空的时候，举世瞩目。”曙光号“功能货舱，配备有两块太阳能板和一个推进系统。这个推进系统肩负重要功能，即保持空间站始终距离地球有400千米的安全距离，以保证这个刚成立的空间站不会撞向地球。两周后，美国的”奋进号“航天飞机也出发了。它载着”团结号”节点舱（一个可以连接其他机舱的连接舱），以及六个人组成的国际组装小组。然后是载着通讯和住宿设施的“星辰号“服务舱。自从入住第一批“住户”后，国际空间站就再也没有闲置过了。已有两百个多个访客，平均登录时长为六个月。宇航员Samantha Cristoforetti保持了空间站女子单次飞行时长最长的记录，达199天。2001年，四个实验舱中，”命运号“首先到达空间站。宇航员每周花费约36个小时在舱中，进行微重力条件下的特别实验。日常安排包括每日运动两个小时，预防肌肉萎缩，空间站保养和维修，以及和家人或者世界各地的精英联系。还要找出时间娱乐，比如例行的“电影之夜”，比如在空间站拍摄第一部音乐录像。“命运号”同时也操控着加拿大太空臂2，它有7个关节，可以移动超过100，000公斤的重量。非常适合上载航天飞机载来的新组件。2001年是非常忙碌的一年， ”寻求号气密舱“也在这一年加入了空间站。”寻求号“是主要的气密舱，适用于舱外漫步。俄罗斯”码头号对接舱“可使飞船能停靠在空间站上，上面准备有紧急逃生工具--Soyuz号返回舱。然后到了2003年2月1日，向国际空间站运送实验舱以后，重返途中，航天飞机“哥伦比亚号”发生了爆炸，机上7名太空人全数罹难。直到四年后，太空站建设活动才重新恢复。加入了更多的处理器、气密舱和码头舱，以及可以360°观看地球及外太空景象的穹顶仓。其他重要的部分还包括支撑散热器的平台和机械臂，这个散热器能将空间站电子产生的热能导入外太空和太阳能板，能量足够55个家庭使用。耗时长达十年，执行了超过30次的任务后，国际空间站终于完成，同时，美国的航天飞机项目也终于退役了。空间站则依旧运行，成为一个令人惊叹的国际合作典范。今年（2015），两位宇航员在空间站首次呆够一年，可供科学家研究人类长期停留太空的生理及心理变化。这将对人类熊心勃勃的未来太空旅行大有裨益，比如火星之旅。整个历程中，我们不仅了解了很多科学内容，更重要的是学习合作完成卓越任务的能力。

**P281 2015-09-30 What 'Orwellian' really means - Noah Tavlin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=281)

If you've watched the news or followed politics chances are you've heard the term Orwellian thrown around in one context or another. But have you ever stopped to think about what it really means, or why it's used so often? The term was named after British author Eric Blair known by his pen name George Orwell. Because his most famous work, the novel "1984," depicts an oppressive society under a totalitarian government, "Orwellian" is often used simply to mean authoritarian. But using the term in this way not only fails to fully convey Orwell's message, it actually risks doing precisely what he tried to warn against. Orwell was indeed opposed to all forms of tyranny, spending much of his life fighting against anti-democratic forces of both the left-wing and the right. But he was also deeply concerned with how such ideologies proliferate. And one of his most profound insights was the importance that language plays in shaping our thoughts and opinions. The government of "1984"'s Oceania controls its people's actions and speech in some ways that are obvious. Their every move and word is watched and heard, and the threat of what happens to those who step out of line is always looming overhead. Other forms of control are not so obvious. The population is inundated with a constant barrage of propaganda made up of historical facts and statistics manufactured in the Ministry of Truth. The Ministry of Peace is the military. Labor camps are called "Joycamps." Political prisoners are detained and tortured in the Ministry of Love. This deliberate irony is an example of doublespeak, when words are used not to convey meaning but to undermine it, corrupting the very ideas they refer to. The regime's control of language goes even further, eliminating words from the English language to create the official dialect of Newspeak, a crudely limited collection of acronyms and simple concrete nouns lacking any words complex enough to encourage nuanced or critical thought. This has an effect on the psyche Orwell calls, "Doublethink," a hypnotic state of cognitive dissonance in which one is compelled to disregard their own perception in place of the officially dictated version of events, leaving the individual completely dependent on the State's definition of reality itself. The result is a world in which even the privacy of one's own thought process is violated, where one may be found guilty of thoughtcrime by talking in their sleep, and keeping a diary or having a love affair equals a subversive act of rebellion. This might sound like something that can only happen in totalitarian regimes, but Orwell was warning us about the potential for this occurring even in democratic societies. And this is why "authoritarian" alone does not "Orwellian" make. In his essay, "Politics and the English Language," he described techniques like using pretentious words to project authority, or making atrocities sound acceptable by burying them in euphemisms and convoluted sentence structures. But even more mundane abuses of language can affect the way we think about things. The words you see and hear in everyday advertising have been crafted to appeal to you and affect your behavior, as have the soundbites and talking points of political campaigns which rarely present the most nuanced perspective on the issues. And the way that we use ready-made phrases and responses gleaned from media reports or copied from the Internet makes it easy to get away with not thinking too deeply or questioning your assumptions. So the next time you hear someone use the word Orwellian, pay close attention. If they're talking about the deceptive and manipulative use of language, they're on the right track. If they're talking about mass surveillance and intrusive government, they're describing something authoritarian but not necessarily Orwellian. And if they use it as an all-purpose word for any ideas they dislike, it's possible their statements are more Orwellian than whatever it is they're criticizing. Words have the power to shape thought. Language is the currency of politics, forming the basis of society from the most common, everyday interactions to the highest ideals. Orwell urged us to protect our language because ultimately our ability to think and communicate clearly is what stands between us and a world where war is peace and freedom is slavery.

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翻译人员: Yue ZHANG 校对人员: Gabriella Hu如果你看新闻或者关注政治那么你很有可能听说过“奥威尔现象”频繁地出现在不同的语境中但是你可能会停下来， 好奇这个词究竟是什么意思为什么被这样频繁地使用这个词是根据英国作家 埃里克·布莱尔命名的他的笔名就是乔治·奥威尔在他的最著名的作品《1984》中描述了一个被极权主义政府压制的社会“奥威尔现象”经常被简单地指代专制主义但是这样使用这个词不仅并未传达奥威尔的全意反而有可能适得其反奥威尔确实是反对各种形式的专政他倾其一生对抗反民主力量不论是左翼还是右翼但是他也非常担心这样的思想滋生扩散的方式他最著名的一个见解就是语言在塑造思想和意见中起到重要作用《1984》中的大洋国的政府用一种明显的方式控制了人们的行动和言语他们的一言一行都被监视，行为异常的下场时刻威胁着所有人其他的控制形式没有这么明显所有的人民都被蒙蔽在"真理部门"捏造的所谓“史实”和数据中和平部负责军事劳动营被叫做“欢乐营”政治囚犯被"友爱部"囚禁和折磨这种故意的讽刺就是“双重思想”的一个例证言语不为传达却为扭曲其含义腐坏了每个观点的本意政权的言语控制还有更过分的方法从英语中剔除词汇在新闻媒体上塑造官方说法一个简陋的、满是缩写和简单名词的集合缺乏能够表达细微和关键观点的复杂词汇这就产生了一种 被奥威尔叫做“双重思想”的心理现象一种催眠状态下的认知失调在此状态下， 人们被强迫放弃自己的认知取而代之的是事件解读的官方版本使个人完全依附于政府定义下的“现实”这样的结果就是个人独立的思维过程被侵犯梦呓可能被认定是思想犯罪写日记或者发生外遇被认为是反叛的颠覆性行为这看起来只有在极权政体下 才可能发生的现象但是奥威尔警示我们这种现象在民主社会仍有可能发生这就是为什么单单“专制主义” 并不等同与“奥威尔现象”在他的《政治与英语语言》一文中他描述了各种手段， 诸如矫饰词汇来形容权威或者用委婉说法掩盖残暴行径， 使其得到接受或者迂回扭曲句子结构更平常的语言滥用 也可以影响我们的思维方式我们每天在广告中看到听到的言论都是为了吸引观众和改变其行为而塑造的政治竞选中的评述和论点亦是如此这些都很少表达出细致的观点在我们使用这些媒体报道中 现成的短语或者评论或者从网络上复制内容的时候就很少再去深刻思考或者质疑前提假设下一次你听到某人使用 “奥威尔现象这次词”的时候可要注意了如果他们说的是对语言的欺诈性 和操控性使用这是正确的使用方式如果他们说的是大规模监视 和干预型政府那他们更像是在说“专制主义”， 而不一定是“奥威尔现象”如果他们试图用万能词汇 描述他们反对的观点那么有可能他们正表现出了“奥威尔现象”而非他们所批评的内容词汇有塑造思维的力量语言是政治的流通货币从日常互动到高级理想建立社会的基础奥威尔劝告我们去保护我们的语言因为，思考和交流的能力正是我们与一个颠倒的世界之间的屏障在那里，战争即和平，奴役即自由。

**P282 2015-10-01 3 tips to boost your confidence - TED-Ed**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=282)

Translator: Jennifer Cody Reviewer: Jessica Ruby When faced with a big challenge where potential failure seems to lurk at every corner, maybe you've heard this advice before: "Be more confident." And most likely, this is what you think when you hear it: "If only it were that simple." But what is confidence? Take the belief that you are valuable, worthwhile, and capable, also known as self-esteem, add in the optimism that comes when you are certain of your abilities, and then empowered by these, act courageously to face a challenge head-on. This is confidence. It turns thoughts into action. So where does confidence even come from? There are several factors that impact confidence. One: what you're born with, such as your genes, which will impact things like the balance of neurochemicals in your brain. Two: how you're treated. This includes the social pressures of your environment. And three: the part you have control over, the choices you make, the risks you take, and how you think about and respond to challenges and setbacks. It isn't possible to completely untangle these three factors, but the personal choices we make certainly play a major role in confidence development. So, by keeping in mind a few practical tips, we do actually have the power to cultivate our own confidence. Tip 1: a quick fix. There are a few tricks that can give you an immediate confidence boost in the short term. Picture your success when you're beginning a difficult task, something as simple as listening to music with deep bass; it can promote feelings of power. You can even strike a powerful pose or give yourself a pep talk. Tip two: believe in your ability to improve. If you're looking for a long-term change, consider the way you think about your abilities and talents. Do you think they are fixed at birth, or that they can be developed, like a muscle? These beliefs matter because they can influence how you act when you're faced with setbacks. If you have a fixed mindset, meaning that you think your talents are locked in place, you might give up, assuming you've discovered something you're not very good at. But if you have a growth mindset and think your abilities can improve, a challenge is an opportunity to learn and grow. Neuroscience supports the growth mindset. The connections in your brain do get stronger and grow with study and practice. It also turns out, on average, people who have a growth mindset are more successful, getting better grades, and doing better in the face of challenges. Tip three: practice failure. Face it, you're going to fail sometimes. Everyone does. J.K. Rowling was rejected by twelve different publishers before one picked up "Harry Potter." The Wright Brothers built on history's failed attempts at flight, including some of their own, before designing a successful airplane. Studies show that those who fail regularly and keep trying anyway are better equipped to respond to challenges and setbacks in a constructive way. They learn how to try different strategies, ask others for advice, and perservere. So, think of a challenge you want to take on, realize it's not going to be easy, accept that you'll make mistakes, and be kind to yourself when you do. Give yourself a pep talk, stand up, and go for it. The excitement you'll feel knowing that whatever the result, you'll have gained greater knowledge and understanding. This is confidence.

**P282 2015-10-01 3 tips to boost your confidence - TED-Ed**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=282)

翻译人员: Emma Gao 校对人员: 易帆 余当面临一个巨大的挑战时失败的可能性貌似在各个角落潜伏着也许你曾听过这样的建议＂更自信一点！“在你听到这样的建议后 你更有可能会想＂如果真有那么简单就好了＂然而，什么是自信呢？相信自己是有价值的，值得被看重的， 并且有能力的也被称为自尊心加入肯定自己的乐观态度这些让你变得更有力量勇敢无畏地直面挑战这，就是自信。它可以把想法变为实际行动那么，自信到底从何而来？影响自信的因素很多一：先天的因素，像是基因会影响大脑 神经化学物质的平衡二：别人对待你的方式这包括你所处环境的社会压力三：你自己控制的部分你所做的选择、你要冒的险，加上你面临挑战和困难时的想法这三个因素密不可分但是我们自己做出的选择其实在树立自信的过程中 扮演着更重要的角色所以，通过牢记一些实用技巧我们就能真正的拥有培养自信的能力技巧一：快速调整心态善用一些小技巧让自己在短时间内快速提升自信当你面对一项艰巨的任务， 试着想象你成功时的画面，比如像听重低音的音乐这样简单的事这可以提升你的正面能量。你也可以摆出一个强有力的姿势 或者对自己说鼓励的话。技巧二：相信自己会进步如果你追求的是长期的改变，不妨想一想你对自己的 能力与天赋的看法，你认为能力是先天的吗？还是像肌肉一样可以锻炼?这些想法很重要， 因为当你面对挫折时它们会影响你的所作所为。如果你有自我设限的想法，那就意味着你对于自身的天资没信心，你也许就会放弃。认为自己就是不擅长这件事。如果你拥有［成长性思维］ 并认为自己有能力可以改善挑战于你而言 将会是一次学习与提升的机会，神经科学证实成长型思维的人随着学习与实践， 他么脑突触间的链接会得到不断的强化结果表明，平均而言，具有成长型思维的人会更容易成功，获得更好的成就并且在面对挑战之时会表现得更精彩技巧三：练习失败面对现实吧！你总有失败的时候，每个人都会有。J.K.罗琳曾被十二个不同的出版商所拒绝直至一个出版商决定出版《哈利波特》莱特兄弟的成功是建立在 无数次失败的的飞行尝试其中包括了几次他们自己的失败经历这些后，他们才设计出 一架成功的飞机研究表明，那些经常失败 却还坚持不断尝试的人从自身能力上讲比较有能力面对对挑战与挫折。他们学会了怎样去尝试不同的策略寻问他人的意见并且坚持不懈所以，考虑好你想要承受的挑战明白那不会是件容易的事，坦然接受自己将要犯的错，并在此过程中善待自己，对自己加以鼓励， 站起来，并为此奋斗，真正令人兴奋的是， 不管你遭遇怎样的结果你都将收获到更好的知识与领悟。这，才是自信。

**P283 2015-10-01 Can you solve the prisoner hat riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=283)

You and nine other individuals have been captured by super intelligent alien overlords. The aliens think humans look quite tasty, but their civilization forbids eating highly logical and cooperative beings. Unfortunately, they're not sure whether you qualify, so they decide to give you all a test. Through its universal translator, the alien guarding you tells you the following: You will be placed in a single-file line facing forward in size order so that each of you can see everyone lined up ahead of you. You will not be able to look behind you or step out of line. Each of you will have either a black or a white hat on your head assigned randomly, and I won't tell you how many of each color there are. When I say to begin, each of you must guess the color of your hat starting with the person in the back and moving up the line. And don't even try saying words other than black or white or signaling some other way, like intonation or volume; you'll all be eaten immediately. If at least nine of you guess correctly, you'll all be spared. You have five minutes to discuss and come up with a plan, and then I'll line you up, assign your hats, and we'll begin. Can you think of a strategy guaranteed to save everyone? Pause the video now to figure it out for yourself. Answer in: 3 Answer in: 2 Answer in: 1 The key is that the person at the back of the line who can see everyone else's hats can use the words "black" or "white" to communicate some coded information. So what meaning can be assigned to those words that will allow everyone else to deduce their hat colors? It can't be the total number of black or white hats. There are more than two possible values, but what does have two possible values is that number's parity, that is whether it's odd or even. So the solution is to agree that whoever goes first will, for example, say "black" if he sees an odd number of black hats and "white" if he sees an even number of black hats. Let's see how it would play out if the hats were distributed like this. The tallest captive sees three black hats in front of him, so he says "black," telling everyone else he sees an odd number of black hats. He gets his own hat color wrong, but that's okay since you're collectively allowed to have one wrong answer. Prisoner two also sees an odd number of black hats, so she knows hers is white, and answers correctly. Prisoner three sees an even number of black hats, so he knows that his must be one of the black hats the first two prisoners saw. Prisoner four hears that and knows that she should be looking for an even number of black hats since one was behind her. But she only sees one, so she deduces that her hat is also black. Prisoners five through nine are each looking for an odd number of black hats, which they see, so they figure out that their hats are white. Now it all comes down to you at the front of the line. If the ninth prisoner saw an odd number of black hats, that can only mean one thing. You'll find that this strategy works for any possible arrangement of the hats. The first prisoner has a 50% chance of giving a wrong answer about his own hat, but the parity information he conveys allows everyone else to guess theirs with absolute certainty. Each begins by expecting to see an odd or even number of hats of the specified color. If what they count doesn't match, that means their own hat is that color. And everytime this happens, the next person in line will switch the parity they expect to see. So that's it, you're free to go. It looks like these aliens will have to go hungry, or find some less logical organisms to abduct.

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翻译人员: Chenxiao Qian 校对人员: Peipei Xiang你和其他九个人被高智商的外星人统治者俘虏了。他们觉得地球人看起来很好吃，但是他们的文明禁止他们吃 有很强逻辑性和合作性的生物。不幸的是，他们不确定你们是否合乎标准，所以他们决定给你们所有人一个测试。通过他们的“全宇宙通翻译“软件，外星守卫告诉你以下信息：你们会被从高到矮排成一条直线，这样每个人就可以看到站在前面的所有人，你不能往后看或者走到线外。每个人的头上会有一顶白色或者黑色的帽子。帽子的颜色是随机分配的，而且我不会告诉你 每种颜色的帽子总共有几个。当我说“开始”时， 每个人必须猜测自己帽子的颜色，从最后一个人开始。不要试图说除了黑或白以外的词，或者通过声调或音量等其他方式做出暗示，要不你们就会马上被吃掉。如果至少九个人能猜对，你们就会被释放。你们有五分钟的时间来商量，想出一个方案，然后我会把你们排成一排， 分发帽子，然后就开始。你能想到一个绝对能救大家的计划吗？暂停下视频，好好想想。倒计时：3、2、1。其实重点在于排在队尾的人，他在看到其他所有人的帽子后可以用黑白来传递加密信息。那么我们应当在这些词上附加什么含义，以使得其他人可以推测他们帽子的颜色呢？首先不能是黑帽子或白帽子的总数，那样可能的值就会超过两种。但是数字的奇偶性恰好只有两种可能，那就是奇数，或偶数。所以，解决方案就在于第一个说的人——举个例子，比如他看到了奇数个黑帽子， 他就要说“黑色”，当他看到了偶数个黑帽子时就要说“白色”。我们看下如果帽子颜色是这样分配的话， 这个策略执行起来如何。最高的人看到前面有三个黑帽子，所以他说“黑色”， 告诉其他所有人他看到的是奇数个黑帽子。他没有说对自己帽子的颜色，但是没关系，因为所有被抓的人总共可以犯一个错误。第二高的人也看到奇数个黑帽子，她就会知道她的是白色的，就答对了。第三个人看到前面是偶数个黑帽子，所以他知道他的一定是前面两个人看到的其中一顶黑帽子。第四个人听到后就知道她应当看到前面有偶数顶黑帽子，因为其中一顶在她身后，但是她只看到了一个， 所以她推测出自己的也是黑帽子。第五个人至第九个人每个都寻找奇数个黑帽子，他们找到了，所以他们推测 自己的帽子都是白色的。现在到了站在最前面的你了，假如第九个人看到的是奇数个黑帽子的话，那就只有一种可能（最后一个人是黑帽子）。你会发现这个策略 对所有的排列组合都是适用的。最开始的那个人有50%的几率出错，但是他传达的奇偶性的信息让其他所有人都可以猜对自己帽子的颜色。每个人在开始时都假定自己 应当在身前看到奇数或偶数个特定颜色的帽子，如果他们的数字不对的话， 意味着他们自己的帽子就是那种特定的颜色。每次这样的情况发生后，下个人就知道他们需要看到 奇数还是偶数个特定颜色的帽子。好了成功了，你们可以走了。看起来这些外星人只好饿肚子了，或者去找些其他逻辑差的生物来绑架。

**P284 2015-10-02 Where did Russia come from - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=284)

Where did Russia come from, why is it so big, and what are the differences between it and its neighbors? The answers lie in an epic story of seafaring warriors, nomadic invaders, and the rise and fall of a medieval state known as Kievan Rus. In the first millennium, a large group of tribes spread through the dense woodlands of Eastern Europe. Because they had no writing system, much of what we know about them comes from three main sources: archaeological evidence, accounts from literate scholars of the Roman Empire and the Middle East, and, lastly, an epic history called the Primary Chronicle compiled in the 12th century by a monk named Nestor. What they tell us is that these tribes who shared a common Slavic language and polytheistic religion had by the 7th century split into western, southern and eastern branches, the latter stretching from the Dniester River to the Volga and the Baltic Sea. As Nestor's story goes, after years of subjugation by Vikings from the north, who, by the way, did not wear horned helmets in battle, the region's tribes revolted and drove back the Northmen, but left to their own devices, they turned on each other. Such chaos ensued that, ironically, the tribes reached out to the foreigners they had just expelled, inviting them to return and establish order. The Vikings accepted, sending a prince named Rurik and his two brothers to rule. With Rurik's son, Oleg, expanding his realm into the south, and moving the capitol to Kiev, a former outpost of the Khazar Empire, the Kievan Rus was born, "Rus" most likely deriving from an old Norse word for "the men who row." The new princedom had complex relations with its neighbors, alternating between alliance and warfare with the Khazar and Byzantine Empires, as well as neighboring tribes. Religion played an important role in politics, and as the legend goes, in 987, the Rus prince Vladamir I decided it was time to abandon Slavic paganism, and sent emissaries to explore neighboring faiths. Put off by Islam's prohibition on alcohol and Judaism's expulsion from its holy land, the ruler settled on Orthodox Christianity after hearing odd accounts of its ceremonies. With Vladimir's conversion and marriage to the Byzantine emperor's sister, as well as continued trade along the Volga route, the relationship between the two civilizations deepened. Byzantine missionaries created an alphabet for Slavic languages based on a modified Greek script while Rus Viking warriors served as the Byzantine Emperor's elite guard. For several generations, the Kievan Rus flourished from its rich resources and trade. Its noblemen and noblewomen married prominent European rulers, while residents of some cities enjoyed great culture, literacy, and even democratic freedoms uncommon for the time. But nothing lasts forever. Fratricidal disputes over succession began to erode central power as increasingly independent cities ruled by rival princes vied for control. The Fourth Crusade and decline of Constantinople devastated the trade integral to Rus wealth and power, while Teutonic crusaders threatened northern territories. The final blow, however, would come from the east. Consumed by their squabbles, Rus princes paid little attention to the rumors of a mysterious unstoppable hoard until 1237, when 35,000 mounted archers led by Batu Khan swept through the Rus cities, sacking Kiev before continuing on to Hungary and Poland. The age of Kievan Rus had come to an end, its people now divided. In the east, which remained under Mongol rule, a remote trading post, known as Moscow, would grow to challenge the power of the Khans, conquering parts of their fragmenting empire, and, in many ways, succeeding it. As it absorbed other eastern Rus territories, it reclaimed the old name in its Greek form, Ruscia. Meanwhile, the western regions whose leaders had avoided destruction through political maneuvering until the hoard withdrew came under the influence of Poland and Lithuania. For the next few centuries, the former lands of Kievan Rus populated by Slavs, ruled by Vikings, taught by Greeks, and split by Mongols would develop differences in society, culture and language that remain to the present day.

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翻译人员: Emma Gao 校对人员: Yanwen Wang俄罗斯起源于哪里，为何其幅员如此辽阔，它和其邻国有什么不同之处呢？答案就在一个有着漂流的海上勇士，入侵的游牧民族，以及在中世纪起起落落的国家－基辅罗斯中在公元后第一个千年一个庞大的游牧民族开始向东欧繁茂的森林扩张由于他们没有文字记载这段历史我们主要通过三个途径了解这段历史考古学的佐证当时罗马帝国和中东地区文学家的记述以及，最后，由一名叫 Nestor 的游僧编篡的一部有时代意义的历史著作－《往年纪事》(Primary Chronicle)书中记述了这些部落共用着一套语言系统，斯拉夫语并且共同信仰着多神教在公元七世纪，他们分裂成西部，南部和东部三个分支东部分支从德涅斯特河伸展到伏尔加河，波罗的海等地在 Nestor 记载的故事中，遭受了北边袭来的维京人多年侵扰后(这里说的并不是带着牛角帽子的维京人)当地人奋起并把这帮维京人驱赶了出去但当只剩他们自己的时候，他们又相互把矛头指向对方讽刺的是，这样的混乱促使他们寻求之前的敌人—维京人—的帮助邀请着他们回来帮助建立秩序维京人欣然同意了，派遣来他们的王子Rurik和他的两个兄弟回来统治同时，Rurik 的儿子 Oleg 开始在南部扩张他们的帝国不久后迁都到基辅那是哈扎尔帝国曾经的边境小村这同时也意味着基辅罗斯帝国的诞生“罗斯”是来自一个古老的挪威语，意思是 “划桨人”这个新成立的国家和他的邻国有着十分复杂的关系它改变着哈扎尔和拜占庭帝国之间的利害关系对其他的邻近部落也同样有些影响宗教在当时的政治系统中有着重要的影响随着故事的发展，在公元987年罗斯的王子，弗拉基米尔一世决定是时候放弃斯拉夫的异教信仰了他向邻国派去了使者，让他们去研究当地的宗教他无法忍受伊斯兰不喝酒的传统接受不了犹太人被驱逐出圣地的凄惨在听说了基督教的各式庆典后他接受了正统基督教(东正教)通过弗拉米尔的转变，还有他和拜占庭皇妹的联姻以及伏尔加河上蓬勃发展的贸易两个帝国的关系更加紧密了在罗斯帝国的维京战士在拜占庭帝国做一流的守卫的同时拜占庭的传教士根据改良版的希腊字母为斯拉夫语创造了一套新的字母表在很长的一段时间后基辅罗斯由于自身广袤的资源和蓬勃发展的贸易变得十分强大在他们的贵族与欧洲其他的统治者联姻的同时当地的居民们享受着他们自己伟大的文化，文学，甚至是当时罕有的民主自由但是好景不长兄弟间争夺继承权的斗争使中央集权逐渐瓦解王子争夺着不同城市的统治权当日耳曼的十字军逐渐抵达北部时随着第四次十字军战争和君士坦丁堡的沦陷基辅罗斯因贸易而积攒的财富和权力慢慢沦陷然而，压死骆驼的最后一根稻草来自东部王子们执着于眼前的争吵忽视了当地对于一个神秘，快速发展的组织的流言直到公元1237年，成吉思汗率领着3500名骑兵横扫了基辅罗斯的所有城市洗劫了首都基辅后又前往匈牙利以及波兰基辅罗斯的时代告一段落，原基辅罗斯的居民如今也散布在世界各地在仍然被蒙古人统治着的东方有一个叫做莫斯科的贸易点成长起了一股可以挑战蒙古可汗的团体他们夺回了破碎帝国的部分领土之后他们势如破竹逐渐吸收了原属基辅罗斯的东部领土他们改变了原来的名字，用了希腊发音，叫Ruscia与此同时，西部地区的统治者们一直通过一些政治手段规避风险直到蒙古骑兵撤退但他们仍然遭受着波兰和立陶宛的影响在接下来的几个世纪期间在基辅罗斯的这片领土上曾填满了斯拉夫人曾被维京人统治曾被希腊人教导曾被蒙古人瓜分最终形成了其社会，语言，文化的多元一直延续到今天

**P285 2015-10-06 Where does gold come from - David Lunney**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=285)

In medieval times, alchemists tried to achieve the seemingly impossible. They wanted to transform lowly lead into gleaming gold. History portrays these people as aged eccentrics, but if only they'd known that their dreams were actually achievable. Indeed, today we can manufacture gold on Earth thanks to modern inventions that those medieval alchemists missed by a few centuries. But to understand how this precious metal became embedded in our planet to start with, we have to gaze upwards at the stars. Gold is extraterrestrial. Instead of arising from the planet's rocky crust, it was actually cooked up in space and is present on Earth because of cataclysmic stellar explosions called supernovae. Stars are mostly made up of hydrogen, the simplest and lightest element. The enormous gravitational pressure of so much material compresses and triggers nuclear fusion in the star's core. This process releases energy from the hydrogen, making the star shine. Over many millions of years, fusion transforms hydrogen into heavier elements: helium, carbon, and oxygen, burning subsequent elements faster and faster to reach iron and nickel. However, at that point nuclear fusion no longer releases enough energy, and the pressure from the core peters out. The outer layers collapse into the center, and bouncing back from this sudden injection of energy, the star explodes forming a supernova. The extreme pressure of a collapsing star is so high, that subatomic protons and electrons are forced together in the core, forming neutrons. Neutrons have no repelling electric charge so they're easily captured by the iron group elements. Multiple neutron captures enable the formation of heavier elements that a star under normal circumstances can't form, from silver to gold, past lead and on to uranium. In extreme contrast to the million year transformation of hydrogen to helium, the creation of the heaviest elements in a supernova takes place in only seconds. But what becomes of the gold after the explosion? The expanding supernova shockwave propels its elemental debris through the interstellar medium, triggering a swirling dance of gas and dust that condenses into new stars and planets. Earth's gold was likely delivered this way before being kneaded into veins by geothermal activity. Billions of years later, we now extract this precious product by mining it, an expensive process that's compounded by gold's rarity. In fact, all of the gold that we've mined in history could be piled into just three Olympic-size swimming pools, although this represents a lot of mass because gold is about 20 times denser than water. So, can we produce more of this coveted commodity? Actually, yes. Using particle accelerators, we can mimic the complex nuclear reactions that create gold in stars. But these machines can only construct gold atom by atom. So it would take almost the age of the universe to produce one gram at a cost vastly exceeding the current value of gold. So that's not a very good solution. But if we were to reach a hypothetical point where we'd mined all of the Earth's buried gold, there are other places we could look. The ocean holds an estimated 20 million tons of dissolved gold but at extremely miniscule concentrations making its recovery too costly at present. Perhaps one day, we'll see gold rushes to tap the mineral wealth of the other planets of our solar system. And who knows? Maybe some future supernova will occur close enough to shower us with its treasure and hopefully not eradicate all life on Earth in the process.

**P285 2015-10-06 Where does gold come from - David Lunney**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=285)

翻译人员: Winnie Ge 校对人员: Ruby Liu在中世纪炼金术士们总是梦想着完成一些不可能的事情他们想把锈迹斑斑的铁块变成亮闪闪的金子历史学家们觉得这些人是怪人但是他们不知道这些梦想 事实上 是现实的如今 我们可以大量生产金块多亏了那些在炼金术士时代尚未出现的现代发明但是想要了解这稀有金属是如何点缀我们的星球的我们得先仰望星空 探索宇宙的奥秘金存在在外星球上它并不是直接形成于地壳上而是来自宇宙由于超新星爆炸而来到地球恒星由宇宙中最简单、最轻的元素 氢 构成由于巨大的引力氢被压缩并激发横行的核聚变这一过程会释放能量令其发光几百万年来核聚变将氢元素转化成一些更沉的元素如 氦 碳 氧并支持它们快速燃烧 最终变为铁或镍然而 当核聚变不再释放能量时核中的气压也会逐渐降低外层因此破裂崩塌 向心坠入恒星从被突然注入的能量恢复之后爆炸形成超新星爆裂的恒星的气压非常大使得质子和电子被贴在一起在核中形成中子中子不带电荷所以它们很容易被铁元素吸引很多中子促进了更沉的元素的形成使得在一般情况下的恒星不能从银变为金铅 和铀由氢到氦的形成大概要几百万年然而超新星中最沉的元素的形成只需要仅仅几秒钟那么爆炸后的结果是什么呢？不断扩展的超新星冲击波用它的星际间介质推进它的残骸使其带动周围的气体和尘埃旋转最后又凝缩成心的恒星和行星地球上的金子很可能就是这么形成的在被开发成金矿前几十亿年后 我们开采这稀有的物质因为它的稀有 所以开采过程变得很昂贵事实上 人类史上开采过的所有金矿仅仅能填满三个奥林匹克级别的游泳馆而已尽管它们质量很高因为金比水重20倍所以 我们可以生产更多的这令人垂涎的金子吗？答案是可以的我们可以使用粒子加速器来模仿复杂的核反应进而产生宇宙中的金但这些机器只能通过原子来制造金制造一克金所需的时间像宇宙形成一样漫长同时花费也远超制成的金的价值所以这并不是一个明智的选择不过如果假设我们能够开采世界上所有的金那么就有其他的地方供我们选择海洋里大概包含两千万吨未溶解的金不过因为它们集中在很小的区域 开采所需花费巨大也许有一天 我们可以看到淘金热在太阳系的其它行星上流行起来谁知道呢？也许在将来超新星会距离我们越来越近洒落大批黄金同时不要毁灭地球上的其它物质

**P286 2015-10-13 What are the universal human rights - Benedetta Berti**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=286)

The idea of human rights is that each one of us, no matter who we are or where we are born, is entitled to the same basic rights and freedoms. Human rights are not privileges, and they cannot be granted or revoked. They are inalienable and universal. That may sound straighforward enough, but it gets incredibly complicated as soon as anyone tries to put the idea into practice. What exactly are the basic human rights? Who gets to pick them? Who enforces them, and how? The history behind the concept of human rights is a long one. Throughout the centuries and across societies, religions, and cultures we have struggled with defining notions of rightfulness, justice, and rights. But one of the most modern affirmations of universal human rights emerged from the ruins of World War II with the creation of the United Nations. The treaty that established the UN gives as one of its purposes to reaffirm faith in fundamental human rights. And with the same spirit, in 1948, the UN General Assembly adopted the Universal Declaration of Human Rights. This document, written by an international committee chaired by Eleanor Roosevelt, lays the basis for modern international human rights law. The declaration is based on the principle that all human beings are born free and equal in dignity and rights. It lists 30 articles recognizing, among other things, the principle of nondiscrimination and the right to life and liberty. It refers to negative freedoms, like the freedom from torture or slavery, as well as positive freedoms, such as the freedom of movement and residence. It encompasses basic civil and political rights, such as freedom of expression, religion, or peaceful assembly, as well as social, economic, and cultural rights, such as the right to education and the right to freely choose one's occupation and be paid and treated fairly. The declaration takes no sides as to which rights are more important, insisting on their universality, indivisibility, and interdependence. And in the past decades, international human rights law has grown, deepening and expanding our understanding of what human rights are, and how to better protect them. So if these principles are so well-developed, then why are human rights abused and ignored time and time again all over the world? The problem in general is that it is not at all easy to universally enforce these rights or to punish transgressors. The UDHR itself, despite being highly authoritative and respected, is a declaration, not a hard law. So when individual countries violate it, the mechanisms to address those violations are weak. For example, the main bodies within the UN in charge of protecting human rights mostly monitor and investigate violations, but they cannot force states to, say, change a policy or compensate a victim. That's why some critics say it's naive to consider human rights a given in a world where state interests wield so much power. Critics also question the universality of human rights and emphasize that their development has been heavily guided by a small number of mostly Western nations to the detriment of inclusiveness. The result? A general bias in favor of civil policital liberties over sociopolitical rights and of individual over collective or groups rights. Others defend universal human rights laws and point at the positive role they have on setting international standards and helping activists in their campaigns. They also point out that not all international human rights instruments are powerless. For example, the European Convention on Human Rights establishes a court where the 47 member countries and their citizens can bring cases. The court issues binding decisions that each member state must comply with. Human rights law is constantly evolving as are our views and definitions of what the basic human rights should be. For example, how basic or important is the right to democracy or to development? And as our lives are increasingly digital, should there be a right to access the Internet? A right to digital privacy? What do you think?

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翻译人员: zhiqiang liu 校对人员: Gabriella Hu无论你是谁，出身如何你都拥有人权理念中的基本权利和自由人权不是特权它不能被授权或废除是不可剥夺并且普适的这听起来很简单明了，但当把理念放到实践上时是十分复杂什么是基本人权？谁有权利来选择？谁来执行，然后又怎么执行？人权的历史是悠久的几个世纪以来在社会，宗教，文化等领域我们费尽心血寻找公正，正义和权利的真理然而其中被现代公认的人权是在在二战废墟后成立的联合国中形成的联合国条约的宗旨重申基本人权的信念在同样的精神下联合国大会于1948年采用了世界人权宣言。这份文件是由埃莉诺·罗斯福主持的 国际委员会编写的它奠基了现代国际人权法这项公告基于所有人都是自由且拥有平等尊严及权利的原则这里列出30篇条款，证实非歧视原则和生命自由的权利它包括了消极自由，比如免于折磨和奴役的自由以及积极自由，比如行为和居住的自由这包含基本的公民和政治权利比如自由表达，宗教，或和平集会以及社会， 经济， 和文化等权利比如受教育权和选择职业的自由权并且被公平的获得酬劳及对待这项宣言没有偏重哪项权利更重要而是坚持其全方面性不可分割性和相互依赖性。在过去数十年间， 国际人权法发展得更成熟了，延深并扩展了我们对人权的理解和如何更有效的维护它那么既然这些原则已经根深蒂固了那么为什么在整个世界范围内人权被一次次地滥用和无视？总的来说，困难度在于全方面的保障这些权利或是惩罚违规者即使世界人权宣言是权威并被高度重视的，它依旧是一项宣言，而非硬法所以当个别国家违反了定位这些违反行为的机制依旧是虚弱的列如，联合国负责保护人权的主要部门主要是监视和调查违反行为但是不能迫使国家改变政策或补偿受害者这也是为什么一些批判家认为人权是被赋予的这个想法是非常天真的在一个注重挥舞权力的世界里批判家同时也怀疑人权的全方面性并强调了其发展仅被少数国家（大多西方国家为首）的人权法损害了其包容性这样导致的结果？大体上的偏向在公民政治自由而非社会政治权利和个人主义而非集体或群体利益其他人为世界人权法辩护并指出其在建立国际标准上的积极性和帮助积极分子的竞选他们也指出不是所有国际人权部门都是无能的列如欧洲人权公约基于人权上所建立的法院47成员国和成员国公民都能进行申诉法院给出的判决将建立在成员国都一致赞同的情况下随着人权法不断的进展在我们对基本人权的理解和看法上还会持续进行列如， 民主的权利究竟有多基本和重要或是其发展的重要性我们的生活更加信息化我们是否应有网络权？信息化隐私权？你怎么看？

**P287 2015-10-14 How computers translate human language - Ioannis Papachimonas**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=287)

How is it that so many intergalactic species in movies and TV just happen to speak perfect English? The short answer is that no one wants to watch a starship crew spend years compiling an alien dictionary. But to keep things consistent, the creators of Star Trek and other science-fiction worlds have introduced the concept of a universal translator, a portable device that can instantly translate between any languages. So is a universal translator possible in real life? We already have many programs that claim to do just that, taking a word, sentence, or entire book in one language and translating it into almost any other, whether it's modern English or Ancient Sanskrit. And if translation were just a matter of looking up words in a dictionary, these programs would run circles around humans. The reality, however, is a bit more complicated. A rule-based translation program uses a lexical database, which includes all the words you'd find in a dictionary and all grammatical forms they can take, and set of rules to recognize the basic linguistic elements in the input language. For a seemingly simple sentence like, "The children eat the muffins," the program first parses its syntax, or grammatical structure, by identifying the children as the subject, and the rest of the sentence as the predicate consisting of a verb "eat," and a direct object "the muffins." It then needs to recognize English morphology, or how the language can be broken down into its smallest meaningful units, such as the word muffin and the suffix "s," used to indicate plural. Finally, it needs to understand the semantics, what the different parts of the sentence actually mean. To translate this sentence properly, the program would refer to a different set of vocabulary and rules for each element of the target language. But this is where it gets tricky. The syntax of some languages allows words to be arranged in any order, while in others, doing so could make the muffin eat the child. Morphology can also pose a problem. Slovene distinguishes between two children and three or more using a dual suffix absent in many other languages, while Russian's lack of definite articles might leave you wondering whether the children are eating some particular muffins, or just eat muffins in general. Finally, even when the semantics are technically correct, the program might miss their finer points, such as whether the children "mangiano" the muffins, or "divorano" them. Another method is statistical machine translation, which analyzes a database of books, articles, and documents that have already been translated by humans. By finding matches between source and translated text that are unlikely to occur by chance, the program can identify corresponding phrases and patterns, and use them for future translations. However, the quality of this type of translation depends on the size of the initial database and the availability of samples for certain languages or styles of writing. The difficulty that computers have with the exceptions, irregularities and shades of meaning that seem to come instinctively to humans has led some researchers to believe that our understanding of language is a unique product of our biological brain structure. In fact, one of the most famous fictional universal translators, the Babel fish from "The Hitchhiker's Guide to the Galaxy", is not a machine at all but a small creature that translates the brain waves and nerve signals of sentient species through a form of telepathy. For now, learning a language the old fashioned way will still give you better results than any currently available computer program. But this is no easy task, and the sheer number of languages in the world, as well as the increasing interaction between the people who speak them, will only continue to spur greater advances in automatic translation. Perhaps by the time we encounter intergalactic life forms, we'll be able to communicate with them through a tiny gizmo, or we might have to start compiling that dictionary, after all.

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翻译人员: Chuyu Huang 校对人员: Scarlett Huang为什么影视剧里会有那么多的星际物种恰好都会说一口流利的英语呢？原因很简单，因为没人希望为了看一部星际舰队还得花上好几年时间去编译一本外星字典但为了保证一致性，星际迷航和其它科幻小说的编导们就想出了万能翻译机这个点子一个能够立马能在各种语言间进行翻译的手持设备你们觉得万能翻译机在现实生活中是可行的吗？现在已经有很多程序声称他们能在各种语言间进行翻译不管是一个字，一句话，一本书也不管是现代英语还是古梵语如果翻译仅仅只是在字典上查找字意的话，这些程序完全能比人类做得更好但实际上没那么简单一个基于规则的翻译系统所用的词义数据包括你能在字典上找到的所有单词和所有能够使用的语法形态并且得有一套规则能够区分输入语言的基本语言成分举个看起来比较简单的例子：孩子们在吃松饼。翻译程序会先解析这句话的句法或语法结构通过将“孩子”定为主语剩下的部分作为谓语并且包含动词“吃”和直接宾语“松饼”或者这段话怎么才能够拆分成几个小词组就比如说“松饼”这个词后缀“s” 通常是表示复数最后一步还需要理解其中的语义学需要理解这段话中的每个部分都各自表示什么意思为了恰当地翻译这句话翻译程序会为将翻译的文本参照其语言的各个要素词汇和使用规则但这才是麻烦的地方在一些语言的句法结构中，文字并没有特定的顺序而且在有些语言中这句话看起来就像：松饼在吃小孩儿词态学也是个问题斯洛文尼亚语中区别通过使用双重后缀缺失来区分这句话中孩子的数量，两个、三个或者更多然后俄罗斯人不使用定冠词会让你觉得这些孩子到底是在吃一些特定的松饼呢还是一般含义上的松饼结果是，就算程序翻译出来的语义是正确的它可能还是会忽略一些细节就比如说这些孩子到底是在吃松饼还是在吞松饼？另一个研究方法是：统计翻译法这个方法是取分析那些已经被前人翻译过的书籍、文章和文件的数据库翻译系统可以通过找到那些不是偶然和译文恰好匹配的资源辨识相关的短语和句型并存以备用然而这种方式的翻译质量得根据某些语言或写作风格的初始数据库和语库可用性而定有一些困难，就像一些特例、非常规的事物和人类本能上的细微区别这样的困难导致了一些研究人员觉得我们对于语言的理解是我们大脑生物结构的单一产物但事实上，最著名的科幻小说通用翻译器－“巴别塔” 是从“银河系漫游指南”中逐渐分离出来的这翻译器不完全只是一个机器，而是一个能以心电感应形式从有意识生物那儿翻译他们的脑电波和神经信号的小生物目前为止，用老办法去学一门新的语言仍然比用目前可用的计算机程序的效果更好但这也绝非易事，世界上语言的绝对数量和其使用者间的相互作用会刺激自动翻译系统不断进步也许等到我们遇到星际生命形态的物种时我们就能够通过一个小发明与他们交流又或许我们终究得编译那样一套字典。

**P288 2015-10-14 Why do women have periods**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=288)

A handful of species on Earth share a seemingly mysterious trait: a menstrual cycle. We're one of the select few. Monkeys, apes, bats, humans, and possibly elephant shrews are the only mammals on Earth that menstruate. We also do it more than any other animal, even though its a waste of nutrients and can be a physical inconvenience. So where's the sense in this uncommon biological process? The answer begins with pregnancy. During this process, the body's resources are cleverly used to shape a suitable environment for a fetus, creating an internal haven for a mother to nurture her growing child. In this respect, pregnancy is awe-inspiring, but that's only half the story. The other half reveals that pregnancy places a mother and her child at odds. As for all living creatures, the human body evolved to promote the spread of its genes. For the mother, that means she should try to provide equally for all her offspring. But a mother and her fetus don't share exactly the same genes. The fetus inherits genes from its father, as well, and those genes can promote their own survival by extracting more than their fair share of resources from the mother. This evolutionary conflict of interests places a woman and her unborn child in a biological tug-of-war that plays out inside the womb. One factor contributing to this internal tussle is the placenta, the fetal organ that connects to the mother's blood supply and nourishes the fetus while it grows. In most mammals, the placenta is confined behind a barrier of maternal cells. This barrier lets the mother control the supply of nutrients to the fetus. But in humans and a few other species, the placenta actually penetrates right into the mother's circulatory system to directly access her blood stream. Through its placenta, the fetus pumps the mother's arteries with hormones that keep them open to provide a permanent flow of nutrient-rich blood. A fetus with such unrestricted access can manufacture hormones to increase the mother's blood sugar, dilate her arteries, and inflate her blood pressure. Most mammal mothers can expel or reabsorb embryos if required, but in humans, once the fetus is connected to the blood supply, severing that connection can result in hemorrhage. If the fetus develops poorly or dies, the mother's health is endangered. As it grows, a fetus's ongoing need for resources can cause intense fatigue, high blood pressure, and conditions like diabetes and preeclampsia. Because of these risks, pregnancy is always a huge, and sometimes dangerous, investment. So it makes sense that the body should screen embryos carefully to find out which ones are worth the challenge. This is where menstruation fits in. Pregnancy starts with a process called implantation, where the embryo embeds itself in the endometrium that lines the uterus. The endometrium evolved to make implantation difficult so that only the healthy embryos could survive. But in doing so, it also selected for the most vigorously invasive embryos, creating an evolutionary feedback loop. The embryo engages in a complex, exquisitely timed hormonal dialogue that transforms the endometrium to allow implantation. What happens when an embryo fails the test? It might still manage to attach, or even get partly through the endometrium. As it slowly dies, it could leave its mother vulnerable to infection, and all the time, it may be emitting hormonal signals that disrupt her tissues. The body avoids this problem by simply removing every possible risk. Each time ovulation doesn't result in a healthy pregnancy, the womb gets rid of its endometrial lining, along with any unfertilized eggs, sick, dying, or dead embryos. That protective process is known as menstruation, leading to the period. This biological trait, bizarre as it may be, sets us on course for the continuation of the human race.

**P288 2015-10-14 Why do women have periods**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=288)

翻译人员: Di SUN地球上只有极少数的物种 有这种神秘的特质：月经周期。人类是便是这少数物种之一。猴子、猿、蝙蝠、人类， 可能还有象鼩是地球上仅有的 有月经的哺乳动物。人类的月经比其他动物更频繁，即便月经会导致营养流失 和身体上的不便。那么这种罕见的生理过程 究竟意义何在？这要从怀孕说起。在怀孕过程中， 身体的资源被充分地利用来塑造一个适合胎儿生长的环境，为胎儿成长提供营养的港湾。从这方面来看， 怀孕多么神奇啊。但这只是一方面。另一方面，怀孕的过程中 母体和胎儿也存在冲突。和其他所有生物一样，人类身体进化的目的是 更好地延续物种基因。对母亲而言，这意味着 她应该给她所有的后代提供相同的条件。但母亲和胎儿的基因 不是完全相同的。胎儿还继承了其父亲的基因。这些基因为了生存，会向母亲索取更多的资源。这种进化中的利益冲突，让女性和她腹中的孩子在子宫内展开 一场生理上的拔河比赛。这场比赛的成因之一是胎盘。胎盘是连接胎儿和 母体血液系统的器官。它为胎儿提供发育需要的营养。大多数哺乳动物的胎盘 被母体内的一层细胞屏障包围。这层屏障让母体能控制 给胎儿的营养供应。但对于人类和其他少数物种来说，胎盘实际上直接进入了 母体的循环系统，直接接触母体的血液。通过胎盘， 胎儿向母体的动脉释放荷尔蒙，这使母体的动脉扩张， 运送营养丰富的血液。这样无限制的接触， 胎儿能通过控制激素来增加母体血糖， 扩张母体动脉，并提高母体血压。在必要的情况下，大多数哺乳动物的母体 能排出或者再吸收胚胎，但是对人类来说， 一旦胎儿连接到血液供应，切断了这种连接 会导致严重内出血。如果胎儿发育不良或死亡，则会危及母亲的健康。胎儿发育和对营养的持续需求会使母亲极其疲惫，血压升高，并可能出现 糖尿病和先兆子痫等状况。因为这些风险的存在，怀孕是一项重大而危险的投资。因此身体有理由仔细筛选胚胎，只留下那些值得为之冒险的胚胎。月经则随之产生了。怀孕始于“着床”这一过程，胚胎把自己嵌入到子宫内膜上。子宫内膜不断演化 使得着床变得困难。这样只有健康的胚胎能够存活。但这样一来，它也选择了最有活力的胚胎，创造了一个进化反馈循环。胚胎向子宫内膜传递 复杂而精细的激素信号，使子宫内膜允许它着床。那么如果胚胎着床失败了呢？胚胎可能还会附着在子宫内膜上，甚至部分进入子宫内膜。但胚胎慢慢死去时， 母体会更容易发生感染。它可能还会一直释放激素信号， 扰乱母体组织。身体为了避免这个问题， 会排出所有可能的危险。每当排卵未能形成健康胚胎，子宫都会使整个内膜脱落，同时将未受精的，虚弱的 或濒死的胚胎一并排出。这个自我保护的过程 就是月经周期，其结果就是月经来潮。正是这种奇异的生物特性使得人类能一直繁衍下去。

**P289 2015-10-15 How stress affects your body - Sharon Horesh Bergquist**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=289)

Cramming for a test? Trying to get more done than you have time to do? Stress is a feeling we all experience when we are challenged or overwhelmed. But more than just an emotion, stress is a hardwired physical response that travels throughout your entire body. In the short term, stress can be advantageous, but when activated too often or too long, your primitive fight or flight stress response not only changes your brain but also damages many of the other organs and cells throughout your body. Your adrenal gland releases the stress hormones cortisol, epinephrine, also known as adrenaline, and norepinephrine. As these hormones travel through your blood stream, they easily reach your blood vessels and heart. Adrenaline causes your heart to beat faster and raises your blood pressure, over time causing hypertension. Cortisol can also cause the endothelium, or inner lining of blood vessels, to not function normally. Scientists now know that this is an early step in triggering the process of atherosclerosis or cholesterol plaque build up in your arteries. Together, these changes increase your chances of a heart attack or stroke. When your brain senses stress, it activates your autonomic nervous system. Through this network of nerve connections, your big brain communicates stress to your enteric, or intestinal nervous system. Besides causing butterflies in your stomach, this brain-gut connection can disturb the natural rhythmic contractions that move food through your gut, leading to irritable bowel syndrome, and can increase your gut sensitivity to acid, making you more likely to feel heartburn. Via the gut's nervous system, stress can also change the composition and function of your gut bacteria, which may affect your digestive and overall health. Speaking of digestion, does chronic stress affect your waistline? Well, yes. Cortisol can increase your appetite. It tells your body to replenish your energy stores with energy dense foods and carbs, causing you to crave comfort foods. High levels of cortisol can also cause you to put on those extra calories as visceral or deep belly fat. This type of fat doesn't just make it harder to button your pants. It is an organ that actively releases hormones and immune system chemicals called cytokines that can increase your risk of developing chronic diseases, such as heart disease and insulin resistance. Meanwhile, stress hormones affect immune cells in a variety of ways. Initially, they help prepare to fight invaders and heal after injury, but chronic stress can dampen function of some immune cells, make you more susceptible to infections, and slow the rate you heal. Want to live a long life? You may have to curb your chronic stress. That's because it has even been associated with shortened telomeres, the shoelace tip ends of chromosomes that measure a cell's age. Telomeres cap chromosomes to allow DNA to get copied every time a cell divides without damaging the cell's genetic code, and they shorten with each cell division. When telomeres become too short, a cell can no longer divide and it dies. As if all that weren't enough, chronic stress has even more ways it can sabotage your health, including acne, hair loss, sexual dysfunction, headaches, muscle tension, difficulty concentrating, fatigue, and irritability. So, what does all this mean for you? Your life will always be filled with stressful situations. But what matters to your brain and entire body is how you respond to that stress. If you can view those situations as challenges you can control and master, rather than as threats that are insurmountable, you will perform better in the short run and stay healthy in the long run.

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翻译人员: Zhao Harry 校对人员: Yunxi Shi正在为考试突击填鸭背诵？尝试在有限的时间内完成更多的事儿？当面临挑战或感到无助时，我们可以清晰的感受到压力的存在。但压力不仅仅是一种情绪，它还是一种穿行在我们体内的身体反应，就像电路板上的电流那样。短期来看，压力有着积极作用；但是当压力出现的过于频繁，持续的过长时，它产生的反应，不仅仅会影响到你的大脑，还会对你全身的器官与细胞造成伤害。你的肾上腺会释放压力荷尔蒙皮质醇，肾上腺素，以及去甲肾上腺素。所有的这些激素在你的血液系统中穿行着，它们可以轻易的到达你的血管和心脏。肾上腺素会使你的心跳加速、血压升高，时间长了还会引发高血压。压力荷尔蒙皮质醇会令你的内循环或血管中的内覆组织无法正常运行。如今，科学家发现这些还是产生动脉硬化以及胆固醇斑块化的早期诱因。同时，它们还会增加心脏病或中风的患病几率。当你的大脑感受到压力时，它会激活你的自主神经系统。通过这个系统中神经纤维间的联系，你的大脑向你的肠道，或者说肠神经系统传递了压力的信号。除了会令你紧张外（肠胃颤动），这个大脑与肠胃之间的联系还会打断有节奏的肠胃收缩（正是这种收缩帮助食物蠕动进了胃里，）导致肠道易激综合症；同时使你更容易患上胃酸、胃灼热。通过肠神经系统，压力还会改变肠道细菌的成分和功能，而这可能会使你消化不良，甚至影响你整个身体的健康。说到消化功能，那么长期的处于压力之中会否使人变胖呢？答案是肯定的。肾上腺皮质醇会增加你的食欲。它会向身体释放饥饿信号，进而促使你去进食大量的高能量食物和碳水化合物来补充能量储存。肾上腺皮质醇甚至可以释放更高级的信号，让身体将多余的卡路里转化为内脏脂肪或者皮下脂肪。这种类型的脂肪不仅仅是令你胖到难以找到能穿的衣服。它还是一种被叫做细胞因子的器官，功效就是释放荷尔蒙以及和免疫系统相关的化学物质。它会大大增加慢性疾病的患病几率，如心脏疾病和胰岛素抵抗。同时，压力荷尔蒙还会以多种方式影响免疫细胞。原本免疫细胞可以帮助抵御外来病菌、治愈外部伤口，但慢性压力会抑制某些免疫细胞的功能，进而增加身体受感染的几率，延缓身体的自愈速度。想要活的更长寿么？你或许需要减少你的慢性压力了。因为它甚至会令你的染色体终端变短，而染色体的这个端粒恰恰影响着细胞的寿命。每次细胞分裂的时候，染色体端粒帽保证着细胞可以正确复制细胞的遗传代码。同时，随着细胞的分裂，它们也在不断变短。当染色体终端太短时，细胞也就无法再分裂了，这意味着一个细胞的死亡。不仅仅是这些，慢性压力还会从更多的方面去危害你的健康。比如痤疮、脱发、性功能障碍、头痛、肌张力、精神难以集中、疲劳、还有易怒等症状。那么，这些对您又意味着什么呢？您的生活将始终充斥着压力。重要的是您的大脑和身体是如何应对这些压力的。如果您能够将这些压力视为可以控制的挑战，而非无法抗拒的威胁的话，您的生活一定会更加的高效、健康。

**P290 2015-10-20 The science of snowflakes - Maruša Bradač**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=290)

If you ever find yourself gazing at falling snow, why not catch a few snowflakes on your glove and examine their shapes? You might notice that they look symmetrical, and if you look closely, you'll see they have six sides. You could say a snowflake is simply frozen water, but compare one with an ice cube from the freezer, and you'll realize they're very different things. Unlike ice cubes, formed when liquid freezes into a solid, snowflakes form when water vapor turns straight into ice. But that still doesn't explain why snowflakes have six sides. To understand that, we need to delve deeper into the physics of water. Water is made out of two hydrogen atoms and one oxygen atom. A single water molecule thus has ten protons and ten electrons, eight from oxygen and one from each hydrogen atom. The two electrons from oxygen's outer shell are shared with two electrons from both hydrogens as they bond together, and the remaining four outer shell electrons from oxygen form two pairs. We call the bonds between these atoms covalent bonds. The pairs of electrons are all negatively charged. Similar charges repel, so they tend to stay as far away from each other as possible. The pairs form four electron clouds, two of which are where the hydrogen and oxygen share electrons. The repulsion between the unbonded pairs is even stronger than repulsion between the shared pairs, so the two hydrogens get pushed a little further to an angle of 104.5 degrees. The water molecule as a whole is electrically neutral, but oxygen gets a larger share of electrons, making it slightly negative and the hydrogens slightly positive. Due to its negative charge, the oxygen in one molecule is attracted to the positive charge of the hydrogen in another molecule. And so a weak bond between the two molecules, called a hydrogen bond, is formed. When water freezes, this bonding occurs on repeat, ultimately forming a hexagonal structure due to the angle between hydrogens and oxygen within each molecule. This is the seed of a snowflake, and it retains a hexagonal shape as it grows. As the snowflake moves through the air, water vapor molecules stick to the six sharp edges and expand the snowflake outwards, bit by bit. A snowflake's developing shape depends on atmospheric conditions, like humidity and temperature. As a snowflake falls, changes in weather conditions can affect how it grows, and even small differences in the paths two snowflakes take will differentiate their shapes. However, since conditions at the six sharp edges of one snowflake are similar, a symmetric snowflake can grow. Weather conditions affect snow on the ground, as well. Warmer ground temperatures produce a wetter snow that is easier to pack because liquid water molecules help snowflakes stick to each other. Melted snow also plays a critical role in another wintry activity, skiing. Completely dry snow is very difficult to ski on because there's too much friction between the jagged snowflakes and the ski surface. So what's happening is that as skis move, they rub the surface of the snow and warm it up, creating a thin layer of water, which helps them slide along. So technically, it's not really snow skiing, but water skiing. But it is true that no matter how hard you look, you're almost definitely not going to find two identical snowflakes, and that's a mystery that scientists are still trying to solve, though we know that it has to do with the many possible branching points in snowflake formation, and the differences in temperature and humidity, and while we wait for the answer, we can enjoy watching these tiny fractals falling from the sky.

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翻译人员: Liya Duo 校对人员: Shanshan (Alice) Lin当你凝视着飘落的雪花为什么不试着用手套接住几片并观察它们的形状？你可能会发现它们看起来是对称的当你近距离观察你会发现它们有六个面你可以简单将雪花定义为冻住的水但与冰箱制造出的冰块相比你会发现它们其实有着天壤之别不像从液体凝固成固体的冰块那样雪花直接由水蒸气凝华成冰但这仍旧不能解释为什么雪花有六个边为了更好地理解这个问题我们需要更深入地研究水的物理性质水分子由两个氢原子和一个氧原子构成因此一个水分子有十个质子和十个电子其中八个来自氧原子，剩下两个分别来自两个氢原子来自氧原子外壳的两个电子通过分享分别来自两个氢原子上的两个电子使氢原子和氧原子键合在一起氧原子外壳上剩下的四个电子分别组成两对我们将这些原子之间的键称作共价键每对电子都带负电荷异性相斥所以它们倾向于距离对方尽可能地远这几对电子形成四个电子云其中两个来自氢原子和氧原子共享的两对电子剩返的两对电子之前的斥力比共享电子对之间的斥力更强所以两个氢原子被推得更远形成一个104.5度的角水分子整体呈电中性但氧原子分享到更多的电子使得氧原子带负电荷而氢原子带正电荷由于氧原子的电负性一个水分子里的氧原子会被另一个水分子里带正电荷的氢原子吸引所以两个分子间的弱键我们称之为氢键的键，就形成了当水结冰，这样的键合不断重复由每个水分子内氢原子和氧原子的角度驱使最终形成一个六边形结构这就是雪花的种子并在雪花的形成中始终保持六边形的形状当雪花在空气中移动水蒸气分子黏合在六个锋利的边缘使雪花向外一点一点扩大雪花的形状发展取决于大气条件如湿度和温度当雪花飘落大气条件的变化会影响到雪花如何生长即使是两片雪花飘落路径中极微小的差异也会使它们的形状有所不同然而，由于雪花六个锋利的边缘是相似的雪花会生长为对称的形状天气状况也能在地表影响雪的状态温暖的地表温度帮助形成湿润瓷实的雪因为液态水分子帮助雪花互相粘连融化的雪同样在另一个冬季活动——滑雪中起着至关重要的作用在干燥的雪上滑是非常困难的因为锯齿状的雪花和滑雪板之间的摩擦力太大了所以事实上随着滑雪板的移动雪的表面温度由于摩擦而升高形成一层薄薄的水帮助其滑动因此从技术上讲，这不是真正的滑雪而是滑水但无论你多仔细地观察你几乎一定不会找到两片相同的雪花这是一个科学家们仍在试图解决的谜团尽管我们知道这与雪花形成中的众多分支点以及温度和湿度的差异相关而在等待答案的时候我们不妨尽情欣赏这些微小的不规则碎片在空中寂静飘落

**P291 2015-10-23 How do hard drives work - Kanawat Senanan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=291)

Imagine an airplane flying one millimeter above the ground and circling the Earth once every 25 seconds while counting every blade of grass. Shrink all that down so that it fits in the palm of your hand, and you'd have something equivalent to a modern hard drive, an object that can likely hold more information than your local library. So how does it store so much information in such a small space? At the heart of every hard drive is a stack of high-speed spinning discs with a recording head flying over each surface. Each disc is coated with a film of microscopic magnetised metal grains, and your data doesn't live there in a form you can recognize. Instead, it is recorded as a magnetic pattern formed by groups of those tiny grains. In each group, also known as a bit, all of the grains have their magnetization's aligned in one of two possible states, which correspond to zeroes and ones. Data is written onto the disc by converting strings of bits into electrical current fed through an electromagnet. This magnet generates a field strong enough to change the direction of the metal grain's magnetization. Once this information is written onto the disc, the drive uses a magnetic reader to turn it back into a useful form, much like a phonograph needle translates a record's grooves into music. But how can you get so much information out of just zeroes and ones? Well, by putting lots of them together. For example, a letter is represented in one byte, or eight bits, and your average photo takes up several megabytes, each of which is 8 million bits. Because each bit must be written onto a physical area of the disc, we're always seeking to increase the disc's areal density, or how many bits can be squeezed into one square inch. The areal density of a modern hard drive is about 600 gigabits per square inch, 300 million times greater than that of IBM's first hard drive from 1957. This amazing advance in storage capacity wasn't just a matter of making everything smaller, but involved multiple innovations. A technique called the thin film lithography process allowed engineers to shrink the reader and writer. And despite its size, the reader became more sensitive by taking advantage of new discoveries in magnetic and quantum properties of matter. Bits could also be packed closer together thanks to mathematical algorithms that filter out noise from magnetic interference, and find the most likely bit sequences from each chunk of read-back signal. And thermal expansion control of the head, enabled by placing a heater under the magnetic writer, allowed it to fly less than five nanometers above the disc's surface, about the width of two strands of DNA. For the past several decades, the exponential growth in computer storage capacity and processing power has followed a pattern known as Moore's Law, which, in 1975, predicted that information density would double every two years. But at around 100 gigabits per square inch, shrinking the magnetic grains further or cramming them closer together posed a new risk called the superparamagnetic effect. When a magnetic grain volume is too small, its magnetization is easily disturbed by heat energy and can cause bits to switch unintentionally, leading to data loss. Scientists resolved this limitation in a remarkably simple way: by changing the direction of recording from longitudinal to perpendicular, allowing areal density to approach one terabit per square inch. Recently, the potential limit has been increased yet again through heat assisted magnetic recording. This uses an even more thermally stable recording medium, whose magnetic resistance is momentarily reduced by heating up a particular spot with a laser and allowing data to be written. And while those drives are currently in the prototype stage, scientists already have the next potential trick up their sleeves: bit-patterned media, where bit locations are arranged in separate, nano-sized structures, potentially allowing for areal densities of twenty terabits per square inch or more. So it's thanks to the combined efforts of generations of engineers, material scientists, and quantum physicists that this tool of incredible power and precision can spin in the palm of your hand.

**P291 2015-10-23 How do hard drives work - Kanawat Senanan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=291)

翻译人员: Lisha Huang 校对人员: Chenlu Wang想象一架飞机以离地面1毫米的高度飞行，每25秒绕地球一圈，还能覆盖每一寸表面。再将其缩小成手掌大小，你就会得到和现代硬盘差不多的东西，它所包含的信息比你们当地图书馆还要多。那么它是如何在这么小的空间 储存这么多的信息呢？在每个硬盘的中心都有 大量高速旋转的磁盘,每个磁盘的表面都有高速扫过的 记录磁头。每个磁盘上都覆盖着一层薄薄的 微小的磁化金属粒，数据以一种肉眼无法分辨的形式存在。很多组微小颗粒形成的磁化图案记录形成了数据。每一组，又称之为比特（bit），所有微粒都按照自身的磁性排列形成两种状态之一，对应0或者1。将比特信息通过电磁铁转换成电流，数据就能被读写在硬盘上。这块磁铁会产生一个强大磁场，足以改变金属微粒的磁性。当信息写入磁盘，驱动使用磁读取器 将其还原成有意义的形式，类似于留声机针将唱片纹路转化成音乐。但是你是怎么从0和1中 得到这么多信息的呢？其实是将很多很多个0和1组合在一起。例如，一个字节（byte）， 即8比特可以代表一个字母，你平均每张相片有好几兆字节，每一兆字节相当于800万比特。由于每一比特必须写在磁盘的实体表面上，所以我们总在寻求方法增加磁盘磁录密度，或者说是增加每平方厘米能塞下的比特数。现代硬盘的磁录密度大约是 每平方厘米93千兆比特，是1957年IBM第一款硬盘的3亿倍。储存容量的巨大提升不仅仅是归因于将所有东西缩小，而是包含了许多项创新技术。一种称之为薄膜光刻的技术使得工程师们可以缩小读写器。除了尺寸，利用物质磁性和量子特性上的新发现 可以让读取器变得更加敏感。数学算法的出现可以让比特 被更紧凑地排列在一起能过滤电磁干扰产生的噪音，并且能从大量回读信息中 找到最有可能的比特顺序。磁头热膨胀的控制是通过在磁性记录器下面放上一个加热器，使其能悬于磁盘表面5纳米以内，大约是两条DNA链的宽度。在过去的数十年，电脑储存容量及性能的大幅度增长遵循着一种模式，称为“摩尔定律”，这一定律于1975年预测 信息密度每两年会增长一倍。但是若每平方厘米超过15.5千兆，继续缩小磁性颗粒， 或者将它们塞得更紧，则会导致“超顺磁效应”。即当磁粒体积过小，它的磁性很容易受到热能干扰，导致比特的朝向发生混乱，从而引起数据丢失。科学家们采用了一种 非常简单的方法解决了这个问题：将磁记录方向由水平改为垂直，这使得磁录密度增加到接近 每平方厘米0.155太（1000千兆）字节。最近，通过热辅助磁记录技术，磁录密度又提升了。这种技术采用了一种热稳定记录介质，通过在局部进行激光加热来短暂减小磁阻力，从而实现写入数据。尽管这些驱动磁盘还处于原型阶段，科学家们已经又玩出了新花样：位元规则媒介，比特对应的位置被安置于独立的 纳米大小的结构，潜在地实现了磁录密度 至每平方厘米3.1太字节，甚至更多。多亏了一代又一代工程师，材料科学家，还有量子物理学家们的共同努力，这个拥有不可思议的能量， 无比精确的小工具才能在你手掌中旋转。

**P292 2015-11-02 How mucus keeps us healthy - Katharina Ribbeck**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=292)

If you've got a cold, mucus is hard to miss. But what is it, and what does it do besides making you miserable? Your body produces more than a liter of mucus every day, and all the wet surfaces of your body that are not covered by skin, like your eyes, nose, mouth, lungs, and stomach get a liberal coating. That's why they're known as mucus membranes. Mucus plays lots of roles in your body. It keeps delicate tissues from drying out and cracking, which would expose them to infection. It lubricates your eyes so you can blink. It protects your stomach lining from acid. It neutralizes threats by removing or trapping substances that could make you sick. And finally, it houses and keeps your body's trillions of bacterial inhabitants, your microbiota, under control. Mucus contains lots of different compounds, including proteins, fats, and salts. But a key component of mucus versatility is a set of proteins called mucins. Mucins are the primary large molecules in mucus and are essential for giving mucus its slippery feel. They belong to a class of proteins called glycoproteins which are built out of both amino acids and sugars. In mucin, long chains of sugars are attached to specific amino acids in the protein backbone. The hydrophilic sugar chains help mucin dissolve in your body's watery fluids. Mucus, which is up to 90% water, stays hydrated thanks to these sugar chains. Some of these mucins can interact with other mucin molecules to create a complex network that establishes a barrier against pathogens and other invaders. That's why mucus is the body's first line of defense against foreign objects, like bacteria and dust. It's continuously produced to clear them from the respiratory tract, like a slimy conveyor belt. This keeps bacteria from getting a solid purchase on delicate lung tissue, or making it to the blood stream, where they could cause a major infection. Many of those harmful bacteria also cause diseases when they cluster into slimy growths called biofilms. But mucus contains mucins, antimicrobial peptides, antibodies, and even bacteria-hungry viruses called bacteriophages that all work together to prevent biofilms from forming. If microbes do become harmful and you get sick, the body ramps up mucus production to try to quickly flush out the offenders, and the immune system floods your mucus with extra white blood cells. In fact, the greenish mucus often associated with infections gets its color from an enzyme produced by those white blood cells. This multi-pronged approach to bacterial management is one of the main reasons why we're not sick all the time. Even though mucus protects against the infectious bacteria, the vast majority of your body's bacterial tenants are not harmful, and many are actually beneficial. That's particularly true when they live in mucus, where they can perform important functions, like synthesizing vitamins, suppressing harmful inflammation, and controlling the growth of more harmful species. So even though you probably associate mucus with being ill, it's really helping you stay healthy. Sure, it might seem gross, but can you think of any other substance that can lubricate, keep your body clean, fight infection, and domesticate a teeming bacterial population? Nope, just mucus.

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翻译人员: Di SUN 校对人员: Yolanda Zhang当你感冒时，肯定躲不开黏液。那么黏液究竟是什么？ 除了让你感到难受，它还有什么功能？你的身体每天产生超过1升的黏液，多分布在没有被皮肤覆盖的湿润表面，比如眼睛里，鼻子里，嘴里，肺壁，以及胃壁也有一层黏膜。所以它们也被称为黏膜。黏液在人体中发挥着多种作用。它防止脆弱的组织干裂，从而避免组织受感染。它滋润了眼球表面，方便眼睛眨动。它防止胃内壁被酸腐蚀。黏液还通过排除或吸附异物， 减弱一些致病因子对身体的侵袭。另外，黏液中还寄生着几万亿细菌，并控制着这些微生物群。黏液中包含多种化合物，包括蛋白质、脂肪和各类盐。其中一种关键的成分，叫做黏蛋白。黏蛋白是黏液中主要的大分子，黏液的润滑感多来自于黏蛋白。黏蛋白是一种糖蛋白，是由氨基酸和糖构成的。在黏蛋白中，糖链与蛋白支架上特定的氨基酸结合。亲水性的糖链使黏蛋白在体液中溶解。正是这些糖链的存在使得黏液中含有90%以上的水分。一些黏蛋白可以和 其他黏蛋白分子结合，构建一个复杂的保护屏障，来抵御病原体和其他侵入物。这就是为什么说 黏液是人体的第一道屏障，能抵抗细菌和灰尘等的侵入。呼吸道内壁的黏液不断产生，像传送带一样清理吸入的异物。这样可以避免细菌感染脆弱的肺组织，也能防止细菌进入到血液 而引起严重感染。有害细菌聚集生长成粘滑的生物膜时，能够致病。但黏液中包含黏蛋白，抗菌肽，抗体，还有能吞噬细菌的病毒，叫做噬菌体。这些成分协同作用防止生物膜的生成。当微生物导致人体生病时，人体会增加黏液的分泌， 将致病体迅速冲出体外，同时免疫系统也会释放 更多白细胞到黏液中。实际上，绿色的黏液往往与感染相关，它的绿色是由白细胞产生的酶释放的。这多管齐下的细菌防控系统正是我们能够维持健康的主要原因之一。尽管黏液保护我们不受细菌感染，你身体中大多数的细菌其实是无害的，甚至很多是对人体有益的。尤其是那些生长在黏液中的细菌，它们在黏液中发挥了很重要的作用，比如合成维他命，消除炎症，和抑制有害物的生长。虽然我们总把黏液和 生病联系在一起，但它其实正在帮助我们维持健康。黏液看起来的确挺恶心的，但你还知道有其他物质 可以像黏液这样润滑，能保持身体清洁，能对抗感染，还能驯服寄生的细菌群吗？没有，只有黏液。

**P293 2015-11-02 What makes muscles grow - Jeffrey Siegel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=293)

Muscles. We have over 600 of them. They make up between 1/3 and 1/2 of our body weight, and along with connective tissue, they bind us together, hold us up, and help us move. And whether or not body building is your hobby, muscles need your constant attention because the way you treat them on a daily basis determines whether they will wither or grow. Say you're standing in front of a door, ready to pull it open. Your brain and muscles are perfectly poised to help you achieve this goal. First, your brain sends a signal to motor neurons inside your arm. When they receive this message, they fire, causing muscles to contract and relax, which pull on the bones in your arm and generate the needed movement. The bigger the challenge becomes, the bigger the brain's signal grows, and the more motor units it rallies to help you achieve your task. But what if the door is made of solid iron? At this point, your arm muscles alone won't be able to generate enough tension to pull it open, so your brain appeals to other muscles for help. You plant your feet, tighten your belly, and tense your back, generating enough force to yank it open. Your nervous system has just leveraged the resources you already have, other muscles, to meet the demand. While all this is happening, your muscle fibers undergo another kind of cellular change. As you expose them to stress, they experience microscopic damage, which, in this context, is a good thing. In response, the injured cells release inflammatory molecules called cytokines that activate the immune system to repair the injury. This is when the muscle-building magic happens. The greater the damage to the muscle tissue, the more your body will need to repair itself. The resulting cycle of damage and repair eventually makes muscles bigger and stronger as they adapt to progressively greater demands. Since our bodies have already adapted to most everyday activities, those generally don't produce enough stress to stimulate new muscle growth. So, to build new muscle, a process called hypertrophy, our cells need to be exposed to higher workloads than they are used to. In fact, if you don't continuously expose your muscles to some resistance, they will shrink, a process known as muscular atrophy. In contrast, exposing the muscle to a high-degree of tension, especially while the muscle is lengthening, also called an eccentric contraction, generates effective conditions for new growth. However, muscles rely on more than just activity to grow. Without proper nutrition, hormones, and rest, your body would never be able to repair damaged muscle fibers. Protein in our diet preserves muscle mass by providing the building blocks for new tissue in the form of amino acids. Adequate protein intake, along with naturally occurring hormones, like insulin-like growth factor and testosterone, help shift the body into a state where tissue is repaired and grown. This vital repair process mainly occurs when we're resting, especially at night while sleeping. Gender and age affect this repair mechanism, which is why young men with more testosterone have a leg up in the muscle building game. Genetic factors also play a role in one's ability to grow muscle. Some people have more robust immune reactions to muscle damage, and are better able to repair and replace damaged muscle fibers, increasing their muscle-building potential. The body responds to the demands you place on it. If you tear your muscles up, eat right, rest and repeat, you'll create the conditions to make your muscles as big and strong as possible. It is with muscles as it is with life: Meaningful growth requires challenge and stress.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=293)

翻译人员: Pechow Z 校对人员: Ivy Wang肌肉我们有超过600块肌肉大约占了身体重量的三分之一到二分之一它们和结缔组织一起组成我们的身体，使我们能够站立和移动不管健身是不是你的兴趣爱好肌肉需要你持续关注因为你每天的锻炼情况会决定肌肉是萎缩还是增长假想你正站在一扇门前，准备拉门你的大脑和肌肉会达成完美的平衡以帮助你达成目标首先，你的大脑给遥控你手臂的神经发射信号神经接受信号之后，开始行动引起肌肉收缩与放松牵引手臂的骨骼运动 从而做出相应的动作动作难度越大，大脑发出的信号越强协助完成动作所调动的遥控神经单位越多但是如果门是铁制的呢？现在，光靠你手臂的肌肉是不能产生足够的拉力来开门的所以你的大脑会让其他肌肉来帮忙你扎好马步，收紧小腹，拉紧脊背，产生足够的力把门扯开你的神经系统刚刚借用了你所有的已有资源：别的肌肉来完成你的目标当这一切发生时你的肌肉纤维经历了细胞层面的变化你拉伸细胞时，细胞经历了细微的损伤在这里，是一件好事作为回应，受损的细胞会释放出 被称作细胞因子的炎性分子激活了免疫系统以修复损伤这就是肌肉变大的魔法对肌肉组织造成的损伤越大，你身体的自我修复就会越多损伤和修复的循环最终使肌肉变大变结实逐渐适应更大的需求因为我们的身体已经适应了日常的活动，这些就不能产生足够的压力来促进新的肌肉生长了所以，要长肌肉，要经过一个叫过度增长的过程我们的细胞需要比它已经适应的 更大的工作强度事实上，如果你不持续的让肌肉锻炼起来，它们会变小这被称为肌肉萎缩相反的，让肌肉承受更高的拉力，特别是肌肉在伸展时，又被称作离心收缩，为肌肉提供有效的生长条件然而，肌肉生长还要更多条件没有所需的营养，激素，和休息，你的身体永远不能修复受损的肌肉组织我们饮食中的蛋白质通过以氨基酸的形式提供新组织的基础来维持细胞的质量足量的蛋白质摄入，与自然产生的荷尔蒙一起，比如胰岛素，比如生长因子和睾酮，协助组织的修复和生长这个至关重要的修复过程主要发生在我们休息时，尤其是晚上睡觉的时候性别和年龄也会影响修复机制，这就是为什么有更多睾酮的青壮年，在肌肉增长上更有优势基因因素也会影响肌肉增长有些人对肌肉损伤有更强大的免疫反应，更容易修复和替换受损肌肉纤维，这都加大了肌肉增长的潜力身体会对你的需求做出回应如果你撕裂肌肉，补充营养，休息然后重复你就为肌肉变大变强壮创造了条件肌肉增长和生活一个道理：有效的成长需要挑战和压力

**P294 2015-11-06 The science behind the myth - Homer's 'Odyssey' - Matt Kaplan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=294)

Homer's "Odyssey", one of the oldest works of Western literature, recounts the adventures of the Greek hero Odysseus during his ten-year journey home from the Trojan War. Though some parts may be based on real events, the encounters with strange monsters, terrifying giants and powerful magicians are considered to be complete fiction. But might there be more to these myths than meets the eye? Let's look at one famous episode from the poem. In the midst of their long voyage, Odysseus and his crew find themselves on the mysterious island of Aeaea. Starving and exhausted, some of the men stumble upon a palatial home where a stunning woman welcomes them inside for a sumptuous feast. Of course, this all turns out to be too good to be true. The woman, in fact, is the nefarious sorceress Circe, and as soon as the soldiers have eaten their fill at her table, she turns them all into animals with a wave of her wand. Fortunately, one of the men escapes, finds Odysseus and tells him of the crew's plight. But as Odysseus rushes to save his men, he meets the messenger god, Hermes, who advises him to first consume a magical herb. Odysseus follows this advice, and when he finally encounters Circe, her spells have no effect on him, allowing him to defeat her and rescue his crew. Naturally, this story of witchcraft and animal transformations was dismissed as nothing more than imagination for centuries. But in recent years, the many mentions of herbs and drugs throughout the passage have piqued the interest of scientists, leading some to suggest the myths might have been fictional expressions of real experiences. The earliest versions of Homer's text say that Circe mixed baneful drugs into the food such that the crew might utterly forget their native land. As it happens, one of the plants growing in the Mediterranean region is an innocent sounding herb known as Jimson weed, whose effects include pronounced amnesia. The plant is also loaded with compounds that disrupt the vital neurotransmitter called acetylcholine. Such disruption can cause vivid hallucinations, bizarre behaviors, and general difficulty distinguishing fantasy from reality, just the sorts of things which might make people believe they've been turned into animals, which also suggests that Circe was no sorceress, but in fact a chemist who knew how to use local plants to great effect. But Jimson weed is only half the story. Unlike a lot of material in the Odyssey, the text about the herb that Hermes gives to Odysseus is unusually specific. Called moly by the gods, it's described as being found in a forest glen, black at the root and with a flower as white as milk. Like the rest of the Circe episode, moly was dismissed as fictional invention for centuries. But in 1951, Russian pharmacologist Mikhail Mashkovsky discovered that villagers in the Ural Mountains used a plant with a milk-white flower and a black root to stave off paralysis in children suffering from polio. The plant, called snowdrop, turned out to contain a compound called galantamine that prevented the disruption of the neurotransmitter acetylcholine, making it effective in treating not only polio but other disease, such as Alzheimer's. At the 12th World Congress of Neurology, Doctors Andreas Plaitakis and Roger Duvoisin first proposed that snowdrop was, in fact, the plant Hermes gave to Odysseus. Although there is not much direct evidence that people in Homer's day would have known about its anti-hallucinatory effects, we do have a passage from 4th century Greek writer Theophrastus stating that moly is used as an antidote against poisons. So, does this all mean that Odysseus, Circe, and other characters in the Odyssey were real? Not necessarily. But it does suggest that ancient stories may have more elements of truth to them than we previously thought. And as we learn more about the world around us, we may uncover some of the same knowledge hidden within the myths and legends of ages passed.

**P294 2015-11-06 The science behind the myth - Homer's 'Odyssey' - Matt Kaplan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=294)

翻译人员: Da Xie 校对人员: Yunxi Shi荷马的《奥德赛》是西方最古老的文学作品之一它详细描述了希腊英雄奥德赛的一段延续十年，从特洛伊战争开始一直到他回家的 冒险经历也许这本书中有一些故事的原型可能是真实的但是那些关于他遇到怪兽、巨人和魔法师的情节基本就是幻想出来的故事了但是我们是否还可以 从这些神话故事中看出一些别的东西呢？让我们一起来看一看这本诗集中十分有名的一章故事发生在一次长时间的航海旅行中当奥德赛和他的伙伴们到达了埃阿亚魔幻岛时所有人都感到十分疲惫和饥饿 偶然的，其中一些人发现了在岛上有一个宏伟的宫殿一个美妙绝伦的艳妇站在宫殿的门口 邀请他们进屋子去享受盛宴当然，这发生的一切都看起来和真的一样但是事实上，这个艳妇 就是那个喜欢把人变成动物的邪恶女巫---瑟希正当这些士兵们在享受美食的时候女巫突然挥了挥魔杖 将这些士兵就全部都变成了动物幸运的是 其中有一个士兵逃过了一劫随后他找到了奥德赛， 将伙伴们的遭遇告诉了他正当奥德赛准备冲过去救他的伙伴们的时候他遇到了众神使者--赫尔墨斯赫尔墨斯建议奥德赛 让他先吃掉一种神奇草药，然后再去救人奥德赛接受了他的意见（先吃药再救人）当最后奥德赛与女巫瑟希决战的时候， 正是因为吃了草药才使得女巫的咒语对奥德赛无效从而使得奥德赛击败了女巫并且救出伙伴们简单的来说，很长时间以来 这种关于巫术和魔法变形的故事往往都只是被认为是幻想罢了但是最近 这些贯穿了这本书的神奇草药挑起了科学家们的兴趣有一些科学家猜测道这些有着魔幻情节的神话也许是基于现实经验的就在那篇荷马文章的最开始部分提到了女巫瑟希将一些有毒的草药混到了食物中从而使得奥德赛的伙伴们完全忘记了 他们的本性（人类）而在这个故事发生的时候 在地中海区域生长着一种听起来很无害的草药--曼陀罗但它却会让人产生严重的失忆症曼陀罗其本身含有的化合物 也会损坏大脑中一种十分重要的神经传递素乙酰胆碱对乙酰胆碱的损坏会让人产生十分严重的幻觉而且做出一些古怪的行为而且这种损坏往往会让人难以区分现实和幻想正是上述的一些症状可能会让人产生一种 他们已经被变成动物的感觉这个科学实验结果证明了瑟希其实并不是女巫而是一个知道当地植物特性 并且可以使用其特性的药剂师但是曼陀罗也仅仅是这个故事的一半而已不像奥德赛中所提到的许多草药一样赫尔墨斯给奥德赛吃的那一种药草描述的并不是很详细这种神奇药草被众神们称之为“moly"书中描述道它是在一个森林幽谷中被发现的它的根部是黑色的，花朵的颜色就像奶油一样白就像其它有关女巫瑟希的片段当中在很长世间以来，“moly”都被人们认为是一种幻想出来的草药但是在1951年，俄罗斯的药理学家 麦克马·马思科夫斯基发现了那些生活在乌拉尔山脉的村民们用一种花朵是奶油白，根是黑色的植物来麻痹治疗那些患有小儿麻痹症的孩子这种植物就是雪莲在其中可以发现一种叫做雪花胺的化合物这种化合物有效避免乙酰胆碱这种神经传递素被破坏从而可以有效的治疗包括小儿麻痹症在内的许多疾病还有比如阿尔茨海莫式症等在第十二届世界神经学研究会议中安德烈亚斯·普雷塔克斯博士和罗杰·都沃森博士第一次提出了，雪莲就是众神使者赫尔墨斯给予奥德赛的那种神奇植物尽管并没有直接的证据辨明 在荷马年代已经有人知道了雪莲有可以抑制幻觉的作用但是我们从公元四世纪希腊作家 泰奥弗拉斯托斯的文章中可以知道他说“moly”这种植物是一种解毒草药那么，上述这些证据可以表明奥德赛，女巫瑟希和 其他一些《奥德赛》的故事情节就都是真的么？事实上，这也并不一定但是，这些证据至少表明了 基于现实经验而产生的古代神话故事的数量远比我们之前所认为的要多的多随着我们对世界了解的越来越多我们也许还会发现许多像隐藏在奥德赛这类神话故事中的真相

**P295 2015-11-10 How to write descriptively - Nalo Hopkinson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=295)

We read fiction for many reasons. To be entertained, to find out who done it, to travel to strange, new planets, to be scared, to laugh, to cry, to think, to feel, to be so absorbed that for a while we forget where we are. So, how about writing fiction? How do you suck your readers into your stories? With an exciting plot? Maybe. Fascinating characters? Probably. Beautiful language? Perhaps. "Billie's legs are noodles. The ends of her hair are poison needles. Her tongue is a bristly sponge, and her eyes are bags of bleach." Did that description almost make you feel as queasy as Billie? We grasp that Billie's legs aren't actually noodles. To Billie, they feel as limp as cooked noodles. It's an implied comparison, a metaphor. So, why not simply write it like this? "Billie feels nauseated and weak." Chances are the second description wasn't as vivid to you as the first. The point of fiction is to cast a spell, a momentary illusion that you are living in the world of the story. Fiction engages the senses, helps us create vivid mental simulacra of the experiences the characters are having. Stage and screen engage some of our senses directly. We see and hear the interactions of the characters and the setting. But with prose fiction, all you have is static symbols on a contrasting background. If you describe the story in matter of fact, non-tactile language, the spell risks being a weak one. Your reader may not get much beyond interpreting the squiggles. She will understand what Billie feels like, but she won't feel what Billie feels. She'll be reading, not immersed in the world of the story, discovering the truths of Billie's life at the same time that Billie herself does. Fiction plays with our senses: taste, smell, touch, hearing, sight, and the sense of motion. It also plays with our ability to abstract and make complex associations. Look at the following sentence. "The world was ghost-quiet, except for the crack of sails and the burbling of water against hull." The words, "quiet," "crack," and "burbling," engage the sense of hearing. Notice that Buckell doesn't use the generic word sound. Each word he chooses evokes a particular quality of sound. Then, like an artist laying on washes of color to give the sense of texture to a painting, he adds anoter layer, motion, "the crack of sails," and touch, "the burbling of water against hull." Finally, he gives us an abstract connection by linking the word quiet with the word ghost. Not "quiet as a ghost," which would put a distancing layer of simile between the reader and the experience. Instead, Buckell creates the metaphor "ghost-quiet" for an implied, rather than overt, comparison. Writers are always told to avoid cliches because there's very little engagement for the reader in an overused image, such as "red as a rose." But give them, "Love...began on a beach. It began that day when Jacob saw Anette in her stewed-cherry dress," and their brains engage in the absorbing task of figuring out what a stewed-cherry dress is like. Suddenly, they're on a beach about to fall in love. They're experiencing the story at both a visceral and a conceptual level, meeting the writer halfway in the imaginative play of creating a dynamic world of the senses. So when you write, use well-chosen words to engage sound, sight, taste, touch, smell, and movement. Then create unexpected connotations among your story elements, and set your readers' brushfire imaginations alight.

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翻译人员: Evelyn Li 校对人员: Shanshan (Alice) Lin我们出于很多原因去阅读小说。找乐，找出真相，穿越到陌生的新星球，被惊吓，大笑，哭泣，思考，感受，为了沉浸其中而忘记自己身在何处。那么，写小说呢？你怎样把读者吸引到自己的故事中呢？用精彩的故事情节？可能。用引人入胜的角色？ 大概。用优美的语句？ 也许。“比利的腿像面条一样。她的发梢像毒针。她的舌头像有毛的海绵，眼睛像是漂白的袋子。这种描述是否几乎使你像比利一样感到眩晕作呕？我们知道比利的腿并不是真正的面条。对于比利来说，它们像煮熟的面条一样无力松软。这是一个隐晦的对比，叫做“暗喻”。那么，为什么不直接这样写：“比利感到反胃和虚弱。”很可能是因为第二种描述不像第一种那样生动有趣。小说的关键是施加一个咒语——一种让读者置身于故事中的短暂幻觉。小说调动感官，帮我们营造一种关于主人公经历的生动的精神幻象。舞台和荧屏直接调用我们的一部分感官，我们看到、听到那些剧中人物和场景的互动，但是对于单调的小说来说，你所拥有的只是一些在对比鲜明的背景之上的静止符号。如果你用事实性的、没有质感的语言来描述故事，那个咒语的功能可能就比较弱。你的读者除了理解那些文字之外，可能不会收获更多。她知道比利的感觉，但是她不会感同身受。虽然她在阅读，但并没有沉浸到故事中去，她只是同比利自己一样，发现了关于比利生活的真相。小说依赖于我们的感官：味觉，嗅觉，触觉，听觉，视觉，以及动感。它还依赖于我们的抽象、联想能力。来看下面这个句子。“世界像幽灵般寂静，除了船帆的断裂声，以及水拍打船身的汩汩声。”“寂静”，“断裂”，”汩汩“这些词，和听觉相关。注意，巴克尔没有用那个通常会用的词——声音。他选择的每个词都能激发一种特殊的声音质感。然后，像画家涂抹颜料以赋予一幅画质感一样，他添加了另一层，动感，“帆的断裂，”和触觉，“水拍打船身的汩汩声。”最终，他给我们一种抽象的连接，通过把”寂静“和”鬼魂“这两个词放在一起。不是“像鬼魂一样寂静，”这样会把一种间离性的明喻置于读者和经验之间。相反，巴克尔用“鬼魂般的寂静”的比喻，来形成一个暗含的而非明显的比较。作家们通常被告诫：要避免陈词滥调因为在一个用烂了的形象中，读者很难投入进去如“像玫瑰一样红。”但是如果给他们，“爱情...开始于沙滩上。它始于当雅各布看到穿着一身'烩樱桃'裙子的安奈特时，”这时读者们就开始在头脑中猜想“烩樱桃”的裙子是什么样的。突然，他们在沙滩上即将陷入爱河。他们在本能的和观念的层面上同时经历着故事，见到作者正在一个想象性的戏剧中创造一个感官的动态世界。所以当你写作时，用那些精心选择的词汇，以调动听觉、视觉、味觉、触觉、嗅觉，和运动。然后在你的故事元素之中创造一些出其不意的暗示，以点燃读者的想象力。

**P296 2015-11-10 What would happen if you didn’t sleep - Claudia Aguirre**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=296)

In 1965, 17-year-old high school student, Randy Gardner stayed awake for 264 hours. That's 11 days to see how he'd cope without sleep. On the second day, his eyes stopped focusing. Next, he lost the ability to identify objects by touch. By day three, Gardner was moody and uncoordinated. At the end of the experiment, he was struggling to concentrate, had trouble with short-term memory, became paranoid, and started hallucinating. Although Gardner recovered without long-term psychological or physical damage, for others, losing shuteye can result in hormonal imbalance, illness, and, in extreme cases, death. We're only beginning to understand why we sleep to begin with, but we do know it's essential. Adults need seven to eight hours of sleep a night, and adolescents need about ten. We grow sleepy due to signals from our body telling our brain we are tired, and signals from the environment telling us it's dark outside. The rise in sleep-inducing chemicals, like adenosine and melatonin, send us into a light doze that grows deeper, making our breathing and heart rate slow down and our muscles relax. This non-REM sleep is when DNA is repaired and our bodies replenish themselves for the day ahead. In the United States, it's estimated that 30% of adults and 66% of adolescents are regularly sleep-deprived. This isn't just a minor inconvenience. Staying awake can cause serious bodily harm. When we lose sleep, learning, memory, mood, and reaction time are affected. Sleeplessness may also cause inflammation, halluciations, high blood pressure, and it's even been linked to diabetes and obesity. In 2014, a devoted soccer fan died after staying awake for 48 hours to watch the World Cup. While his untimely death was due to a stroke, studies show that chronically sleeping fewer than six hours a night increases stroke risk by four and half times compared to those getting a consistent seven to eight hours of shuteye. For a handful of people on the planet who carry a rare inherited genetic mutation, sleeplessness is a daily reality. This condition, known as Fatal Familial Insomnia, places the body in a nightmarish state of wakefulness, forbidding it from entering the sanctuary of sleep. Within months or years, this progressively worsening condition leads to dementia and death. How can sleep deprivation cause such immense suffering? Scientists think the answer lies with the accumulation of waste prducts in the brain. During our waking hours, our cells are busy using up our day's energy sources, which get broken down into various byproducts, including adenosine. As adenosine builds up, it increases the urge to sleep, also known as sleep pressure. In fact, caffeine works by blocking adenosine's receptor pathways. Other waste products also build up in the brain, and if they're not cleared away, they collectively overload the brain and are thought to lead to the many negative symptoms of sleep deprivation. So, what's happening in our brain when we sleep to prevent this? Scientists found something called the glymphatic system, a clean-up mechanism that removes this buildup and is much more active when we're asleep. It works by using cerebrospinal fluid to flush away toxic byproducts that accumulate between cells. Lymphatic vessels, which serve as pathways for immune cells, have recently been discovered in the brain, and they may also play a role in clearing out the brain's daily waste products. While scientists continue exploring the restorative mechanisms behind sleep, we can be sure that slipping into slumber is a necessity if we want to maintain our health and our sanity.

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翻译人员: zhen you 校对人员: Yunjung Nam在1965年， 17岁的高中学生Randy Gardner维持了264小时的清醒状态。累计11天，来看看 他是怎么保持清醒的。第二天，他的眼睛已经无法聚焦了，然后，他失去了依靠触摸 来辨别物体的能力。第三天，Gardner变得喜怒无常， 动作也无法协调。在实验结束的时候， 保持专注对他来说十分艰难短期记忆出现了问题变的易怒，而且出现了幻觉。尽管Gardner痊愈了，没有长期的生理或心理的后遗症，对于其他人来说失去睡眠可以导致荷尔蒙失衡，生病，在极端情况下，死亡。我们刚刚才开始明白我们为什么要睡觉，但是我们知道睡眠是至关重要的。成人每晚需要7到8小时的睡眠，青少年大概需要10小时。我们变困是因为身体发出暗示告诉我们的大脑，“我们累了”环境中的信号告诉我们，外面天黑了。嗜睡化学成分的上升，比如腺苷和褪黑素，使我们进入浅睡眠，并越睡越深，使我们的呼吸和心跳变缓，肌肉变放松。DNA在这段非快速眼动 睡眠期被修复，我们的身体也补充能量 以准备迎接新的一天。在美国，大概30%的成人和66%的青少年经常缺少睡眠。这并不只是个小小的不便长期保持清醒会对身体 产生巨大的伤害。当我们失去睡眠的时候学习，记忆情绪和反应时间会受到影响。失眠还可能会导致发炎幻觉，高血压，甚至和高血糖和肥胖产生联系。在2014年,一个铁杆球迷因为 连续48小时观看世界杯而死亡。虽然他是因为中风而“英年早逝”，研究表明，长期维持每日少于 六小时的睡眠，相对于那些保持 每晚7到8小时睡眠的人来说增加了4.5倍的中风风险。对于那些世上少数的， 通过遗传得到基因异变的人来说，失眠是家常便饭这种症状，被称为致死性家族失眠症 （Fatal Familial Insomnia）将身体置于一种噩梦般的清醒状态防止患者进入睡眠这个庇护所。在几个月到几年内，这种逐渐恶化到病情 会导致痴呆和死亡。失眠是如何导致如此严重的痛苦的？科学家们认为答案是 代谢物在大脑中的累积。在清醒的时候，我们的细胞紧张的消耗一天的能量，分解成各种副产品，包括腺苷。当腺苷累积起来的时候，它增加了困倦感， 也就是睡眠压力。事实上，咖啡因是靠阻断接受 腺苷的感知器官来实现其作用的。其他的代谢物也会积聚于大脑，如果不清理出去，它们会导致大脑和思想超负荷运转，并导致各种失眠症状。那我们睡觉的时候, 大脑是如何防止这些发生的呢？科学家们发现了一种叫glymphatic system 的脑部淋巴系统，一种能清除这些积聚物的清扫系统，当我们睡觉的时候，这个系统更加活跃。它利用脑脊液来清除 在细胞之间的有毒物质。淋巴管，为免疫细胞提供路径的血管最近被发现存在于大脑中，淋巴管也可能在清除大脑 日常代谢物中扮演了重要的角色。虽然科学家们还在继续 探索关于睡眠的修复机制，我们可以肯定， 想要保持健和理智，打瞌睡是必需的！

**P297 2015-11-11 Would you opt for a life with no pain - Hayley Levitt and Bethany Ric**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=297)

Imagine if you could plug your brain into a machine that would bring you ultimate pleasure for the rest of your life. If you were given the choice to sign up for that kind of existence, would you? That's the question philosopher Robert Nozick posed through a thought experiment he called the Experience Machine. The experiment asks us to consider a world in which scientists have developed a machine that would simulate real life while guaranteeing experiences of only pleasure and never pain. The catch? You have to permanently leave reality behind, but you'll hardly know the difference. Your experiences will be indistinguishable from reality. Life's natural ups and downs will just be replaced with an endless series of ups. Sounds great, right? It may seem like a tempting offer, but perhaps it's not as ideal as it sounds. The experiment was actually designed to refute a philosophical notion called hedonism. According to hedonists, maximizing net pleasure is the most important thing in life because pleasure is the greatest good that life has to offer. For hedonists, the best choice that a person could make for himself is one that brings him the greatest possible amount of pleasure while bringing him no pain. Limitless pleasure minus zero pain equals maximum net pleasure, or in other words, the exact scenario the Experience Machine offers. Therefore, if hedonism is your philosophy of choice, plugging in would be a no-brainer. But what if there's more to life than just pleasure? That's what Nozick believed he was demonstrating through his Experience Machine thought experiment. Despite the machine's promise of maximum net pleasure, he still found reason not to plug in, as do many other experimenters who consider the proposition. But what could possibly dissuade us from choosing a future of ultimate pleasure? Consider this scenario. Betsy and Xander are in a loving, committed relationship. Betsy is head over heels and has never felt happier. However, unbeknownst to Betsy, Xander has been romancing her sister, Angelica, with love letters and secret rendezvous for the duration of their relationship. If Betsy found out, it would destroy her relationships with both Xander and Angelica, and the experience would be so traumatic, she would never love again. Since Betsy is in blissful ignorance about Xander's infidelity, hedonists would say she's better off remaining in the dark and maintaining her high level of net pleasure. As long as Betsy never finds out about the relationship, her life is guaranteed to go on as happily as it is right now. So, is there value in Besty knowing the truth of her situation? Imagine if you were Betsy. Would you prefer to know the truth? If the answer is yes, you'd be choosing an option that sharply decreases your net pleasure. Perhaps, then, you believe that there are things in life with greater intrinsic value than pleasure. Truth, knowledge, authentic connection with other human beings. These are all things that might make the list. By never learning the truth, Betsy is essentially living life in her own personal Experience Machine, a world of happiness that's not based in reality. This love triangle is an extreme example, but it mirrors many of the decisions we make in day to day life. So whether you're making a choice for Betsy or for yourself, why might you feel reality should be a factor? Is there inherent value in real experiences, whether pleasurable or painful? Do you yourself have more value when you're experiencing real life's pleasures and pains? Nozick's experiment may not provide all the answers, but it forces us to consider whether real life, though imperfect, holds some intrinsic value beyond the pleasure of plugging in.

**P297 2015-11-11 Would you opt for a life with no pain - Hayley Levitt and Bethany Ric**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=297)

翻译人员: Huiying Ma 校对人员: Wei Wang想像一下，如果把你的大脑连接到一种机器这种机器可以给你的余生带来无尽的欢乐如果让你选择，你会想要拥有这种机器么？这个问题是由哲学家罗伯特 · 诺齐克所提出的由此，他展开了一项被称作“体验机器”的思想实验这个实验让我们设想这样一个世界科学家发明了一种可以模拟现实生活的机器这种机器提供给你的只有欢乐而没有悲伤需要注意的是一旦你进入了这个机器，你将永远的脱离现实生活但是你自己却很难发现你无法分辨出自己是在现实世界还是虚拟世界人生本应有的跌宕起伏都会被一帆风顺而取代听起来很不错，是吧？这种体验可能会很诱人，但是，它可能并没有听上去的那么美好这个实验的设计初衷是为了反驳一个哲学思想享乐主义享乐主义者认为人生中最重要的事情是将净快乐最大化因为快乐是生活送给我们最珍贵的礼物对于享乐主义者来说，他所作出的选择一定是能够带给他最大限度快乐却没有痛苦的选择所谓净快乐就是力求无穷无尽的快乐而没有一丝痛苦换句话说，也就是体验机器所带给我们的感受因此，如果你是一个享乐主义者的话你恐怕连想都不用想，就进入这个机器了吧但是，如果能够体现人生价值的不仅仅是快乐呢？这也正是诺齐克想要通过体验机器实验所要证实的尽管这个机器能够提供最大净快乐他仍提出了不要进入机器的理由正如许多其他实验人员所主张的但是，究竟是什么东西阻止我们去选择无穷无尽的快乐呢？想像一下贝特西和泽安得是一对处在热恋中的情侣贝特西是情浓意密，感觉再幸福不过了然而，她却不知道泽安得却对她的妹妹安吉莉嘉暗送秋波在他们恋爱期间，与她的妹妹互送情书并秘密约会如果贝特西发现这个事情这将会同时毁掉她与泽安得、安吉莉嘉的关系并且这样的体验会对她留下永久的创伤，可能以后再也不会去爱了由于贝特西仍沉浸在幸福当中，而没有注意到泽安得对她的不忠享乐主义者会劝她最好安于现状这样她仍拥有无尽的快乐因为她没有察觉那段恋情的存在她将像现在一样，继续这样快乐的生活下去那么，贝特西是否应该知道她的恋情真相呢？想像一下如果你是贝特西你会想要知道真相么？如果答案是肯定的那么你所做的选择，将大大减少你的净快乐可能，从此之后，你就会发现，人生中还有许多东西比快乐更具有内在价值比如真相，知识，以及和其他人的关系还有很多很多如果不知道真相贝特西实际上就是生活在她自己的体验机器中虽然幸福，但并不真实这样的三角恋虽然是一个极端的例子但却反映出我们生活中每天所作出的众多决定因此，无论你为了贝特西或是为自己作出选择为什么现实应该成为一个重要因素？这个现实的体验是否具有内在价值无论是快乐的或是痛苦的？当你体验现实生活中的悲与欢时，你会更看重这个选择的价值么？诺齐克的实验可能不能回答所有的问题但它却促使我们去思考，现实生活，尽管有很多的不完美却仍有除了快乐以外的内在价值

**P298 2015-11-17 What’s the difference between a scientific law and theory - Matt Anti**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=298)

Chat with a friend about an established scientific theory and she might reply, "Well, that's just a theory." But a conversation about an established scientific law rarely ends with, "Well, that's just a law." Why is that? What is the difference between a theory and a law, and is one better? Scientific laws and theories have different jobs to do. A scientific law predicts the results of certain initial conditions. It might predict your unborn child's possible hair colors, or how far a baseball travels when launched at a certain angle. In contrast, a theory tries to provide the most logical explanation about why things happen as they do. A theory might invoke dominant and recessive genes to explain how brown-haired parents ended up with a red-headed child, or use gravity to shed light on the parabolic trajectory of a baseball. In simplest terms, a law predicts what happens while a theory proposes why. A theory will never grow up into a law, though the development of one often triggers progress on the other. In the 17th century, Johannes Kepler theorized cosmic musical harmonies to explain the nature of planetary orbits. He developed three brilliant laws of planetary motion while he was studying decades of precise astronomical data in an effort to find support for his theory. While his three laws are still in use today, gravity replaced his theory of harmonics to explain the planets' motions. How did Kepler get part of it wrong? Well, we weren't handed a universal instruction manual. Instead, we continually propose, challenge, revise, or even replace our scientific ideas as a work in progress. Laws usually resist change since they wouldn't have been adopted if they didn't fit the data, though we occasionally revise laws in the face of new unexpected information. A theory's acceptance, however, is often gladiatorial. Multiple theories may compete to supply the best explanation of a new scientific discovery. Upon further research, scientists tend to favor the theory that can explain most of the data, though there may still be gaps in our understanding. Scientists also like when a new theory successfully predicts previously unobserved phenomena, like when Dmitri Mendeleev's theory about the periodic table predicted several undiscovered elements. The term scientific theory covers a broad swath. Some theories are new ideas with little experimental evidence that scientists eye with suspicion, or even ridicule. Other theories, like those involving the Big Bang, evolution, and climate change, have endured years of experimental confirmation before earning acceptance by the majority of the scientific community. You would need to learn more about a specific explanation before you'd know how well scientists perceive it. The word theory alone doesn't tell you. In full disclosure, the scientific community has bet on the wrong horse before: alchemy, the geocentric model, spontaneous generation, and the interstellar aether are just a few of many theories discarded in favor of better ones. But even incorrect theories have their value. Discredited alchemy was the birthplace of modern chemistry, and medicine made great strides long before we understood the roles of bacteria and viruses. That said, better theories often lead to exciting new discoveries that were unimaginable under the old way of thinking. Nor should we assume all of our current scientific theories will stand the test of time. A single unexpected result is enough to challenge the status quo. However, vulnerability to some potentially better explanation doesn't weaken a current scientific theory. Instead, it shields science from becoming unchallenged dogma. A good scientific law is a finely-tuned machine, accomplishing its task brilliantly but ignorant of why it works as well as it does. A good scientific theory is a bruised, but unbowed, fighter who risks defeat if unable to overpower or adapt to the next challenger. Though different, science needs both laws and theories to understand the whole picture. So next time someone comments that it's just a theory, challenge them to go nine rounds with the champ and see if they can do any better.

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翻译人员: Yumeng Hao 校对人员: Ying Li和朋友聊天，谈及已有的科学理论她可能会说：“算了，那只不过是一个理论啦。”但是谈论已有的科学定律时，很少有人会说：“算了， 那只不过是个定律啦。”为什么会这样？理论和定律有什么区别？哪个更好？科学定律和理论有不同的分工。科学定律可以预测在特定初始 情况下可能出现的结果它可以预测你未降生的孩子头发颜色或者特定角度扔出的棒球会跑多远相反，理论只会从最符合逻辑的角度解释为什么事情会这样？一个理论可能会引入显性和隐性基因来解释为什么棕色头发的父母 会生出红色头发的小孩或者运用重力来阐释棒球的抛物线轨迹简单来说定律预测会发生什么 而理论解释为什么尽管定律和理论互相促进一个理论永远不会演变成定律在17世纪，约翰尼斯·开普勒 将宇宙周期理论化来解释行星轨道的本质。他潜心研究几十年精确的天文数据来找出天体运行的规律，并且提出了三个才华横溢的天体运行定律虽然他的三个定律至今仍被使用，但是牛顿的万有引力定律已经取代了 他提出的周期定律来解释天体运动。开普勒怎么可能弄错了一部分呢？嗨，宇宙又没有给我们一本说明书。事实上，我们一直在不断地提出新想法，不断的质疑、修改、甚至取代 现有的科学理论。定律一般来说不会被改变，因为他们不会因为与数据不符而被遗弃，虽然我们有时会就新的不可预测的信息将其进行修改与其相反，接受一个理论常常需要一场争斗。为了最好的诠释一个新的科学发现不同理论可能会相互竞争。在进一步研究前，科学家会更倾向于选择一个可以解释 最多现有发现的理论即使还有很多问题我们并不明白科学家们还喜欢一个可以成功预测以前没有观察到现象的新理论。就像门捷列夫的元素周期表预测了很多还未被发现的元素的性质。科学理论这个概念其实覆盖面很广。一些理论只是咸有实验数据支持的新想法科学家们眼带怀疑，甚至嗤之以鼻。其他理论比如大爆炸理论，进化论和气候变化等等都是经历了多年的实验证实才被科学大众所接受。在学习一个特定理论之前，你要知道有科学家到底怎样看待它。因为理论这个词本身并不能告诉你什么。总而言之科学家们不是没有做出过错误的判断炼金术地心说无生源说还有星际以太这些只是被正确理论抛弃的 众多理论中的一小部分。但是即使错误理论也有他们的价值。靠不住的炼金术是现代化学的发源地，而在我们理解细菌和病毒的作用之前，医学也取得了长足的进步。由此说来，更好的理论往往会带来前人无法想象的令人兴奋的新发现。但是我们也不应该假定所有的科学理论都会经得起时间的考验。一个意想不到的结果就足够挑战了然而，科学理论不会因为存在潜在的更好解释而衰弱正好相反，不断创新让科学免于固步自封一个好的科学定律像一个好机器能够出色的完成任务但是我们对于它为何可以这样好的工作 知之甚少一个好的科学理论像一个伤痕累累 却依旧站立的斗士只有不能适应或者打败下一个 挑战者才会俯首认输即使定律和定律两者不同科学家仍然需要两者去掌控全局。所以下次有人说那只是一个理论的时候你可以让他们和冠军比九轮，看看他们谁能赢。

**P299 2015-11-19 How did clouds get their names - Richard Hamblyn**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=299)

The Naming of Clouds On a cold December evening in 1802, a nervous young man named Luke Howard stood before the assembled members of a London science club about to give a lecture that would change his life and go on to change humanity's understanding of the skies. Luke Howard was a pharmacist by profession, but he was a meteorologist by inclination, having been obsessed by clouds and weather since childhood. As a school boy, he spent hours staring out of the classroom window, gazing at the passing clouds. Like everyone else at the time, he had no idea how clouds formed, or how they stayed aloft. But he enjoyed observing their endless transformations. By his own admission, Luke paid little attention to his lessons, but fortunately for the future of meteorology, he managed to pick up a good knowledge of Latin. Compared to the other natural sciences, meteorology, the study of weather, was a late developer, mainly because weather is elusive. You can't snap off a piece of rainbow or a section of cloud for convenient study. You can, of course, collect rain water in calibrated containers, but all you really end up with are buckets of water. Understanding clouds required a different approach, which is where Luke Howard's idea came in. His simple insight based on years of observation was that clouds have many individual shapes but they have few basic forms. In fact, all clouds belong to one of three principle types to which Howard gave the names: cirrus, Latin for tendril or hair, cumulus, heap or pile, and stratus, layer or sheet. But that wasn't the clever part. Clouds are constantly changing, merging, rising, falling, and spreading throughout the atmosphere, rarely maintaining the same shapes for more than a few minutes. Any successful naming system had to accommodate this essential instability, as Howard realized. So, in addition to the three main cloud types, he introduced a series of intermediate and compound types as a way of including the regular transitions that occur among clouds. A high, whispy cirrus cloud that descended and spread into a sheet was named cirrostratus, while groups of fluffy cumulus clouds that joined up and spread were named stratocumulus. Howard identified seven cloud types, but these have since been expanded to ten, cloud nine being the towering cumulonimbus thunder cloud, which is probably why being on cloud nine means to be on top of the world. Howard's classification had an immediate international impact. The German poet and scientist J.W. von Goethe wrote a series of poems in praise of Howard's clouds, which ended with the memorable lines, "As clouds ascend, are folded, scatter, fall, Let the world think of thee who taught it all," while Percy Shelley also wrote a poem "The Cloud," in which each of Howard's seven cloud types was characterized in turn. But perhaps the most impressive response to the naming of clouds was by the painter John Constable, who spent two summers on Hampstead Heath painting clouds in the open air. Once they had been named and classified, clouds became easier to understand as the visible signs of otherwise invisible atmospheric processes. Clouds write a kind of journal on the sky that allows us to understand the circulating patterns of weather and climate. Perhaps the most important breakthrough in understanding clouds was realizing that they are subject to the same physical laws as everything else on Earth. Clouds, for example, do not float, but fall slowly under the influence of gravity. Some of them stay aloft due to upward convection from the sun-heated ground, but most are in a state of slow, balletic descent. "Clouds are the patron goddesses of idle fellows," as the Greek dramatist Aristophanes wrote in 420 B.C. and nephology, the study of clouds, remains a daydreamer's science, aptly founded by a thoughtful young man whose favorite activity was staring out of the window at the sky.

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翻译人员: Zihan Zhao-Holland 校对人员: Jiawei Ni云的命名在1802年12月的一个寒冷的晚上，一个紧张的，名为卢克.霍华德的年轻人，站在伦敦科学学会的成员面前，将要发表一个会改变他人生的演讲，继而改变人类对天空的认识。职业上，卢克霍华德是一名药剂师，志趣上，他是一名气象学者，他从童年就对云和天气十分着迷。在学校时，他常常长时间地凝视窗外，盯着飘过的云。和那时所有人一样，他不知道云是怎样形成的，也不知道云怎么能漂浮在空中。但他乐此不疲地观察云朵无穷无尽的变化，据他自己承认，他几乎没花什么心思在课堂上，但幸运的是，从气象学未来的角度考虑，他掌握了足够的拉丁语知识。与其他自然学科相比，气象学，研究天气科学，发展得较晚。这主要是因为天气变幻莫测。你无法摘下一小段彩虹，或一小块云朵来进行研究。你当然可以用精准的容器来收集雨水，但你最终得到的，不过是一桶水。了解云朵，需要另一种途径，卢克.霍华德想出来一个主意。根据他对云朵多年的观察，他发现，虽然云有很多各不相同的形状,但基本的形式只有几种。实际上，所有的云属于三种基本形式之一，霍德华给它们命名为：卷云，来自于拉丁语中的卷须或头发，积云，堆积或积累，层云，层叠或片。但这还不是他的高明之处。云是在不断变化的，合并，上升，下降，扩散，在整个大气中，相同的形状很少能维持几分钟，一套有效的命名系统，必须迎合云的不确定性，这是霍华德意识到的。所以，除了三种主要的形状的命名，他还给一系列由三种形状衍生或合成的云命名，这样便能概括常见的云的变形。原本在高空中的纤薄的层云下降并且扩散成薄片状，被命名为卷层云。由大量蓬松的积云聚集并扩散而成的，则命名为层积云。霍华德一共命名了七种云，现在人们已将其扩展为十种。第九种云是高耸的积雨云，这或许是为什么“在第九种云上”有登上世界之巅的意思。霍华德对云的分类当即在国际上产生了重大影响。德国诗人和科学家约翰·沃尔夫冈·冯·歌德写了一系列的诗来赞美霍华德的云，结尾，有难以忘怀的诗句：“当云上升、层叠、扩散、下落，让世界想起你，这教导一切的人，“珀西·比希·雪莱也写过一首名为“云”是诗，在诗中，霍华德七种云中的每一种，都被逐一描述。但或许，在云被命名之后最令人难忘的举动，是画家约翰.康斯塔伯，他花了两个夏天在汉普西斯，在户外描画云朵。自从云朵被命名和分类后，理解它们就变得容易了。通过可看见的云，我们能知道其他看不见的大气变化。云就像是天空的日记通过云，我们可以了解天气和气候的循环模式。人类在对云的认识上所取得的最大突破，应该是意识到云也遵循同一套物理定律，与其他在地球上的一切事物一样。比如说，云，并不会飘浮，而是在重力的影响下慢慢下降，有一些云飘浮在空中，是因为受到了太阳照射地面热气流上升的影响，但大部分云还是在优雅而缓慢地下降。“云朵是懒汉的守护女神”，古希腊戏剧家阿里士多芬尼斯在公元前420年写下这句话。而云学，仍然是一个爱做白日梦的人的科学，恰巧由一个好思考的年轻人创立，他最爱做的事，便是出神地望着窗外的云朵。

**P300 2015-11-19 Let's make history…by recording it - StoryCorps & TED Prize**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=300)

StoryCorps Founder & TED Prize winner Davey Isay has created an app that aims to bring people together in a project of listening, connection, and generosity. Here's why... This is the library of lost stories. It's where you'll find the true origins of the Sphinx and Stonehenge, the text lost in the fire of Alexandria, all of the great ideas that Einstein never thought to write down, the dream you can't quite remember from last night, your ancestor's first words, her last words. And it's the fastest growing library in the world. In the next year, 25 languages will be added to the collection, never to be heard aloud again, 50 million points of view never related, the last eyewitness account of an incredible act of athleticism, disobedience, courage, unread, unheard, unwatched. But this is the StoryCorps archive at the Library of Congress where everything recorded by StoryCorps is preserved for posterity. This is where, if you record your parents, your grandparents, your neighbors, your children, their stories will live on. What if Anne Frank hadn't kept her diary? What if no one could listen to Martin Luther King's Mountaintop speech? What if the camera hadn't been rolling during the first moon landing? But what if, this Thanksgiving, the youngest member of every family interviewed the oldest? "It's like the only thing on his mind was to tell the kids that he loved them." Or if on February 14th, you asked a person you love some questions you've never thought to ask. "Being married is like having a color television set, you never want to go back to black and white." History is all of these things, the testament to tragedy, the progress of civilization, the heroic triumphs, and the moments and stories that are our lives. It's also the act of actively listening to the voices of the past and the people who matter to us. "Grand Central Station, now, we know there's an architect, but who hung the iron? Who were the brick masons? Who swept the floor? Who kept the trains going? We shall begin celebrating the lives of the uncelebrated." So you can make history by recording it.

**P300 2015-11-19 Let's make history…by recording it - StoryCorps & TED Prize**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=300)

翻译人员: Cissy Yun 校对人员: Mingyu CuiStoryCorps创始人兼TED大奖获奖者Dave Isay创建了一款手机应用程序。 这个程序致力于把人们聚集在一个关于倾听，联系与慷慨的一个项目中。原因如下：这是一个储存着被遗忘的故事的图书馆。这里你能找到狮身人面像和巨石阵的真正起源，在亚历山大图书馆的那次火灾中所遗失的书籍，爱因斯坦从未写出的那些伟大的想法，你无法想起来的昨晚的梦，你的祖先的第一句话、她的最后一句话。这还是世界上发展最快的图书馆，明年，将有再也不会被听到的25种语言，被录入并收藏。五千万种从未交集过的想法，最后一个对一场精彩的运动比赛的见证，反抗，勇气；未曾被读到的，未曾被听到的，未曾被看到的。但是这些都存于国会图书馆中StoryCorps的档案。这些是 StoryCorps为人类后代保存下来的东西。如果你在这里记录下你的父母、你的祖父母、你的邻居、你的小孩的故事，它们将在这里长存。如果安妮·弗兰克没有写日记呢？如果没有人听到了马丁·路德·金的《我已达至峰顶》呢？如果在第一次登月时相机并未开启呢？但是，如果这个感恩节，每个家中年纪最小的成员采访了最年长的长辈呢？“他脑中想的唯一的事的就是告诉孩子们，他爱他们。又或者，在情人节那天，你问你爱的人一些你从未想过要问的问题。“结婚了就像是拥有了一台彩色电视机——你绝对不会想回到只能看黑白屏的时候。"这些就是历史。悲剧的证明、文明的进步、英雄的凯旋、还有由点滴和故事组成的我们的生活。当然还有聆听来自岁月的声音，聆听那些对我们来说重要的人。“中央火车站！”“我们现在知道这是一个伟大的建筑 但是是谁支起了铁架？”“谁垒砌了砖瓦？”“谁清扫了地板？”“谁开着火车？”“我们应该开始铭记那些未被重视的生命。”从记录开始，你也可以创造历史。

**P301 2015-11-23 Can you solve 'Einstein’s Riddle' - Dan Van der Vieren**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=301)

Before he turned physics upside down, a young Albert Einstein supposedly showed off his genius by devising a complex riddle involving this list of clues. Can you resist tackling a brain teaser written by one of the smartest people in history? Let's give it a shot. The world's rarest fish has been stolen from the city aquarium. The police have followed the scent to a street with five identical looking houses. But they can't search all the houses at once, and if they pick the wrong one, the thief will know they're on his trail. It's up to you, the city's best detective, to solve the case. When you arrive on the scene, the police tell you what they know. One: each house's owner is of a different nationality, drinks a different beverage, and smokes a different type of cigar. Two: each house's interior walls are painted a different color. Three: each house contains a different animal, one of which is the fish. After a few hours of expert sleuthing, you gather some clues. It may look like a lot of information, but there's a clear logical path to the solution. Solving the puzzle will be a lot like Sudoku, so you may find it helpful to organize your information in a grid, like this. Pause the video on the following screen to examine your clues and solve the riddle. Answer in: 3 2 1 To start, you fill in the information from clues eight and nine. Immediately, you also realize that since the Norwegian is at the end of the street, there's only one house next to him, which must be the one with the blue walls in clue fourteen. Clue five says the green-walled house's owner drinks coffee. It can't be the center house since you already know its owner drinks milk, but it also can't be the second house, which you know has blue walls. And since clue four says the green-walled house must be directly to the left of the white-walled one, it can't be the first or fifth house either. The only place left for the green-walled house with the coffee drinker is the fourth spot, meaning the white-walled house is the fifth. Clue one gives you a nationality and a color. Since the only column missing both these values is the center one, this must be the Brit's red-walled home. Now that the only unassigned wall color is yellow, this must be applied to the first house, where clue seven says the Dunhill smoker lives. And clue eleven tells you that the owner of the horse is next door, which can only be the second house. The next step is to figure out what the Norwegian in the first house drinks. It can't be tea, clue three tells you that's the Dane. As per clue twelve, it can't be root beer since that person smokes Bluemaster, and since you already assigned milk and coffee, it must be water. From clue fifteen, you know that the Norwegian's neighbor, who can only be in the second house, smokes Blends. Now that the only spot in the grid without a cigar and a drink is in the fifth column, that must be the home of the person in clue twelve. And since this leaves only the second house without a drink, the tea-drinking Dane must live there. The fourth house is now the only one missing a nationality and a cigar brand, so the Prince-smoking German from clue thirteen must live there. Through elimination, you can conclude that the Brit smokes Pall Mall and the Swede lives in the fifth house, while clue six and clue two tell you that these two have a bird and a dog, respectively. Clue ten tells you that the cat owner lives next to the Blend-smoking Dane, putting him in the first house. Now with only one spot left on the grid, you know that the German in the green-walled house must be the culprit. You and the police burst into the house, catching the thief fish-handed. While that explanation was straightforward, solving puzzles like this often involves false starts and dead ends. Part of the trick is to use the process of elimination and lots of trial and error to hone in on the right pieces, and the more logic puzzles you solve, the better your intuition will be for when and where there's enough information to make your deductions. And did young Einstein really write this puzzle? Probably not. There's no evidence he did, and some of the brands mentioned are too recent. But the logic here is not so different from what you'd use to solve equations with multiple variables, even those describing the nature of the universe.

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翻译人员: Gabriella Hu 校对人员: Tianchang Luo在他颠覆物理学之前，一个年轻的阿尔伯特·爱因斯坦设计了一个带一系列线索的复杂的谜题来展示他的天份你能抗拒去解一个历史上最聪明的人之一写的谜团吗？让我们试一试世界上最罕见的鱼从城市水族馆被盗了警察追踪线索，查到有五座一模一样的房子的街上但是他们不能同时搜查所有的房子，他们一旦选错房子，便会打草惊蛇就看你，城市里最棒的侦查员来破案当你来到现场时，警察告诉你他们了解的情况第一：每栋房子的主人都来自不同国籍，喝不同的饮料，抽不同的雪茄第二：每栋房子的室内墙都刷有不同颜色的涂料第三：每栋房子里都有不同的动物， 其中有一栋就是被偷的鱼经过几个小时的仔细侦查， 你搜集到了一些线索看似有很多信息，但是有一条清晰合理的破案途径解开谜团就像做数独一样所以，把线索做成一张表格会有助于破案请在下面一张画面暂停视频， 阅读线索，解开谜团答案揭晓：321先开始，首先从第八和第九条线索开始你立即就能发现挪威人住在马路的第一栋房子里，在他旁边的只有一栋房子，通过第十四条线索推断， 第二栋肯定有蓝色墙第五条线索说绿墙房子的主人喝咖啡这不可能是中间的那栋房子， 因为你已经知道他喝牛奶，但是也不可能是第二栋房子， 因为你已经知道是蓝色的墙而且第四条线索说：绿墙房子在白墙房子的左边，所以不可能是第一栋或第五栋房子，那绿墙房子里喝咖啡的主人 唯一可能在的地方就是第四栋房子了，也就意味着第五栋房子是白墙第一条线索给了国籍和墙的颜色只有一栏既没有已知颜色也没有国籍，那这个肯定是英国人的红墙房子了现在只有一个颜色还没有看到：黄色，那就肯定是第一栋房子了线索七说抽登喜路雪茄的人就住在这里第十一条线索告诉你养马的人就住在隔壁，那就只有可能是第二栋房子了接下来一步就是找到 第一栋房子里的挪威人喝什么不可能是茶，因为线索三说丹麦人喝茶根据线索十二 也不可能是树根啤酒 因为那个人抽Bluemaster而且你已经分配好牛奶和咖啡了，那就肯定是水根据线索十五，你知道挪威人的邻居，只有可能是第二栋房子，抽Blends雪茄现在只剩下一栋房子的主人 还不知道喝什么饮料，抽什么雪茄，也就是第五栋房子，这就肯定是线索十二里的人的家了只有第二栋房子的主人 还不知道喝什么饮料，喝茶的丹麦人肯定住在这儿第四栋房子是唯一一栋 不知道国籍和雪茄牌子的房子了所以，根据线索十三， 抽Pinrce雪茄的德国人肯定住在这里通过排除法，你可以总结 英国人抽Pall Mall并且瑞典人住在第五栋房子里，线索二和六告诉你这两个人分别养鸟和狗，线索十告诉你养猫的人 是抽Blend的丹麦人的邻居也就是第一栋房子里现在表格里只有一个空白位置，你就能知道绿墙房子里的德国人是罪魁祸首你和警察冲进屋内，抓住盗鱼的小偷虽然这个解释简单明了，解开这样的谜题通常会 开头不妙或者碰上死路常用的技巧就是排除法和多次尝试去找到正确的方向，解开的谜题越多，你的直觉就会更加敏锐，你就知道如何使用已知信息推断年轻的爱因斯坦真的自己写下这个谜题吗？应该不是没有证据指明是他写的，而且有些雪茄牌子是近代的但是这里使用的逻辑性和你解多元方程时的 逻辑没有什么不同，甚至和描述宇宙中的 自然现象是一样的

**P302 2015-12-02 How does anesthesia work - Steven Zheng**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=302)

If you've had surgery, you might remember starting to count backwards from ten, nine, eight, and then waking up with the surgery already over before you even got to five. And it might seem like you were asleep, but you weren't. You were under anesthesia, which is much more complicated. You were unconscious, but you also couldn't move, form memories, or, hopefully, feel pain. Without being able to block all those processes at once, many surgeries would be way too traumatic to perform. Ancient medical texts from Egypt, Asia and the Middle East all describe early anesthetics containing things like opium poppy, mandrake fruit, and alcohol. Today, anesthesiologists often combine regional, inhalational and intravenous agents to get the right balance for a surgery. Regional anesthesia blocks pain signals from a specific part of the body from getting to the brain. Pain and other messages travel through the nervous system as electrical impulses. Regional anesthetics work by setting up an electrical barricade. They bind to the proteins in neurons' cell membranes that let charged particles in and out, and lock out positively charged particles. One compound that does this is cocaine, whose painkilling effects were discovered by accident when an ophthalmology intern got some on his tongue. It's still occasionally used as an anesthetic, but many of the more common regional anesthetics have a similar chemical structure and work the same way. But for major surgeries where you need to be unconscious, you'll want something that acts on the entire nervous system, including the brain. That's what inhalational anesthetics do. In Western medicine, diethyl ether was the first common one. It was best known as a recreational drug until doctors started to realize that people sometimes didn't notice injuries they received under the influence. In the 1840s, they started sedating patients with ether during dental extractions and surgeries. Nitrous oxide became popular in the decades that followed and is still used today. although ether derivatives, like sevoflurane, are more common. Inhalational anesthesia is usually supplemented with intravenous anesthesia, which was developed in the 1870s. Common intravenous agents include sedatives, like propofol, which induce unconsciousness, and opioids, like fentanyl, which reduce pain. These general anesthetics also seem to work by affecting electrical signals in the nervous system. Normally, the brain's electrical signals are a chaotic chorus as different parts of the brain communicate with each other. That connectivity keeps you awake and aware. But as someone becomes anesthetized, those signals become calmer and more organized, suggesting that different parts of the brain aren't talking to each other anymore. There's a lot we still don't know about exactly how this happens. Several common anesthetics bind to the GABA-A receptor in the brain's neurons. They hold the gateway open, letting negatively charged particles flow into the cell. Negative charge builds up and acts like a log jam, keeping the neuron from transmitting electrical signals. The nervous system has lots of these gated channels, controlling pathways for movement, memory, and consciousness. Most anesthetics probably act on more than one, and they don't act on just the nervous system. Many anesthetics also affect the heart, lungs, and other vital organs. Just like early anesthetics, which included familiar poisons like hemlock and aconite, modern drugs can have serious side effects. So an anesthesiologist has to mix just the right balance of drugs to create all the features of anesthesia, while carefully monitoring the patient's vital signs, and adjusting the drug mixture as needed. Anesthesia is complicated, but figuring out how to use it allowed for the development of new and better surgical techniques. Surgeons could learn how to routinely and safely perform C-sections, reopen blocked arteries, replace damaged livers and kidneys, and many other life-saving operations. And each year, new anesthesia techniques are developed that will ensure more and more patients survive the trauma of surgery.

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翻译人员: Claire Zhang 校对人员: Chen Zou如果你做过手术，你也许会记得 开始从10倒数98在你还没数到5的时候 你就苏醒过来，发现手术已完成了。也许看起来像是你睡着了， 可事实并非如此。你被麻醉了这更为复杂。你不仅陷入了昏迷状态，而且你也动不了，不能形成记忆，当然，你也感觉不到疼痛。如果不能在同一时间 阻止上述的发生，许多手术会十分痛苦 而难以进行下去。来自埃及，亚洲和中东的 古代医学书籍，都有描述早期的麻醉药，包括罂粟曼德拉草果以及酒精。如今，麻醉师通常会结合局部麻醉，吸入麻醉 和静脉注射麻醉的方法，在手术中获得合适的平衡点。局部麻醉可以阻止 从身体某一部位发出的疼痛信号传输到脑部。疼痛感与其它感觉在神经系统中 就好像电脉冲一样传输。局部性麻醉剂可以 设立一个电子路障。它们结合到神经元 细胞膜的蛋白质上，这些蛋白质让里子进出，并保持正电荷的粒子不能进入细胞。可卡因是这种类型的化合物的一个例子，当一位眼科实习生不小心把它弄到舌头上，它的止痛效果被偶然发现。它仍然偶尔被用作麻醉剂但许多更常见的局部麻醉剂具有类似的化学结构和工作方式。但对于大部分需要昏迷的手术你要的是可以针对 整个神经系统的药物，包括大脑。这就是吸入麻醉药的用处。西药里，乙醚是最先常见的一种，它以前是以娱乐性药物而闻名直到医生开始认识到 人们有时没注意到他们在乙醚的影响下受的伤。在19世纪40年代 他们开始将乙醚麻醉用在拔牙和手术中。几十年后， 一氧化二氮开始变得普遍，一直沿用到今天。虽然醚衍生物， 像七氟醚，更常见吸入式麻醉剂通常在 静脉麻醉的补充下运作，它源于19世纪70年代。常见的静脉注射剂包括镇静剂， 比如异丙酚镇静剂可以导致昏迷状态，以及阿片类药物 可以减轻疼痛的芬太尼。这些普遍麻醉药似乎也能影响神经系统的电信号工作。通常情况下， 大脑的电信号是一个混乱的大合唱因为大脑的不同部位会互相通信，那种连接使你保持清醒。但当一个人被麻醉这些信号变得平静， 更有条理，这表明大脑的某些部分不能互相交谈了。关于麻醉， 仍有有很多我们不清楚的地方。几种常见的麻醉药 绑定到大脑的神经元GABA-A受体，它们开着大门，让着带负电荷的粒子进入细胞负电荷积聚和作用就像一个塞子不让神经元传输电信号。神经系统有很多门控通道它们控制运动通道、记忆，以及意识。大多数麻醉剂可能作用于不止一个，而且不只作用于神经系统。许多麻醉药也影响心脏肺以及其它重要器官。就像早期的麻醉剂其中包括熟悉的毒药一样 铁杉和附子，现代药可能有严重的副作用。因此，一个麻醉师必须搭配好药物 之间的平衡，才能发挥出麻醉的所有功能，同时密切监测患者的生命体征并根据需要调整药物。麻醉是复杂的但弄清楚如何使用它允许了新和更好的 外科技术的发展。外科医生可以学习如何 系统化地和安全地进行剖腹产，打开阻塞的动脉，替换受损的肝脏和肾脏，以及许多其它可以拯救生命的手术。而且每年，新的麻醉技术在被开发这将确保越来越多的患者 经受得住痛苦的手术过程。

**P303 2015-12-02 Why the octopus brain is so extraordinary - Cláudio L. Guerra**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=303)

What could octopuses possibly have in common with us? After all, they don't have lungs, spines, or even a plural noun we can all agree on. But what they do have is the ability to solve puzzles, learn through observation, and even use tools, just like some other animals we know. And what makes octopus intelligence so amazing is that it comes from a biological structure completely different from ours. The 200 or so species of octopuses are mollusks belonging to the order cephalopoda, Greek for head-feet. Those heads contain impressively large brains, with a brain to body ratio similar to that of other intelligent animals, and a complex nervous system with about as many neurons as that of a dog. But instead of being centralized in the brain, these 500 million neurons are spread out in a network of interconnected ganglia organized into three basic structures. The central brain only contains about 10% of the neurons, while the two huge optic lobes contain about 30%. The other 60% are in the tentacles, which for humans would be like our arms having minds of their own. This is where things get even more interesting. Vertebrates like us have a rigid skeleton to support our bodies, with joints that allow us to move. But not all types of movement are allowed. You can't bend your knee backwards, or bend your forearm in the middle, for example. Cephalopods, on the other hand, have no bones at all, allowing them to bend their limbs at any point and in any direction. So shaping their tentacles into any one of the virtually limitless number of possible arrangements is unlike anything we are used to. Consider a simple task, like grabbing and eating an apple. The human brain contains a neurological map of our body. When you see the apple, your brain's motor center activates the appropriate muscles, allowing you to reach out with your arm, grab it with your hand, bend your elbow joint, and bring it to your mouth. For an octopus, the process is quite different. Rather than a body map, the cephalopod brain has a behavior library. So when an octopus sees food, its brain doesn't activate a specific body part, but rather a behavioral response to grab. As the signal travels through the network, the arm neurons pick up the message and jump into action to command the movement. As soon as the arm touches the food, a muscle activation wave travels all the way through the arm to its base, while the arm sends back another wave from the base to the tip. The signals meet halfway between the food and the base of the arm, letting it know to bend at that spot. What all this means is that each of an octopus's eight arms can essentially think for itself. This gives it amazing flexibility and creativity when facing a new situation or problem, whether its opening a bottle to reach food, escaping through a maze, moving around in a new environment, changing the texture and the color of its skin to blend into the scenery, or even mimicking other creatures to scare away enemies. Cephalopods may have evolved complex brains long before our vertebrate relatives. And octopus intelligence isn't just useful for octopuses. Their radically different nervous system and autonomously thinking appendages have inspired new research in developing flexible robots made of soft materials. And studying how intelligence can arise along such a divergent evolutionary path can help us understand more about intelligence and consciousness in general. Who knows what other forms of intelligent life are possible, or how they process the world around them.

**P303 2015-12-02 Why the octopus brain is so extraordinary - Cláudio L. Guerra**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=303)

翻译人员: Xiaoyu Ye 校对人员: Cissy Yun章鱼和我们可能有什么共同点？毕竟它们没有肺和脊椎， 甚至没有公认的名字但它们有解决问题的能力通过观察来学习的能力甚至使用工具的能力就像我们知道的一些其它动物而章鱼的智力十分令人惊奇，因为它的生物结构与我们的完全不同约200多种章鱼头足纲（cephalopoda）软体动物这个词是头足的希腊语这些头装着大得令人惊奇的大脑大脑和身体比例和其它智慧动物类似还有复杂的神经系统，神经元和狗的一样多但不同于中心化的大脑这5亿神经元分散在互联的神经节网络中并组织成三种基本结构中央大脑只包含约10%的神经元而两个巨大的视神经叶包含约30%另外60%在触手中，相当于人类有了能思维的手臂这一点十分有趣像我们一样的脊椎动物有坚硬的骨骼支撑身体而关节让我们能移动但不是所有类型的移动都可以比如说，你不能把膝盖向后弯或在前臂的中间弯折头足动物与之相反，完全没有骨头使他们能在任何一点向任意方向弯曲肢体将触角自由弯折在几乎无穷种可能的弯折方式中形成任何一种这不像我们习惯的任何事情想象一个简单的任务， 比如抓起一个苹果吃掉人的大脑包含我们身体的神经逻辑地图当你看见苹果大脑的运动部分激活合适的肌肉使你伸出手臂用手抓住它弯曲手肘把它送到你嘴中对章鱼来说，过程却完全不同与身体地图不同头足类的大脑有一个行为知识库当章鱼看见食物其大脑并不激活特定身体部位而是产生一种行为反映：抓取这个信号在神经网络里传递触手神经元收到信息转化为运动命令当触手一碰到食物，一个肌肉激活的信号从触手传递到基质同时触手向触角也发送另一个信号信号在食物到基质的途中相遇让神经元知道在这一点弯曲这意味着，章鱼八只触角的每一只基本上都能自己思考这赋予了章鱼与众不同的灵活性和创造性当面临新问题时无论打开瓶子来获得食物从一个迷宫中逃出移动到新的环境改变皮肤质感和颜色来融入环境甚至模仿其它生物来吓退敌人头足纲动物也许已经发展出复杂的大脑远远早于我们脊椎动物亲戚章鱼的智力不仅仅对章鱼有用它们完全不同的神经系统和自主思考的副肢启发了新的研究来开发由软材料制造的柔性机器人此外，研究智力在趋异的进化路程中如何产生能帮助我们更好地整体理解智力和意识谁知道其它形式的智慧生命可不可能呢？谁又知道它们如何操作身边的世界呢？

**P304 2015-12-04 The ethical dilemma of self-driving cars - Patrick Lin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=304)

This is a thought experiment. Let's say at some point in the not so distant future, you're barreling down the highway in your self-driving car, and you find yourself boxed in on all sides by other cars. Suddenly, a large, heavy object falls off the truck in front of you. Your car can't stop in time to avoid the collision, so it needs to make a decision: go straight and hit the object, swerve left into an SUV, or swerve right into a motorcycle. Should it prioritize your safety by hitting the motorcycle, minimize danger to others by not swerving, even if it means hitting the large object and sacrificing your life, or take the middle ground by hitting the SUV, which has a high passenger safety rating? So what should the self-driving car do? If we were driving that boxed in car in manual mode, whichever way we'd react would be understood as just that, a reaction, not a deliberate decision. It would be an instinctual panicked move with no forethought or malice. But if a programmer were to instruct the car to make the same move, given conditions it may sense in the future, well, that looks more like premeditated homicide. Now, to be fair, self-driving cars are are predicted to dramatically reduce traffic accidents and fatalities by removing human error from the driving equation. Plus, there may be all sorts of other benefits: eased road congestion, decreased harmful emissions, and minimized unproductive and stressful driving time. But accidents can and will still happen, and when they do, their outcomes may be determined months or years in advance by programmers or policy makers. And they'll have some difficult decisions to make. It's tempting to offer up general decision-making principles, like minimize harm, but even that quickly leads to morally murky decisions. For example, let's say we have the same initial set up, but now there's a motorcyclist wearing a helmet to your left and another one without a helmet to your right. Which one should your robot car crash into? If you say the biker with the helmet because she's more likely to survive, then aren't you penalizing the responsible motorist? If, instead, you save the biker without the helmet because he's acting irresponsibly, then you've gone way beyond the initial design principle about minimizing harm, and the robot car is now meting out street justice. The ethical considerations get more complicated here. In both of our scenarios, the underlying design is functioning as a targeting algorithm of sorts. In other words, it's systematically favoring or discriminating against a certain type of object to crash into. And the owners of the target vehicles will suffer the negative consequences of this algorithm through no fault of their own. Our new technologies are opening up many other novel ethical dilemmas. For instance, if you had to choose between a car that would always save as many lives as possible in an accident, or one that would save you at any cost, which would you buy? What happens if the cars start analyzing and factoring in the passengers of the cars and the particulars of their lives? Could it be the case that a random decision is still better than a predetermined one designed to minimize harm? And who should be making all of these decisions anyhow? Programmers? Companies? Governments? Reality may not play out exactly like our thought experiments, but that's not the point. They're designed to isolate and stress test our intuitions on ethics, just like science experiments do for the physical world. Spotting these moral hairpin turns now will help us maneuver the unfamiliar road of technology ethics, and allow us to cruise confidently and conscientiously into our brave new future.

**P304 2015-12-04 The ethical dilemma of self-driving cars - Patrick Lin**

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翻译人员: Peipei Xiang 校对人员: Luyao Zou这是一个思想实验。假定在不久的将来，你坐在你的无人驾驶汽车里面 在高速公路上飞驰，这时候你发现你周围全是车。突然，一个巨大且沉重的物体 从你前面的卡车上掉下来，你的车来不及刹车来避免碰撞，因此它必须做一个决定：继续往前然后撞在这个物体上，迅速往左撞向一辆 SUV，或迅速往右撞向一辆摩托车。你的车应该以你的安全为重从而撞向摩托车吗？还是为了最大程度地降低危险，不迅速转弯——虽然这意味着它要撞上那个巨大的物体 并可能牺牲掉你的性命？亦或是应该选择中间道路，撞向 SUV ——因为 SUV 的安全性能较高？无人驾驶汽车应该怎么做呢？这种情况下，如果我们掌握着方向盘，不管我们怎么做，都会被理解为瞬间的反应，而不是经过深思熟虑的决定。我们是在惊恐之下做出本能反应， 并未深谋远虑或怀揣恶意。但是如果一个程序员要指令这个车在未来的特定情况下做出某一决定，这听上去有点像蓄意谋杀啊。不过话说回来，无人驾驶汽车预计可以大大减少交通事故和死亡率，因为这中间避免了人类会犯的错误。而且，还有很多其他的潜在好处：不再拥堵的路面，汽车尾气排放的减少，以及没有了开车的浪费时间和压力。但是交通意外肯定还是会发生，当它们发生时，意外的后果可能在很久以前就已经被程序员或政策制定者设定好了，这些决定可不好做。我们倾向于提供笼统的指导决定的原则，比如最小化伤害，但是这很快也会导致道德上模棱两可的决定。举个例子，假定前面的情况一致，但是这时候你的左边是一个 戴着头盔骑摩托车的人，而你的右边是一个没戴头盔骑摩托车的人，你的无人驾驶汽车应该撞哪个？如果说撞那个戴着头盔的人因为她的存活率更高，你难道不是在惩罚那个更负责任的骑摩托车者吗？反之，如果说撞那个没戴头盔的人因为不戴头盔是不负责任的行为，但是这样你就彻底违反了原先的“最小化伤害”的原则，无人驾驶汽车现在在主持公路正义了。道德的问题还要复杂得多。两种情况下，其背后的设计都是基于某种目标算法。换句话说，它系统地倾向，或者说歧视 某一类特定目标。而目标车辆的车主就得承担这一算法的消极后果，虽然他们自己并没有犯任何错。这些最新的科技还引起了其他的道德困境。比如，如果你从以下两辆车中选择——一辆在事故发生时总是试图拯救尽可能多的生命的车，和一辆不顾一切拯救你的车，你会买哪一辆？如果汽车开始分析并考虑车里的乘客以及他们的生存概率， 情况又会怎样？一个随机的决定会不会还是比一个以“最小化伤害”为原则事先设计的决定更好？谁又应该做这些决定呢？程序员？公司？政府？现实可能跟我们的思想实验有所出入，但是这不重要，思想实验的目的是对我们的道德本能 进行分离和压力测试，就像物理世界的科学实验一样。现在识别这些道德的急转弯能帮助我们更好地掌控 科技及其道德问题的未知之路，并让我们充满信心和正义地 驶向我们的勇敢、崭新的未来。

**P305 2015-12-10 History through the eyes of the potato - Leo Bear-McGuinness**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=305)

Baked or fried, boiled or roasted, as chips or fries. At some point in your life, you've probably eaten a potato. Delicious, for sure, but the fact is potatoes have played a much more significant role in our history than just that of the dietary staple we have come to know and love today. Without the potato, our modern civilization might not exist at all. 8,000 years ago in South America, high atop the Andes, ancient Peruvians were the first to cultivate the potato. Containing high levels of proteins and carbohydrates, as well as essential fats, vitamins and minerals, potatoes were the perfect food source to fuel a large Incan working class as they built and farmed their terraced fields, mined the Rocky Mountains, and created the sophisticated civilization of the great Incan Empire. But considering how vital they were to the Incan people, when Spanish sailors returning from the Andes first brought potatoes to Europe, the spuds were duds. Europeans simply didn't want to eat what they considered dull and tasteless oddities from a strange new land, too closely related to the deadly nightshade plant belladonna for comfort. So instead of consuming them, they used potatoes as decorative garden plants. More than 200 years would pass before the potato caught on as a major food source throughout Europe, though even then, it was predominantly eaten by the lower classes. However, beginning around 1750, and thanks at least in part to the wide availability of inexpensive and nutritious potatoes, European peasants with greater food security no longer found themselves at the mercy of the regularly occurring grain famines of the time, and so their populations steadily grew. As a result, the British, Dutch and German Empires rose on the backs of the growing groups of farmers, laborers, and soldiers, thus lifting the West to its place of world dominion. However, not all European countries sprouted empires. After the Irish adopted the potato, their population dramatically increased, as did their dependence on the tuber as a major food staple. But then disaster struck. From 1845 to 1852, potato blight disease ravaged the majority of Ireland's potato crop, leading to the Irish Potato Famine, one of the deadliest famines in world history. Over a million Irish citizens starved to death, and 2 million more left their homes behind. But of course, this wasn't the end for the potato. The crop eventually recovered, and Europe's population, especially the working classes, continued to increase. Aided by the influx of Irish migrants, Europe now had a large, sustainable, and well-fed population who were capable of manning the emerging factories that would bring about our modern world via the Industrial Revolution. So it's almost impossible to imagine a world without the potato. Would the Industrial Revolution ever have happened? Would World War II have been lost by the Allies without this easy-to-grow crop that fed the Allied troops? Would it even have started? When you think about it like this, many major milestones in world history can all be at least partially attributed to the simple spud from the Peruvian hilltops.

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翻译人员: Khoo Ziting 校对人员: Claire Zhang烘培或油炸，水煮或烘烤，薯片或薯条，在你的生命里， 你应该吃过土豆。土豆的美味那就不用说了但其实它在我们的历史里 扮演了更重要的角色，不只是如今我们所知与喜爱的主食而已。没有土豆的话，现代文明可能不会存在。八千年前， 在南美安第斯山的顶端古秘鲁人成为了最早种植土豆的人。它含有高蛋白质和碳水化合物，以及必需脂肪酸、维生素和矿物质，土豆是完美的食源， 为印加劳工提供了大量能量来建立与种植梯田，挖掘落基山脉矿产，以及建立起伟大的印加帝国文明。虽然土豆对印加人民非常重要，但当西班牙水手从安第斯山返国，首次将土豆引进欧洲时，它们却变得毫无价值。欧洲人根本不想食用它，他们把它当成来自陌生异地、 食之无味的怪产物跟致命的茄属植物 ——颠茄太像了。与其吃掉它们，欧洲人将土豆作为观赏植物。两百年后，土豆才成为欧洲的主食，即使在那个时候，土豆充其量只是下层阶级的食物。但大约从1750年起，在一定的程度上因为廉价而又有营养的土豆开始普及，欧洲农民有了食物保障发觉到他们不必再受制于 经常发生的谷物饥荒了，他们的人口开始稳定上升。这样一来，英国、荷兰与德意志帝国在农民、劳工和军人的成长下崛起，提升了西方在世界上的统治者地位。然而，并非所有欧洲国家 都发展成为帝国。爱尔兰在培育了土豆之后，人口急剧上升，他们过于依赖这个主食。然而，灾难爆发了。从1845至1852年，土豆枯萎病肆虐了大部分 爱尔兰的土豆作物，导致了爱尔兰土豆饥荒，这是世界历史上致命的饥荒之一。超过一百万爱尔兰人民饥饿致死，两百多万人逃离家园。当然，土豆并不因此消声灭迹作物最后恢复正常。而欧洲人口，尤其是劳工阶级持续增加。得力于爱尔兰移民的涌入欧洲如今已拥有庞大的、 持续增长且丰衣足食的人口，足够应付新兴工业所需的劳动力，从而，工业革命也引领人们 进入现代化世界。所以，几乎无法想象 在一个没有土豆的世界中，工业革命是否还会发生？第二次世界大战的盟军部队 若没了易栽培的土豆充饥，会不会因此战败？第二次世界大战到底会不会发生？当你这样想来，世界历史上的许多重大里程碑多少的归功于这秘鲁山顶上平凡的土豆。

**P306 2015-12-11 What is depression - Helen M. Farrell**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=306)

Depression is the leading cause of disability in the world. In the United States, close to 10% of adults struggle with depression. But because it's a mental illness, it can be a lot harder to understand than, say, high cholesterol. One major source of confusion is the difference between having depression and just feeling depressed. Almost everyone feels down from time to time. Getting a bad grade, losing a job, having an argument, even a rainy day can bring on feelings of sadness. Sometimes there's no trigger at all. It just pops up out of the blue. Then circumstances change, and those sad feelings disappear. Clinical depression is different. It's a medical disorder, and it won't go away just because you want it to. It lingers for at least two consecutive weeks, and significantly interferes with one's ability to work, play, or love. Depression can have a lot of different symptoms: a low mood, loss of interest in things you'd normally enjoy, changes in appetite, feeling worthless or excessively guilty, sleeping either too much or too little, poor concentration, restlessness or slowness, loss of energy, or recurrent thoughts of suicide. If you have at least five of those symptoms, according to psychiatric guidelines, you qualify for a diagnosis of depression. And it's not just behavioral symptoms. Depression has physical manifestations inside the brain. First of all, there are changes that could be seen with the naked eye and X-ray vision. These include smaller frontal lobes and hippocampal volumes. On a more microscale, depression is associated with a few things: the abnormal transmission or depletion of certain neurotransmitters, especially serotonin, norepinephrine, and dopamine, blunted circadian rhythms, or specific changes in the REM and slow-wave parts of your sleep cycle, and hormone abnormalities, such as high cortisol and deregulation of thyroid hormones. But neuroscientists still don't have a complete picture of what causes depression. It seems to have to do with a complex interaction between genes and environment, but we don't have a diagnostic tool that can accurately predict where or when it will show up. And because depression symptoms are intangible, it's hard to know who might look fine but is actually struggling. According to the National Institute of Mental Health, it takes the average person suffering with a mental illness over ten years to ask for help. But there are very effective treatments. Medications and therapy complement each other to boost brain chemicals. In extreme cases, electroconvulsive therapy, which is like a controlled seizure in the patient's brain, is also very helpful. Other promising treatments, like transcranial magnetic stimulation, are being investigated, too. So, if you know someone struggling with depression, encourage them, gently, to seek out some of these options. You might even offer to help with specific tasks, like looking up therapists in the area, or making a list of questions to ask a doctor. To someone with depression, these first steps can seem insurmountable. If they feel guilty or ashamed, point out that depression is a medical condition, just like asthma or diabetes. It's not a weakness or a personality trait, and they shouldn't expect themselves to just get over it anymore than they could will themselves to get over a broken arm. If you haven't experienced depression yourself, avoid comparing it to times you've felt down. Comparing what they're experiencing to normal, temporary feelings of sadness can make them feel guilty for struggling. Even just talking about depression openly can help. For example, research shows that asking someone about suicidal thoughts actually reduces their suicide risk. Open conversations about mental illness help erode stigma and make it easier for people to ask for help. And the more patients seek treatment, the more scientists will learn about depression, and the better the treatments will get.

**P306 2015-12-11 What is depression - Helen M. Farrell**

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翻译人员: Siyue Wang 校对人员: Shanshan (Alice) Lin抑郁症是造成全球残疾类疾病的主要原因在美国大约有10%的成年人被抑郁症所困扰但是作为一种精神疾病抑郁症比类似高胆固醇等概念更难被理解其中最容易被混淆的概念在于区分患有抑郁症与只是简单的情绪低落几乎所有人都有情绪低落的时候考试失利被炒鱿鱼与人发生争执甚至只是雨天都有可能导致心情低落有时可能根本就是没来由的消沉伤感就那么不经意地来袭了但是渐渐地峰回路转悲伤的感觉总会慢慢淡去但是临床上所讲的抑郁症却是另一码事抑郁症是一种医学上的情绪障碍它无法靠意志来改变它会持续至少两周的时间并且会严重影响患者的工作状态行为能力以及情感生活抑郁症有多种不同的症状情绪低落对平时的爱好失去以往的兴趣食欲的改变自卑或者极度的负罪感嗜睡或者失眠无法集中注意力焦躁或迟钝浑身乏力或者反复的轻生念头如果你符合以上所述的五项症状从精神学的角度讲便可以被判定为患有抑郁症不止是行为上的这些症状抑郁症还会导致一些脑部的临床表现首先有些变化可以通过肉眼以及X光检测观察到其中包括检测出较小的额叶以及海马体(大脑的组成部分)从更微观的角度讲抑郁症与以下几点有关:以血清素, 去甲肾上腺素和多巴胺为主的某些神经传导物质的异常传递与消耗生物钟节奏混乱或是睡眠状况的明显变化以及荷尔蒙紊乱例如皮质醇(一种类激素)偏高以及甲状腺激素异常但是神经系统科学家始终未能完美诠释导致抑郁症的原因这可能和基因与环境的相互作用有关但目前我们还没有有效的方法来准确判断这种作用具体的发生机制并且由于抑郁症的病症发生于无形我们便很难发现那些正饱受抑郁症困扰的人根据美国心理健康研究中心数据表示平均每一位患有精神疾病的患者需要花至少10年去寻求帮助但其实目前有很多有效的治疗方法来帮助抑郁症患者药物治疗配合心理治疗可以促进脑内化学物质的产生在一些特殊的病例中，甚至电休克疗法即一种像是控制病患大脑进行休克的方法也有一定疗效另外一些很有潜力的治疗方法比如经颅磁刺激（一种皮层刺激方法）也正在被广泛研究因此，如果你认识某位正饱受抑郁症折磨的人请鼓励他们从以上的方法中寻求帮助你甚至可以进行更为具体的帮助比如寻求一些此领域中的专业治疗师又或者是帮忙列一个问题清单去请教医生对于那些患有抑郁症的人来说迈出这第一步尤为艰难如果他们有负罪感或羞耻感请向他们指出抑郁症是一种医学疾病就像哮喘或糖尿病一样常见告诉他们抑郁症并不能成为他们的弱点或代表他们的人格而且他们不能只靠自己硬撑来克服这个疾病这并不像伤筋动骨一样可以自愈如果你未曾受到抑郁症的困扰请不要将他们的痛苦与你平日里的情绪低落进行比较将他们所承受的困扰与常见的悲伤情绪相提并论会使他们为自己的病情感到自责哪怕只是单纯而诚恳地谈谈抑郁症都会对他们有所帮助例如，研究显示询问一些人关于自杀的看法实际上可以降低他们自杀的几率开诚布公地谈谈精神疾病有利于淡化患者的自卑意识并且让他们更有勇气去寻求帮助而越多的患者来积极寻求治疗对于抑郁症的研究才能有所突破从而使他们得到更有效的治疗

**P307 2015-12-12 Forget shopping. Soon you'll download your new clothes - Danit Peleg**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=307)

In the past few months, I've been traveling for weeks at a time with only one suitcase of clothes. One day, I was invited to an important event, and I wanted to wear something special and new for it. So I looked through my suitcase and I couldn't find anything to wear. I was lucky to be at the technology conference on that day, and I had access to 3D printers. So I quickly designed a skirt on my computer, and I loaded the file on the printer. It just printed the pieces overnight. The next morning, I just took all the pieces, assembled them together in my hotel room, and this is actually the skirt that I'm wearing right now. (Applause) So it wasn't the first time that I printed clothes. For my senior collection at fashion design school, I decided to try and 3D print an entire fashion collection from my home. The problem was that I barely knew anything about 3D printing, and I had only nine months to figure out how to print five fashionable looks. I always felt most creative when I worked from home. I loved experimenting with new materials, and I always tried to develop new techniques to make the most unique textiles for my fashion projects. I loved going to old factories and weird stores in search of leftovers of strange powders and weird materials, and then bring them home to experiment on. As you can probably imagine, my roommates didn't like that at all. (Laughter) So I decided to move on to working with big machines, ones that didn't fit in my living room. I love the exact and the custom work I can do with all kinds of fashion technologies, like knitting machines and laser cutting and silk printing. One summer break, I came here to New York for an internship at a fashion house in Chinatown. We worked on two incredible dresses that were 3D printed. They were amazing -- like you can see here. But I had a few issues with them. They were made from hard plastics and that's why they were very breakable. The models couldn't sit in them, and they even got scratched from the plastics under their arms. With 3D printing, the designers had so much freedom to make the dresses look exactly like they wanted, but still, they were very dependent on big and expensive industrial printers that were located in a lab far from their studio. Later that year, a friend gave me a 3D printed necklace, printed using a home printer. I knew that these printers were much cheaper and much more accessible than the ones we used at my internship. So I looked at the necklace, and then I thought, "If I can print a necklace from home, why not print my clothes from home, too?" I really liked the idea that I wouldn't have to go to the market and pick fabrics that someone else chose to sell -- I could just design them and print them directly from home. I found a small makerspace, where I learned everything I know about 3D printing. Right away, they literally gave me the key to the lab, so I could experiment into the night, every night. The main challenge was to find the right filament for printing clothes with. So what is a filament? Filament is the material you feed the printer with. And I spent a month or so experimenting with PLA, which is a hard and scratchy, breakable material. The breakthrough came when I was introduced to Filaflex, which is a new kind of filament. It's strong, yet very flexible. And with it, I was able to print the first garment, the red jacket that had the word "Liberté" -- "freedom" in French -- embedded into it. I chose this word because I felt so empowered and free when I could just design a garment from my home and then print it by myself. And actually, you can easily download this jacket, and easily change the word to something else. For example, your name or your sweetheart's name. (Laughter) So the printer plates are small, so I had to piece the garment together, just like a puzzle. And I wanted to solve another challenge. I wanted to print textiles that I would use just like regular fabrics. That's when I found an open-source file from an architect who designed a pattern that I love. And with it, I was able to print a beautiful textile that I would use just like a regular fabric. And it actually even looks a little bit like lace. So I took his file and I modified it, and changed it, played with it -- many kinds of versions out of it. And I needed to print another 1,500 more hours to complete printing my collection. So I brought six printers to my home and just printed 24-7. And this is actually a really slow process, but let's remember the Internet was significantly slower 20 years ago, so 3D printing will also accelerate and in no time you'll be able to print a T-Shirt in your home in just a couple of hours, or even minutes. So you guys, you want to see what it looks like? Audience: Yeah! (Applause) Danit Peleg: Rebecca is wearing one of my five outfits. Almost everything here she's wearing, I printed from my home. Even her shoes are printed. Audience: Wow! Audience: Cool! (Applause) Danit Peleg: Thank you, Rebecca. (To audience) Thank you, guys. So I think in the future, materials will evolve, and they will look and feel like fabrics we know today, like cotton or silk. Imagine personalized clothes that fit exactly to your measurements. Music was once a very physical thing. You would have to go to the record shop and buy CDs, but now you can just download the music -- digital music -- directly to your phone. Fashion is also a very physical thing. And I wonder what our world will look like when our clothes will be digital, just like this skirt is. Thank you so much. (Applause) [Thank You] (Applause)

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翻译人员: Kuang Jijia 校对人员: Zhimin Lin前几个月，我曾经连续几周都在旅游，身边只带一箱子的衣服。我想穿得特别一点、新潮一点，所以我翻遍了行李箱，却找不到任何合适的衣服。还好，那天我参加的是科技会议，有3D打印机供我使用。所以我很快就在电脑上设计了一条裙子，将文件上传到打印机上，它当晚就把各个部分打印出来了。第二天我拿着那些布料在我的酒店房间里将他们缝合好，今天我穿的正是这条裙子。（鼓掌）这不是我第一次打印衣服。我在时尚设计学院高年级设计系列时装时，我决定尝试用3D打印机 在家里把整个系列都打印出来。而九个月内我必须掌握打印五种时尚款式的方法。我在家工作的时候感到最富有创意，我很喜欢去尝试新的材料和研究新的技术，让我的时尚产品独一无二。我也很喜欢去一些旧工厂或是奇怪的店铺，搜寻一些被他们剩下的奇怪粉末或是特别的材料，把它们带回家，进行多种尝试。可以想象我的室友非常讨厌这一点。（笑声）所以我决定开始使用大型打印机，这种机器体积很大，我的卧室根本装不下。我非常喜欢我在工作中对所有新潮科技 的精准和熟练的运用，比如缝纫机、激光切割、丝绸印花。有一年夏天，我到纽约唐人街的一家时装商店实习。我们用3D打印机制作出两件非常棒的衣服，他们很让人称奇，就如图中所示。但是我对它们也有些不满意，他们制作材料是很坚硬的塑料，所以很容易被折断。模特儿穿这种衣服根本无法坐下。手臂下的塑料甚至被抓坏了。3D打印机使设计者能够非常自如地将他们脑海里想象的衣服制作出来。但他们却极度依赖于 这些昂贵而巨大的工业级打印机，而它们也通常放在远离他们工作室的实验室里。那年下半年，有一个朋友送给我一条3D打印的项链。是用家用打印机来打印的。我知道这种打印机比我实习时使用的那种便宜得多而且更容易获得。所以我看着我的项链，想着如果我能在家打印项链，那为什么不在家打印衣服呢？想到我可以不用去市场，挑选那些其他人售卖的布料我就非常高兴。我能够直接在家里设计并打印衣服。我发现了一个小的工作室，在那儿我学会了有关3D打印的一切。没过多久，他们甚至还把实验室的钥匙给我了，所以我得以每天晚上都去那做实验。我发现最主要的挑战 是找到合适的用于打印的细丝。什么是细丝呢？细丝就是打印的原料。我花了一个月的时间用原生树脂做实验。这种材料非常的坚硬、粗糙、易折。在了解Filaflex之后 我取得了突破性的进展，Filaflex是一种新型的单纤维。很硬同时又很有韧性。我用它打印了我的第一件衣服，一件镶嵌着法语单词"Liberté"——意思是自由——的红色夹克。我选择这个词语因为我感到获得了力量与自由，因为我能在家自己设计一件衣服并且自己打印出来。实际上你也可以很方便地下载这件衣服，并且很容易地把上面的单词换成别的，比如你的名字或者你爱的人的名字。（笑声）打印板非常小，所以我不得不把打印的布料拼接起来， 就像玩拼图。还有一项挑战我希望克服。我想打印纺织品，就像其他材料一样。后来我在一位设计师的开源文件中发现了一个我非常喜欢的款式。于是我能打印出一块非常漂亮的布料，就像普通的纤维一样。看起来还有一点像蕾丝。所以我使用他的文件， 进行修改和编辑，各种摆弄，设计出了很多的版本。一共需要1500多个小时才完成我这个系列的打印。所以我买了六台打印机放在家里， 每天24小时、一周7天连续打印。过程的确很漫长，但是想想20年前， 互联网不也比现在慢很多么。所以3D技术也会不断发展，很快你也可以在家打印你自己的T恤，只花几小时甚至几分钟的时间。在座的各位，你们想看看 我打印出来的衣服吗？观众：想！(掌声）蕾贝卡穿的是其中的一件。她身上几乎所有的东西 都是我在家打印出来的。甚至她穿的鞋也是打印的。观众：哇哦！观众：太厉害了！（掌声）谢谢你，蕾贝卡。（对观众），谢谢大家。我认为以后打印材料也会改进，穿起来、看起来可能和今天我们的布料相似，比如棉花或丝绸。想象一下定制的完全合身的衣服。音乐曾经也以实物形式呈现，那时你必须去唱片店买CD。而现在，我们都可以在网上下载音乐，数字音乐，直接到手机上。时尚也是实体的。我好奇将来衣服也数字化之后，就像这条裙子一样，世界会变成什么样。非常感谢大家！（掌声）谢谢（掌声）

**P308 2015-12-18 The Sun’s surprising movement across the sky - Gordon Williamson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=308)

Suppose you placed a camera at a fixed position, took a picture of the sky at the same time everyday for an entire year and overlayed all of the photos on top of each other. What would the sun look like in that combined image? A stationary dot? A circular path? Neither. Oddly enough, it makes this figure eight pattern, known as the Sun's analemma, but why? The Earth's movement creates a few cycles. First of all, it rotates on its axis about once every 24 hours, producing sunrises and sunsets. At the same time, it's making a much slower cycle, orbiting around the sun approximately every 365 days. But there's a twist. Relative to the plane of its orbit, the Earth doesn't spin with the North Pole pointing straight up. Instead, its axis has a constant tilt of 23.4 degrees. This is known as the Earth's axial tilt, or obliquity. A 23-degree tilt may not seem important, but it's the main reason that we experience different seasons. Because the axis remains tilted in the same direction while the Earth makes its annual orbit, there are long periods each year when the northern half of the planet remains tilted toward the Sun while the southern half is tilted away and vice versa, what we experience as summer and winter. During summer in a given hemisphere, the Sun appears higher in the sky, making the days longer and warmer. Once a year, the Sun's declination, the angle between the equator and the position on the Earth where the Sun appears directly overhead reaches its maximum. This day is known as the summer solstice, the longest day of the year, and the one day where the Sun appears highest in the sky. So the Earth's axial tilt partially explains why the Sun changes positions in the sky and the analemma's length represents the full 46.8 degrees of the sun's declination throughout the year. But why is it a figure eight and not just a straight line? This is due to another feature of the Earth's revolution, its orbital eccentricity. The Earth's orbit around the Sun is an ellipse, with its distance to the Sun changing at various points. The corresponding change in gravitational force causes the Earth to move fastest in January when it reaches its closest point to the Sun, the perihelion, and the slowest in July when it reaches its farthest point, the aphelion. The Earth's eccentricity means that solar noon, the time when the Sun is highest in the sky, doesn't always occur at the same point in the day. So a sundial may be as much as sixteen minutes ahead or fourteen minutes behind a regular clock. In fact, clock time and Sun time only match four times a year. The analemma's width represents the extent of this deviation. So how did people know the correct time years ago? For most of human history, going by the Sun's position was close enough. But during the modern era, the difference between sundials and mechanical clocks became important. The equation of time, introduced by Ptolemy and later refined based on the work of Johannes Kepler, converts between apparent solar time and the mean time we've all come to rely on. Globes even used to have the analemma printed on them to allow people to determine the difference between clock time and solar time based on the day of the year. Just how the analemma appears depends upon where you are. It will be tilted at an angle depending on your latitude or inverted if you're in the southern hemisphere. And if you're on another planet, you might find something completely different. Depending on that planet's orbital eccentricity and axial tilt, the analemma might appear as a tear drop, oval, or even a straight line.

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翻译人员: Kuang Jijia 校对人员: Shanshan (Alice) Lin假设你把相机放在一个固定位置，每天都在同一时间对着天空拍照，一年后把所有照片按时间顺序重叠起来。太阳的轨迹会是什么样子的呢？一个固定的点？一个圆圈？都不是。让人吃惊的是， 太阳的轨迹形状是一个“8”这也被称作日行迹。但是为什么会如此呢？地球的运动包含很多圈。首先，地球每24小时 围绕地轴自转一圈，于是有了日出和日落。同时，地球还在以较慢的速度 围绕太阳旋转，大约365天绕太阳一周。不过有一个不一致，和地球公转的轨道平面相比，地球的自转轴不是指向北极的，相反，有23.4°的倾斜。这也被称作“轴倾角”。一个23度的倾斜本没什么大不了，但正是这个倾斜， 使得我们有了一年四季，因为在地球围绕太阳公转时，自转轴始终是往一个方向倾斜，所以，每一年有段时间， 北半球白昼更长，也就是北半球往太阳那边倾斜，而南半球向另一面倾斜。反之亦然。这也是我们经历的冬天和夏天的原因。在某个半球的夏季，太阳在天空中显得位置更高， 也使得白昼更长，更暖和。一年中会有一天， 太阳在我们看来的倾斜度，也就是赤道和公转平面的角度达到了最大数值， 这时，太阳仿佛正当头顶，这一天被称作“夏至”， 一年中最长的一天，也是太阳看起来最高的一天。所以地球的自转轴的倾斜能够部分解释太阳 在天空中位置变化的原因，日行迹的长度也代表了太阳在一整年倾斜的46.8°的角度。但是为什么是“8”字形， 而不是一条直线呢？这是因为地球旋转的另一个特征，轨道偏心率。地球围绕太阳旋转的轨道是一个椭圆，所以与太阳的距离是不断变化的。相应的地球引力的变化使地球在一月时公转更快，也就是到达离太阳最近的点时，这个点被称作“近日点”，到达离太阳最远的点时，公转最慢，这个点也被称作“远日点”。地球的椭圆运动意味着，太阳的正午，也就是太阳在天空中最高的时候，并不是总是在每一天的固定时间。所以太阳时间和时钟时间相比， 可能会提前16分钟，或是推迟14分钟。事实上，时钟的时间和 太阳时间一年只会重合四次。日行迹的宽度正体现了这种偏离的程度。那么，过去人们 是怎么判断正确的时间呢？在人类历史上，大多数时间都是通过太阳的位置来判断时间的。但是到了现代，日晷测量的时间和机械时钟的时间 之间的差异变得越发重要了。“均时差”概念，由托勒密发明后来由约翰尼斯·开普勒进行的改良，包含了太阳时间和平均时间的差距， 是我们现在主要使用的时间概念。曾经的地球仪上面还会印上日行迹，使人们能知道钟表时间和太阳时间的差距。日行迹的形状对于 各地的人来说不完全相同。倾斜的角度取决于你在的纬度，南半球和北半球的人 测出的形状还会是颠倒的。如果你在另一个星球，可能还会发现形状完全不同。根据那个星球的离心率和 自转轴的倾斜角度，日行迹可能是泪珠、椭圆甚至是直线。

**P309 2015-12-22 How do carbohydrates impact your health - Richard J. Wood**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=309)

Which of these has the least carbohydrates? This roll of bread? This bowl of rice? Or this can of soda? It's a trick question. Although they may differ in fats, vitamins, and other nutritional content, when it comes to carbs, they're pretty much the same. So what exactly does that mean for your diet? First of all, carbohydrate is the nutritional category for sugars and molecules that your body breaks down to make sugars. Carbohydrates can be simple or complex depending on their structure. This is a simple sugar, or monosaccharide. Glucose, fructose, and galactose are all simple sugars. Link two of them together, and you've got a disaccharide, lactose, maltose, or sucrose. Complex carbohydrates, on the other hand, have three or more simple sugars strung together. Complex carbohydrates with three to ten linked sugars are oligosaccharides. Those with more than ten are polysaccharides. During digestion, your body breaks down those complex carbohydrates into their monosaccharide building blocks, which your cells can use for energy. So when you eat any carbohydrate-rich food, the sugar level in your blood, normally about a teaspoon, goes up. But your digestive tract doesn't respond to all carbohydrates the same. Consider starch and fiber, both polysaccharides, both derived from plants, both composed of hundreds to thousands of monosaccharides joined together, but they're joined together differently, and that changes the effect they have on your body. In starches, which plants mostly store for energy in roots and seeds, glucose molecules are joined together by alpha linkages, most of which can be easily cleaved by enzymes in your digestive tract. But in fiber, the bonds between monosaccharide molecules are beta bonds, which your body can't break down. Fiber can also trap some starches, preventing them from being cleaved, resulting in something called resistant starch. So foods high in starch, like crackers and white bread, are digested easily, quickly releasing a whole bunch of glucose into your blood, exactly what would happen if you drank something high in glucose, like soda. These foods have a high glycemic index, the amount that a particular food raises the sugar level in your blood. Soda and white bread have a similar glycemic index because they have a similar effect on your blood sugar. But when you eat foods high in fiber, like vegetables, fruits, and whole grains, those indigestible beta bonds slow the release of glucose into the blood. Those foods have a lower glycemic index, and foods like eggs, cheese, and meats have the lowest glycemic index. When sugar moves from the digestive tract to the blood stream, your body kicks into action to transfer it into your tissues where it can be processed and used for energy. Insulin, a hormone synthesized in the pancreas, is one of the body's main tools for sugar management. When you eat and your blood sugar rises, insulin is secreted into the blood. It prompts your muscle and fat cells to let glucose in and jump starts the conversion of sugar to energy. The degree to which a unit of insulin lowers the blood sugar helps us understand something called insulin sensitivity. The more a given unit of insulin lowers blood sugar, the more sensitive you are to insulin. If insulin sensitivity goes down, that's known as insulin resistance. The pancreas still sends out insulin, but cells, especially muscle cells, are less and less responsive to it, so blood sugar fails to decrease, and blood insulin continues to rise. Chronically consuming a lot of carbohydrates may lead to insulin resistance, and many scientists believe that insulin resistance leads to a serious condition called metabolic syndrome. That involves a constellation of symptoms, including high blood sugar, increased waist circumference, and high blood pressure. It increases the risk of developing conditions, like cardiovascular disease and type II diabetes. And its prevalence is rapidly increasing all over the world. As much as 32% of the population in the U.S. has metabolic syndrome. So let's get back to your diet. Whether your food tastes sweet or not, sugar is sugar, and too many carbs can be a problem. So maybe you'll want to take a pass on that pasta sushi roll pita burrito donut burger sandwich.

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翻译人员: Tianchang Luo 校对人员: Yolanda Zhang这些（食物）中哪些 含碳水化合物最少呢？这卷面包？这碗米饭？或者这罐苏打水？这是一个很难的问题。尽管它们的脂肪、维生素和 其他营养物质的含量不同，但碳水化合物的含量几乎是相同的。那么这对于你的饮食意味着什么呢？首先，碳水化合物是一类 可以通过你的身体被分解生成糖类的物质。根据其结构不同，碳水化合物可以很简单， 也可以很复杂。这是一种结构简单的糖，或者叫单糖。葡萄糖，果糖，半乳糖都是结构简单的糖，把这些糖中的其中两种连接起来， 你就得到了二糖，乳糖，麦芽糖或者蔗糖。另一方面，复合碳水化合物是由两种或者三种单糖形成的。由3到10个糖分子连接起来的 复合碳水化合物，称为低聚糖。由多于10个糖分子组成的 那些称为多聚糖。在消化的过程中你的身体把那些复合碳水化合物分解成它们的单糖单元，你的细胞可以利用 这些单糖来获得能量。因此当你吃任何 富含碳水化合物的食物时，你的血糖含量——正常情况下大概一茶匙 ——就会上升。但是你的消化道并不是对 所有的碳水化合物都有一样的反应。拿淀粉和纤维来说，它们都是多糖，都是从植物中获得的，也都由成百上千个单糖连接而成，但是它们的连接方式不同，这就改变了它们对你身体的影响。淀粉，是植物通常在根或者种子中 存储能量的形式，葡萄糖分子是α键连接在一起的，大部分这种键可以很容易 被你消化道中的酶断开，但是在纤维中，单糖分子之间的键是β键，你的身体不能分解它。纤维也可以捕捉到一些淀粉， 避免其被分解，生成一些被称为抗性淀粉的东西。因此淀粉含量高的食物， 比如薄脆饼干和白面包，就很容易消化，快速地释放大量葡萄糖到你的血液里，就好比你喝了一些葡萄糖含量高的饮料， 比如苏打水。这些食物都有很高的血糖指数，也就是某一种食物升高血糖含量的数值。苏打水和白面包有相似的血糖指数，因为它们对你的血糖含量有相似的影响。但是当你吃富含纤维的食物比如蔬菜、 水果，还有全麦时，那些难消化的β键会减慢 葡萄糖释放到血液中的过程。那些食物的血糖指数就低一些，像鸡蛋、奶酪还有肉这些食物的 血糖指数就是最低的。当糖从消化道进入到血管中时，你的身体就会开始将糖转运到 身体组织中，在这里糖会被处理生成能量。胰岛素，一种在胰腺中合成的荷尔蒙，是身体中一种主要的血糖管理工具。当你吃东西导致血糖升高的时候，胰岛素会被分泌到血液中。它促进你的肌肉和脂肪细胞吸收葡萄糖，并且快速开始从糖到能量的转换。单位量的胰岛素降低血糖的程度能帮助我们理解所谓的胰岛素敏感性。给定单位量的胰岛素降低的 血糖浓度越多，就说明你对胰岛素越敏感。如果胰岛素敏感度降低， 就被称为胰岛素抗性。胰腺仍然会释放胰岛素，但是细胞，特别是肌肉细胞， 对胰岛素做出的反应越来越少，因此血糖浓度无法降低，而血液中胰岛素还会持续增加。长期摄入大量碳水化合物可能会导致胰岛素抗性，许多科学家们相信胰岛素抗性会导致一种严重的病，叫做代谢综合征。代谢综合征有许多症状，包括高血糖，变大的腰围，和高血压。它增加了患病的风险，比如心血管疾病和II型糖尿病。代谢综合征的患病率 在全球范围内增长迅速。多达32%的美国人患有代谢综合征。再回到你的日常饮食吧。不管你的食物尝起来甜不甜， 糖就是糖，摄入过多的碳水化合物 会引发健康问题。那么你也许不会再选择吃意大利面，寿司，皮塔饼，墨西哥玉米卷， 甜甜圈，汉堡和三明治了吧。

**P310 2015-12-22 How do we know what color dinosaurs were - Len Bloch**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=310)

This is the microraptor, a carnivorous four-winged dinosaur that was almost two-feet long, ate fish, and lived about 120 million years ago. Most of what we know about it comes from fossils that look like this. So, is its coloration here just an artist's best guess? The answer is no. We know this shimmering black color is accurate because paleontologists have analyzed clues contained within the fossil. But making sense of the evidence requires careful examination of the fossil and a good understanding of the physics of light and color. First of all, here's what we actually see on the fossil: imprints of bones and feathers that have left telltale mineral deposits. And from those imprints, we can determine that these microraptor feathers were similar to modern dinosaur, as in bird, feathers. But what gives birds their signature diverse colorations? Most feathers contain just one or two dye-like pigments. The cardinal's bright red comes from carotenoids, the same pigments that make carrots orange, while the black of its face is from melanin, the pigment that colors our hair and skin. But in bird feathers, melanin isn't simply a dye. It forms hollow nanostructures called melanosomes which can shine in all the colors of the rainbow. To understand how that works, it helps to remember some things about light. Light is basically a tiny electromagnetic wave traveling through space. The top of a wave is called its crest and the distance between two crests is called the wavelength. The crests in red light are about 700 billionths of a meter apart and the wavelength of purple light is even shorter, about 400 billionths of a meter, or 400 nanometers. When light hits the thin front surface of a bird's hollow melanosome, some is reflected and some passes through. A portion of the transmitted light then reflects off the back surface. The two reflected waves interact. Usually they cancel each other out, but when the wavelength of the reflected light matches the distance between the two reflections, they reinforce each other. Green light has a wavelength of about 500 nanometers, so melanosomes that are about 500 nanometers across give off green light, thinner melanosomes give off purple light, and thicker ones give off red light. Of course, it's more complex than this. The melanosomes are packed together inside cells, and other factors, like how the melanosomes are arranged within the feather, also matter. Let's return to the microraptor fossil. When scientists examined its feather imprints under a powerful microscope, they found nanostructures that look like melanosomes. X-ray analysis of the melanosomes further supported that theory. They contained minerals that would result from the decay of melanin. The scientists then chose 20 feathers from one fossil and found that the melanosomes in all 20 looked alike, so they became pretty sure this dinosaur was one solid color. They compared these microraptor melanosomes to those of modern birds and found a close similarity, though not a perfect match, to the iridescent teal feathers found on duck wings. And by examining the exact size and arrangement of the melanosomes, scientists determined that the feathers were iridescent black. Now that we can determine a fossilized feather's color, paleontologists are looking for more fossils with well-preserved melanosomes. They've found that a lot of dinosaurs, including velociraptor, probably had feathers, meaning that certain films might not be so biologically accurate. Clever girls.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=310)

翻译人员: Devon Geer 校对人员: Gabriella Hu这是一只小盗龙一个四翼的食肉恐龙就有将近两英尺长了以吃鱼为生这是地球上十二亿年前的动物我们从这样的化石上推断出了这些那么这只古老的动物究竟是什么颜色的，会像艺术家们画的那样吗当然不是这样啦据我们所知，这种微微发光的黑色是正确的因为古生物学家已经从化石的成分中分析出了线索但是 得到这样一个结论仍然需要对化石进行细致的检验同样也要求研究人员懂得光学 色彩学的物理知识首先 这是我们最初能在化石上看到的那些压印暴露出了各种矿物沉积的成分从这些痕迹中我们能知道这些盗龙的羽毛和现代的恐龙很相似，就像鸟类的羽毛可又是什么让鸟的羽毛也能具有多种多样的色彩呢大多数羽毛只有一种或者两种色素比如它们身上的鲜红色来自类胡萝卜素类胡萝卜素可以让胡萝卜呈橘色在比如它们脸上的黑色来自黑色素我们的头发和皮肤中就有黑色素但在鸟的羽毛中，黑色素可不仅仅是起到了着色作用它还构成一种名为黑色素体的中空纳米结构可以在赤橙黄绿蓝靛紫的颜色中发出光泽要想进一步了解它是如何产生效果的这就需要我们重新回忆一些有关光学的知识光 是穿行在宇宙空间中的一种电磁波波的最高点叫波峰两个波峰之间的距离叫波长红光的波长大约是700纳米紫光的波长就更短了大约为400纳米当光波到达鸟类羽毛表面的中空黑色素体时一部分光被反射回来 一部分穿过那一部分穿过的光到达羽毛表面的另一侧时又被反射回来两束反射光相遇通常情况下它们会相互抵消但如果反射光的波长恰好和两束反射光波之间的间距相等时它们之间会相互增强对方的能量打个比方 绿光的波长大概是500纳米那么黑色素体的直径为500纳米时会散发出绿色的光更薄的黑色素体散发紫光厚一点的散发红光当然 实际情况比这个更复杂这些黑色素体会和其他因子一起挤在细胞中还有这些黑色素体是如何在羽毛中的排列也很重要让我们回到这只盗龙的化石来吧当科学家们用高倍显微镜检查石上的羽毛印迹时他们发现了一些看起来很像黑色素体的小型纳米结构通过后续的X光实验分析 再一次证实了这一结论因为这些结构中含有许多由黑色素衰退遗留下来的矿物元素科学家们又从一个化石中 选取了20种羽毛成分发现20种成分中的黑色素体都十分相似由此他们得出结论 这只恐龙是一种纯色的生物他们还把这只盗龙的黑色素体拿来和现代的鸟类做比较发现盗龙羽毛中的黑色素体和拥有闪色的羽毛的水鸭尽管不是完全吻合，但是仍然存在许多相似之处对黑色素体的大小和排列的不断研究科学家们得出结论 盗龙的羽毛是闪亮的黑色这样一来 我们可以仅通过化石 检验出远古时期的动物的体毛颜色古生物学家还在寻找那些存在着保留完好的黑色素体的化石他们发现许多的恐龙，包括迅猛龙可能都是有羽毛的也就是说从生物学角度，许多科幻电影中呈现的恐龙的样子都不准确如此机智

**P311 2016-01-06 The surprising (and invisible) signatures of sea creatures - Kakani K**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=311)

So my name is Kakani Katija, and I'm a bioengineer. I study marine organisms in their natural environment. And what I want to point out, and at least you can see this in this visualization, is that the ocean environment is a dynamic place. What you're seeing are the kinds of currents, as well as the whirls, that are left behind in the ocean because of tides or because of winds. And imagine a marine organism as living in this environment, and they're trying to undergo their entire lives while dealing with currents like these. But what I also want to point out is that small organisms also create small fluid motions, as well. And it's these fluid motions that I study. And we can think about them like being footprints. So this is my dog Kieran, and take a look at her footprints. Footprints provide a lot of information. Not only do they tell us what kind of organism left them, they might also tell us something about when that organism was there, but also what kind of behavior, were they running or were they walking? And so terrestrial organisms, like my cute dog Kieran, might be leaving footprints behind in dirt or in sand, but marine organisms leave footprints in the form of what we call wake structures, or hydrodynamic signatures, in fluid. Now imagine, it's really hard to see these kinds of structures because fluid is transparent. However, if we add something to the fluid, we get a completely different picture. And you can see that these footprints that marine organisms create are just dynamic. They are constantly changing. And marine organisms also have the ability to sense these signatures. They can also inform decisions, like whether or not they want to continue following a signature like this to find a mate or to find food, or maybe avoid these signatures to avoid being eaten. So imagine the ability to be able to not only see or visualize these kinds of signatures, but to also measure them. This is the engineering side of what I do. And so what I've done is I actually took a laboratory technique and miniaturized it and basically shrunk it down into the use of underwater housings to make a device that a single scuba diver can use. And so a single scuba diver can go anywhere from the surface to 40 meters, or 120 feet deep, to measure the hydrodynamic signatures that organisms create. Before I begin, I want to immerse you into what these kinds of measurements require. So in order to work, we actually dive at night, and this is because we're trying to minimize any interactions between the laser and sunlight and we're diving in complete darkness because we do not want to scare away the organisms we're trying to study. And then once we find the organisms we're interested in, we turn on a green laser. And this green laser is actually illuminating a sheet of fluid, and in that fluid, it's reflecting off of particles that are found everywhere in the ocean. And so as an animal swims through this laser sheet, you can see these particles are moving over time, and so we actually risk our lives to get this kind of data. What you're going to see is that on the left these two particles images that shows the displacement of fluid over time, and using that data, you can actually extract what the velocity of that fluid is, and that's indicated by the vector plots that you see in the middle. And then we can use that data to answer a variety of different questions, not only to understand the rotational sense of that fluid, which you see on the right, but also estimate something about energetics, or the kinds of forces that act on these organisms or on the fluid, and also evaluate swimming and feeding performance. We've used this technique on a variety of different organisms, but remember, there's an issue here. We're only able to study organisms that a scuba diver can reach. And so before I finish, I want to tell you what the next frontier is in terms of these kinds of measurements. And with collaborators at Monterey Bay Aquarium Research Institute, we're developing instrumentation to go on remotely opperated vehicles so we can study organisms anywhere from the surface down to 4000 meters, or two and a half miles. And so we can answer really interesting questions about this organism, this is a larvacean, that creates a feeding current and forces fluids through their mucus house and extracts nutrients. And then this animal, this is a siphonophore, and they can get to lengths about half the size of a football field. And they're able to swim vertically in the ocean by just creating jet propulsion. And then finally we can answer these questions about how swarming organisms, like krill, are able to affect mixing on larger scales. And this is actually one of the most interesting results so far that we've collected using the scuba diving device in that organisms, especially when they're moving in mass, are able to generate mixing at levels that are equivalent to some other physical processes that are associated with winds and tides. But before I finish, I want to leave you all with a question because I think it's important to keep in mind that technologies today that we take for granted started somewhere. It was inspired from something. So imagine scientists and engineers were inspired by birds to create airplanes. And something we take for granted, flying from San Francisco to New York, is something that was inspired by an organism. And as we're developing these new technologies to understand marine organisms, what we want to do is answer this question: how will marine organisms inspire us? Will they allow us to develop new underwater technologies, like underwater vehicles that look like a jellyfish? I think it's a really exciting time in ocean exploration because now we have the tools available to answer this kind of question, and with the help of you guys at some point, you can apply these tools to answer this kind of question and also develop technologies of the future. Thank you.

**P311 2016-01-06 The surprising (and invisible) signatures of sea creatures - Kakani K**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=311)

翻译人员: YuFei Liang 校对人员: Coco Shen我的名字是卡卡妮.卡缇塔， 我是一名生物工程学家。我研究海洋中的生物有机体。而在此我要点出的是，你可以看到，海洋是一个充满活力的地方，你所看到的是各种水流，以及漩涡，这些东西都因海潮的涨落或风的改变而改变。想象海洋生物们就生活在这些地方，它们穷其一生，都在企图适应这些洋流。同时，我也要指出，小型有机体也会制造出小的流体运动。而我研究的就是这些小型流体运动。我们可以把它们想象成脚印。这是我的狗狗珂润， 看看它的脚印。脚印给予我们许多线索。它们不止告诉我们 这是哪种生物留下的脚印，同时也可能告诉我们 那个生物是什么时候经过的，同时也会提供它们的习性， 以及它们是走还是跑过去的？陆地上的动物们， 像我可爱的狗狗珂润，可能会在泥地或者沙地上留下脚印，但海洋生物的脚印，据其形态， 我们叫它尾流结构，或者水动力结构，这被包含于流体概念中。现在，想想看， 想要看到这些结构是非常难的，因为液体是透明的。但是，如果我们在液体里加点什么， 我们就能看到完全不同的画面。你可以看到这些海洋生物的“脚印”是充满活力的。它们在不断地改变。而海洋生物也有能力感知这些“脚印。”它们可以做出决定，是否要继续追随一个这样的“脚印”以期找到配偶或食物，或者避开这些“脚印”以避开被吞噬。想象拥有一些能力，不只是看或是使这些“脚印“可视化，同时也测量它们。这就是我正在做的， 力学方面的工作。我的研究实际上就是将实验室里的技术缩小，等比例缩小它们使得这些技术在水下也可以使用，是一个潜水员就可以操控的大小。这样潜水员就可以到达 水下40米以内的任何地方，120英尺深的任何地方，去记录生物体留下的流体力学的痕迹。在开始之前，我想告诉你这类观测都需要些什么。为了工作顺利， 我们在夜晚下潜，这是因为我们希望降低镭射与阳光的影响我们在完全的黑暗中下潜因为你不会想吓跑 想要研究的生物体，而一旦我们找到了想要研究的生物，我们就会打开绿色的镭射光。而通过绿色镭射光， 我们可以看见一小片水流被照亮，这一小片水流，会反射出海洋中随处可见的物质颗粒。所以当动物游过这片区域时，你可以看见那些小颗粒在移动，实际上，我们冒着危险记录下这些数据。你将看到的是在左边的这两个图像展现了水流的变化，使用这些数据，你可以计算出这些水流的速度，你可以在中间的帧量图中看到这点，之后，我们使用这些数据来回答一系列问题，不只是水流体的转速，就如你在右图看到的，同时也对动力相关的力做出预估，以及其他任何 加载于水流或生物体上的力，同时记录生物体的游动轨迹及其进食表现，我们在各类生物体上都运用了此类技术，但是要记得，这个技术有一个局限。我们只能研究潜水员 能到达的海域中的生物体，所以在我结束之前， 我想要告诉大家我们的下一步不再只是这样简单的观测。我们与蒙特雷湾水族馆研究所合作，建造可远程操控的测量仪器，以达到海面之下 4000米以内的任何地方，也就是2.5英里内。这样我们就能探寻并了解这个生物体，这是一只尾海鞘它通过尾部摆动，将水流导入被囊， 过滤得到食物，及前进动力，和额外的营养物质。然后这只动物，这是一只管水母，它们体长可以达到半个足球场的长度，它们也可以依靠喷射水流推进自己在海中垂直游动，最后我们终于可以解答这些问题问题如：一大群生物体，诸如磷虾，在很大程度上 的确影响了海洋混合。而这个答案是迄今为止最有趣的，我们用潜水装备收集的生物体们，特别是它们大量聚集移动时收集的样本，可以在很大程度上影响海洋混合该程度甚至可以和某些由风和潮汐导致的物理改变过程媲美。但在我结束之前，我想留给大家一个问题因为我觉得这很重要，如今我们被授予使用的技术起源于某些地方。由某些东西启发而来。所以想象一下科学家和 工程学家被鸟类启发，建造飞机。而某些我们使用的，载着我们从三藩市飞到纽约的东西，是被某种生物启发的。而我们使用这些新技术来更深入的了解海洋生物们，我们想要回答这个问题：海洋生物会如何启迪我们？它们会使我们发展出新的水下技术，比如一个长得很像水母的水下机械么？我想那会是海洋科考一个激动人心的时刻因为我们现在有趁手的工具 用以找到这些问题的答案，从某种程度上，也会对大家有所帮助，你可以使用这些工具来回答这些问题并在未来创造出新的技术。谢谢。

**P312 2016-01-08 How menstruation works - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=312)

This might seem hard to believe, but right now, 300 million women across the planet are experiencing the same thing: a period. The monthly menstrual cycle that leads to the period is a reality most women on Earth will go through in their lives. But why is this cycle so universal? And what makes it a cycle in the first place? Periods last anywhere between two and seven days, arising once within in a 28-day rotation. That whole system occurs on repeat, happening approximately 450 times during a woman's life. Behind the scenes are a series of hormonal controls that fine tune the body's internal workings to make menstruation start or stop during those 28 days. This inner machinery includes two ovaries stocked with thousands of tiny sacks called follicles that each contain one oocyte, an unfertilized egg cell. At puberty, ovaries hold over 400 thousand egg cells, but release only one each month, which results in pregnancy or a period. Here's how this cycle unfolds. Each month beginning around puberty, the hormone-producing pituitary gland in the brain starts releasing two substances into the blood: follicle stimulating hormone and luteinizing hormone. When they reach the ovaries, they encourage the internal egg cells to grow and mature. The follicles respond by pumping out estrogen. The egg cells grow and estrogen levels peak, inhibiting the production of FSH, and telling the pituitary to pump out more LH. That causes only the most mature egg cell from one of the ovaries to burst out of the follicle and through the ovary wall. This is called ovulation, and it usually happens ten to sixteen days before the start of a period. The tiny oocyte moves along the fallopian tube. A pregnancy can only occur if the egg is fertilized by a sperm cell within the next 24 hours. Otherwise, the egg's escapade ends, and the window for pregnancy closes for that month. Meanwhile, the now empty follicle begins to release progesterone, another hormone that tells the womb's lining to plump up with blood and nutrients in preparation for a fertilized egg that may embed there and grow. If it doesn't embed, a few days later, the body's progesterone and estrogen levels plummet, meaning the womb stops padding out and starts to degenerate, eventually falling away. Blood and tissue leave the body, forming the period. The womb can take up to a week to clear out its unused contents, after which, the cycle begins anew. Soon afterwards, the ovaries begin to secrete estrogen again, and the womb lining thickens, getting ready to accommodate a fertilized egg or be shed. Hormones continually control these activities by circulating in ideal amounts delivered at just the right time. The cycle keeps on turning, transforming each day and each week into a milestone along its course towards pregnancy or a period. Although this cycle appears to move by clockwork, there's room for variation. Women and their bodies are unique, after all. Menstrual cycles occur at diffferent times in the month, ovulation comes at various points in the cycle, and some periods last longer than others. Menstruation even begins and ends at different times in life for different women, too. In other words, variations between periods are normal. Appreciating these differences and learning about this monthly process can empower women, giving them the tools to understand and take charge of their own bodies. That way, they're able to factor this small cycle into a much larger cycle of life.

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翻译人员: Zhao Harry 校对人员: Zihan Zhao-Holland这听上去令人难以置信，但是现在全球近3亿的女性正在经历着同样的事情：一段特殊的时期。这就是每月一次的月经期，是一个全球妇女在她们的一生中必然要面对的现实。但为什么这个周期如此普遍呢？最开始的周期是怎样形成的呢？月经会持续2-7天，每28天循环发生。月经现象会重复不断地出现，女人的一生大概会有450次的月经。表象之下，这一切都是由人体激素进行调控的，激素精密地控制着身体内部的运作，在这28天里控制经期的起始。这套内部机制包含两个卵巢，卵巢内存有成千上万的微小袋子，叫做卵泡，每个卵泡内都含有一个卵母细胞，即未受精卵细胞。青春期时期，卵巢内含有超过40万的卵细胞，但每个月只会释放出一个卵细胞，正是这个卵细胞决定着女性是受孕还是月经。接下来我们来看看这个循环过程是如何产生的。青春期的每个月初时候，大脑中的脑下垂体会分泌激素向血液中释放两种物质：促卵泡激素和黄体化激素。当它们到达卵巢后，会促进子卵巢内卵泡的发育和成熟。卵泡的成熟，会进一步促进雌性激素的分泌。伴随着卵细胞的成长，雌性激素的分泌也将达到峰值，同时抑制促卵泡激素，促进垂体释放更多的黄体化激素。结果就是，只有其中一个卵巢中发育最为成熟的卵细胞，才能冲出卵泡，穿越子房壁。这就是排卵现象，排卵通常发生在月经前的10到16天。微小的卵母细胞沿输卵管运动。只有当卵母细胞（卵子）和精子结合后女性才会受孕，这需要在排卵后24小时之内发生。否则，意味着卵子使命的终结，女性在该月受孕的窗口也会关闭。与此同时，空虚的卵泡开始释放孕酮，另一种激素以刺激子宫内膜产生血液和营养物质，为受精卵的着床和生长做准备。如果没有受精卵着床，几天后，身体的孕酮和雌性激素骤降，刺激子宫停止补充养分，内膜开始退化坏死，渐渐脱落。血液和脱落的子宫内膜离开身体，形成月经。子宫清理内部无用物质的过程常常会持续一周，之后，一个新的周期又开始了。很快，卵巢又开始分泌雌性激素，子宫内膜开始变厚，为受精卵着床最准备或再一次脱落。激素长期控制着整个活动过程，通过在精确的时间输送理想的量。随着周期的循环前行，令每一天，每个星期，都是这个受孕或经期过程中的一个里程碑。虽然这个过程看上去如时钟般精准，但它仍然会有区别。毕竟每位女性及其身体都是独一无二的。每个月，月经产生的时间因人而异；排卵期出现的节点不同；甚至经期持续的时间也各有长短。另外，对于不同的女性来说，一生中初潮和绝经的时间也不尽相同。换言之，不同个体的经期有差别是正常的。欣赏这些不同并学习关于生理周期的过程，能让女性更加的从容，自主，让女性了解并掌控自己的身体。这样，她们能够将从这个小周期领会到的东西，运用在更加复杂的生活周期之中。

**P313 2016-01-08 How statistics can be misleading - Mark Liddell**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=313)

Statistics are persuasive. So much so that people, organizations, and whole countries base some of their most important decisions on organized data. But there's a problem with that. Any set of statistics might have something lurking inside it, something that can turn the results completely upside down. For example, imagine you need to choose between two hospitals for an elderly relative's surgery. Out of each hospital's last 1000 patient's, 900 survived at Hospital A, while only 800 survived at Hospital B. So it looks like Hospital A is the better choice. But before you make your decision, remember that not all patients arrive at the hospital with the same level of health. And if we divide each hospital's last 1000 patients into those who arrived in good health and those who arrived in poor health, the picture starts to look very different. Hospital A had only 100 patients who arrived in poor health, of which 30 survived. But Hospital B had 400, and they were able to save 210. So Hospital B is the better choice for patients who arrive at hospital in poor health, with a survival rate of 52.5%. And what if your relative's health is good when she arrives at the hospital? Strangely enough, Hospital B is still the better choice, with a survival rate of over 98%. So how can Hospital A have a better overall survival rate if Hospital B has better survival rates for patients in each of the two groups? What we've stumbled upon is a case of Simpson's paradox, where the same set of data can appear to show opposite trends depending on how it's grouped. This often occurs when aggregated data hides a conditional variable, sometimes known as a lurking variable, which is a hidden additional factor that significantly influences results. Here, the hidden factor is the relative proportion of patients who arrive in good or poor health. Simpson's paradox isn't just a hypothetical scenario. It pops up from time to time in the real world, sometimes in important contexts. One study in the UK appeared to show that smokers had a higher survival rate than nonsmokers over a twenty-year time period. That is, until dividing the participants by age group showed that the nonsmokers were significantly older on average, and thus, more likely to die during the trial period, precisely because they were living longer in general. Here, the age groups are the lurking variable, and are vital to correctly interpret the data. In another example, an analysis of Florida's death penalty cases seemed to reveal no racial disparity in sentencing between black and white defendants convicted of murder. But dividing the cases by the race of the victim told a different story. In either situation, black defendants were more likely to be sentenced to death. The slightly higher overall sentencing rate for white defendants was due to the fact that cases with white victims were more likely to elicit a death sentence than cases where the victim was black, and most murders occurred between people of the same race. So how do we avoid falling for the paradox? Unfortunately, there's no one-size-fits-all answer. Data can be grouped and divided in any number of ways, and overall numbers may sometimes give a more accurate picture than data divided into misleading or arbitrary categories. All we can do is carefully study the actual situations the statistics describe and consider whether lurking variables may be present. Otherwise, we leave ourselves vulnerable to those who would use data to manipulate others and promote their own agendas.

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翻译人员: Zihan Zhao-Holland 校对人员: Mingyu Cui统计数据的说服力很高，以至于很多个人、机构甚至整个国家在做最重要的决定时都会参考统计数据。但其实这样做有一个问题。任何一系列的统计数据都也许有一些隐藏的因素，可以颠覆整个结果。例如，想象你现在需要在两家医院中选择一家为家里的老人做手术。在每个医院最近收治的1000例患者中，A医院有900例患者存活。然而，B医院只有800例患者存活。这样看来，A医院是更好的选择。但是，在你做出决定前，要记得，这两家医院收治的患者入院时，健康状态并不一致。如果我们将1000例患者分为两组，入院时健康状态好的 和入院时健康状态不好的，结果就截然不同。A医院只有100例入院时健康状况不好，其中30例存活。B医院有400例入院时健康状况不好， 210例被救活了。对于重症患者来说，去B医院的生存率为52.5%。所以，B医院是更好的选择。那如果您的亲人入院时健康状态好呢？出人意料，轻症患者在B医院的生存率超过98%，B医院依旧是更好的选择。既然B医院两组病人的生存率都更高，为什么A医院的总体生存率会更高呢？我们遇到的这种现象被称为“辛普森悖论”——同一批数据仅因为分组不同，得出的结果完全相悖。“辛普森悖论”常常发生在总体数据隐藏了条件变量时，条件变量有时被称为潜伏变量。这个隐藏的额外变量会显著影响结果。这里，隐藏变量是患者到达医院时健康状况的构成比。“辛普森悖论”并非只是假说，它时不时出现在现实生活中，有时，是很重要的背景下。英国一项看起来展示出，在20年里，吸烟者生存率高于不吸烟者。但根据参与者的年龄分组后，发现不吸烟组人群的平均年龄显著较高，所以，不吸烟组在随访过程中更容易死亡，恰巧是因为不吸烟者通常更长寿。在这个例子中，年龄就是潜伏变量，而且它对于正确解释数据至关重要。另外一个例子中，佛罗里达州一项在死刑犯中所进行的分析显示，在黑人和白人在被指控谋杀的时候，判刑轻重没有种族差别，但根据受害者的种族分组后，结果大不相同。无论在何种情况下，黑人都更容易被判处死刑。白人之所以总体被判刑的比例高，是因为当受害者是白人的时候，相比于受害者是黑人而言，更容易导致死刑的判决；而且，大部分的谋杀都发生在同一个种族内的。我们怎样才能不被“辛普森悖论”所误导呢？不幸的是，并没有统一的答案。数据可以有无数种分组方法，相对于将数据分成具有误导性的，主观性的类别而言，总体数字有时能更给出更加精准的图景。我们能做的就是仔细地研究这些数据所描述的实际情况，并且考虑是否有潜伏变量。否则，那些用数据去操纵别人，同时推进自己的日程的人，可以轻松伤害我们。

**P314 2016-01-15 The beneficial bacteria that make delicious food - Erez Garty**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=314)

Where does bread get its fluffiness? Swiss cheese its holes? And what makes vinegar so sour? These foods may taste completely different, but all of these phenomena come from tiny organisms chowing down on sugar and belching up some culinary byproducts. Let's start with yeast. Yeast are single-celled fungi used to make bread, beer, and wine, among other products. Yeast break down carbohydrates, like sugar, to get energy and the molecules they need to function. They have two different ways to do this: the oxygen-dependent, or aerobic, pathway, and the oxygen-independent, anaerobic pathway, which is also called fermentation. When you bake bread, yeast can use both pathways, but they normally prefer to start with the anaerobic process of fermentation. In this process, ethanol is produced in addition to CO2. No, bread isn't alcoholic. Small amounts of alcohol that are secreted evaporate during baking. In the aerobic, or oxygen-dependent pathway, the yeast consume some of the sugar and produce carbon dioxide gas, or CO2, and water. In both processes, the CO2 accumulates and creates tiny bubbles. These bubbles get trapped by gluten and create a sponge-like structure that gives the bread its soft texture. Wine also relies on yeast. But a wine-making set-up keeps the oxygen levels low so that yeast consume sugar using fermentation, the anaerobic pathway. The process often starts with wild yeasts already hanging out on the grapes. But to get consistent results, most winemakers also add carefully selected strains of yeast that can tolerate high levels of alcohol. The yeast consume the sugar in the grape juice, and as the sugar level drops, the alcohol level rises. This doesn't necessarily mean that sweeter wines have less alcohol. Different types of grapes start with different amounts of sugar, and sugar can also be added. What happens to the carbon dioxide? It just bubbles away through a vent. In carbonated alcoholic beverages, like champagne and beer, sealed containers are used in primary or secondary fermentation to keep the carbon dioxide in the bottle. Wine also introduces us to our second type of food-producing microorganism: bacteria. A special strain of bacteria turns a tart compound in grape juice into softer tasting ones that are responsible for some of the flavors in red wines and chardonnays. Another type of bacteria, called acetic acid bacteria, isn't so desirable in wine, but they have their function, too. If there's oxygen around, these bacteria convert the ethanol in wine into, well, acetic acid. Let this process continue and you'll eventually get vinegar. Bacteria are the key for cheese, too. To make cheese, milk is inoculated with bacteria. The bacteria gobble up the lactose, a kind of sugar, and produce lactic acid, along with many other chemicals. As the milk gets more and more acidic, its proteins start to aggregate and curdle. That's why spoiled milk is clumpy. Cheesemakers usually add an enzyme called rennet, naturally found inside of cows, goats, and some other mammals to help this process along. Eventually, those little curdles turn into bigger curds, which are pressed to squeeze out the water, and create a firm cheese. Different strains of bacteria make different kinds of cheese. For example, a species of bacteria that emits carbon dioxide is what gives swiss cheese its characteristic holes. Some cheeses, brie and camembert, use another kind of microorganism, too: mold. So your kitchen functions as a sort of biotechnology lab manned by microorganisms that culture your cuisine. Yogurt, soy sauce, sour cream, sauerkraut, kefir, kimchi, kombucha, cheddar, challah, pita, and naan. But maybe not all at the same dinner.

**P314 2016-01-15 The beneficial bacteria that make delicious food - Erez Garty**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=314)

翻译人员: Nellie Bi 校对人员: Jing Zhou面包为什么松软？瑞士奶酪为什么有洞？醋为什么是酸的？这些食物的味道可能千差万别，但这些现象都是 微生物分解糖分释放出一些美味副产品的结果。我们先来看看酵母。酵母是单细胞真菌， 用于制作面包、啤酒、葡萄酒，及许多其他的产品。酵母分解碳水化合物，例如糖，从而获得其工作所需的分子和能量。他们的工作方式分两种：氧依赖的，或好氧途径，及非氧依赖的，或厌氧途径，厌氧途径又被称为发酵。当你烤面包时，酵母可两种途径并用，不过它们通常会先开始厌氧发酵。在这个过程中，会产生乙醇和二氧化碳。哦不，面包可不酗酒。少量酒精在烘焙过程中就蒸发了。在好氧（氧依赖）途径中，酵母分解部分糖，然后产生二氧化碳气体（Co2），以及水。在这两个过程中，二氧化碳积聚形成气泡，这些气泡被面筋困住 就形成了类似海绵的结构，让面包变得松软。葡萄酒的制作也需要酵母。不过制酒装置保持低氧含量从而保证酵母 通过发酵分解糖分，即厌氧途径。一开始，都是葡萄本身 自带的野生酵母自行发酵。不过为了统一发酵结果，大多酿酒师都会 谨慎挑选加入一些酵母菌株，这些菌株须能忍受高浓度的酒精酵母分解葡萄汁中的糖分，随着糖分减少，酒精便浓度升高。这也不意味着偏甜的葡萄酒 酒精浓度就不高。葡萄种类不同，所含糖分也不同，而且糖分可以额外添加。那二氧化碳呢？从通风口排出去了。那些碳酸酒精饮料， 如香槟和啤酒，在初次或二次发酵时， 将被密封储存，来把二氧化碳留在瓶子里。说到葡萄酒，也就说到了 要介绍的第二种可制作食品的微生物：细菌。某种特殊菌株将葡萄汁中某种酸化合物的口味变柔和，这影响了一些红酒 和霞多丽白酒的味道。另一种细菌， 名为醋酸菌,虽然在葡萄酒中不太受欢迎，但也有其用武之地。若周围有氧气，这些细菌会将 葡萄酒中的乙醇转换成……醋酸。继续这个过程，你就酿成了醋。细菌也是制作奶酪的关键。要制作奶酪，就要在牛奶中放入细菌。这些细菌很快消耗掉乳糖（一种糖），并且产生乳酸，及很多其他的化学成分。奶因此越变越酸，所含的蛋白质开始聚集并凝结。这就是为什么 坏掉的奶是一块一块的。奶酪制作者通常会添加一种叫凝乳酶的酶它自然存在于 牛、羊及其他哺乳动物的体内，来帮助发酵。最终，那些小凝块变成大凝乳，凝乳被挤压从而榨出其中的水就形成了硬奶酪。不同的菌株用以制作不同的奶酪。比如某种释放二氧化碳的细菌让瑞士奶酪有了其特有的洞有些奶酪，如布里干酪和卡芒贝尔奶酪， 还使用另一种微生物：霉菌。这样你的厨房就像一个生物技术实验室一样运作，利用微生物来培养美食。酸奶、酱油、酸奶油、德国泡菜、克菲尔酸乳酒、辣白菜、康普茶、 切达干酪、哈拉面包、皮塔饼、馕饼。不过不要 一口气全吃了哟。

**P315 2016-01-20 When will the next mass extinction occur - Borths, D'Emic, and Pritch**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=315)

About 66 million years ago, something terrible happened to life on our planet. Ecosystems were hit with a double blow as massive volcanic eruptions filled the atmosphere with carbon dioxide and an asteroid roughly the size of Manhattan struck the Earth. The dust from the impact reduced or stopped photosynthesis from many plants, starving herbivores and the carnivores that preyed on them. Within a short time span, three-quarters of the world's species disappeared forever, and the giant dinosaurs, flying pterosaurs, shelled squids, and marine reptiles that had flourished for ages faded into prehistory. It may seem like the dinosaurs were especially unlucky, but extinctions of various severities have occurred throughout the Earth's history, and are still happening all around us today. Environments change, pushing some species out of their comfort zones while creating new opportunities for others. Invasive species arrive in new habitats, outcompeting the natives. And in some cases, entire species are wiped out as a result of activity by better adapted organisms. Sometimes, however, massive changes in the environment occur too quickly for most living creatures to adapt, causing thousands of species to die off in a geological instant. We call this a mass extinction event, and although such events may be rare, paleontologists have been able to identify several of them through dramatic changes in the fossil record, where lineages that persisted through several geological layers suddenly disappear. In fact, these mass extinctions are used to divide the Earth's history into distinct periods. Although the disappearance of the dinosaurs is the best known mass extinction event, the largest occurred long before dinosaurs ever existed. 252 million years ago, between the Permian and Triassic periods, the Earth's land masses gathered together into the single supercontinent Pangaea. As it coalesced, its interior was filled with deserts, while the single coastline eliminated many of the shallow tropical seas where biodiversity thrived. Huge volcanic eruptions occurred across Siberia, coinciding with very high temperatures, suggesting a massive greenhouse effect. These catastrophes contributed to the extinction of 95% of species in the ocean, and on land, the strange reptiles of the Permian gave way to the ancestors of the far more familiar dinosaurs we know today. But mass extinctions are not just a thing of the distant past. Over the last few million years, the fluctuation of massive ice sheets at our planet's poles has caused sea levels to rise and fall, changing weather patterns and ocean currents along the way. As the ice sheets spread, retreated, and returned, some animals were either able to adapt to the changes, or migrate to a more suitable environment. Others, however, such as giant ground sloths, giant hyenas, and mammoths went extinct. The extinction of these large mammals coincides with changes in the climate and ecosystem due to the melting ice caps. But there is also an uncomfortable overlap with the rise of a certain hominid species originating in Africa 150,000 years ago. In the course of their adaptation to the new environment, creating new tools and methods for gathering food and hunting prey, humans may not have single-handedly caused the extinction of these large animals, as some were able to coexist with us for thousands of years. But it's clear that today, our tools and methods have become so effective that humans are no longer reacting to the environment, but are actively changing it. The extinction of species is a normal occurrence in the background of ecosystems. But studies suggest that rates of extinction today for many organisms are hundreds to thousands of times higher than the normal background. But the same unique ability that makes humans capable of driving mass extinctions can also enable us to prevent them. By learning about past extinction events, recognizing what is happening today as environments change, and using this knowledge to lessen our effect on other species, we can transform humanity's impact on the world from something as destructive as a massive asteroid into a collaborative part of a biologically diverse future.

**P315 2016-01-20 When will the next mass extinction occur - Borths, D'Emic, and Pritch**

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翻译人员: Lyn Beaumont 校对人员: Gabriella Hu大约在六千六百万年以前，我们的星球上的生命遭遇了一次恐怖的劫难。我们的生态系统遭受了双重打击空气中弥漫着大规模的火山喷发带来的二氧化碳同时一个体积相当于曼哈顿的小行星撞击了地球。大气中的尘埃严重得影响了许多植物的光合作用，饥饿肆虐着食草动物和捕食它们的食肉动物。在很短的时间内，世界上四分之三的物种灭绝了，许多巨型恐龙、飞翼龙、甲壳类软体动物、和那些世代繁衍的海洋爬行动物都从我们的史前史中渐渐消失了。恐龙看上去似乎非常不幸，但这却是地球史上适者生存的法则，并且一直延续至今。环境一直在变化，挑战到一些物种的生存极限同时也为其它一些物种创造新的机遇。入侵物种在新的栖息地中战胜原生物种。有时是整个物种被歼灭，这就是适者生存的法则。有时急剧的环境改变让大部分生物来不及自身调整，导致成千上万的物种在地质突变中灭绝。我们称之为生物大灭绝，尽管这种事件很罕见，古生物学家已经能从化石记录的戏剧性改变中鉴定出其中的几个案例。例如某些物种化石在几个地质层后突然消失。我们用这些生物大灭绝事件将地球的历史划分为不同的时期。虽然恐龙的消失是最有名的大灭绝事件，但是最大的大灭绝是在恐龙出现之前。2.52亿年前， 在二叠纪和三叠纪时期之间，地球上的陆地聚集 成 一个超级大的盘古大陆。由于陆地中充满了沙漠，在合并的过程，堆积的沙滩湮没了许多生物赖以生息的热带浅海海域。巨大的火山喷发 横跨整个西伯利亚，持续的高温造成大规模的温室效应。这些灾难促成了95%的海洋生物的灭绝。陆地上二叠纪的爬行动物被我们现在熟知的恐龙所取代。然而大规模的生物灭绝并非只是遥远的过去。在过去的几百万年，地球两极巨大的冰层波动造成了海平面的上升和下降，以及气候和洋流的变化。在冰层蔓延和回退的同时，有些动物能够适应这些变化，或迁移去更适合它们的地方，但是其余的动物，如巨型地懒、巨鬣狗、和猛犸象则灭绝了。这些巨型哺乳动物的灭绝与气候和生态系统的变化同步，都是由于冰层融化所致。另一个双重效应就是15万年前某些原于非洲的原始人种的进化。在适应新环境的过程中他们创造新的工具和方法来采集食物和狩猎，人类也许并没有直接造成这些大型动物的灭绝，因为其中的一些动物和我们共存了数千年。但是显然今天我们的捕食工具和方式已经变得如此有效，人类不再需要适应自然环境，而是开始改变自然环境。物种的灭绝在当今生态系统的大背景下已变成一种正常现象。但研究显示，我们今天许多生物的灭绝率高于自然生态灭绝率的几百至几千倍。人类能够大规模地灭绝生物，也能用同样的能力来阻止它的发生。通过对物种灭绝的了解，让我们认识到环境的变化对今天的影响。人类正利用这些知识来减少我们对其他物种的影响。我们可以改变人类对自然界的影响从如小行星撞击地球般的破坏力的转变为一个和谐共存的生物多样性的未来。

**P316 2016-01-20 Why are human bodies asymmetrical - Leo Q. Wan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=316)

Symmetry is everywhere in nature, and we usually associate it with beauty: a perfectly shaped leaf, or a butterfly with intricate patterns mirrored on each wing. But it turns out that asymmetry is pretty important, too, and more common than you might think, from crabs with one giant pincer claw to snail species whose shells' always coil in the same direction. Some species of beans only climb up their trellises clockwise, others, only counterclockwise, and even though the human body looks pretty symmetrical on the outside, it's a different story on the inside. Most of your vital organs are arranged asymmetrically. The heart, stomach, spleen, and pancreas lie towards the left. The gallbladder and most of your liver are on the right. Even your lungs are different. The left one has two lobes, and the right one has three. The two sides of your brain look similar, but function differently. Making sure this asymmetry is distributed the right way is critical. If all your internal organs are flipped, a condition called situs inversus, it's often harmless. But incomplete reversals can be fatal, especially if the heart is involved. But where does this asymmetry come from, since a brand-new embryo looks identical on the right and left. One theory focuses on a small pit on the embryo called a node. The node is lined with tiny hairs called cilia, while tilt away from the head and whirl around rapidly, all in the same direction. This synchronized rotation pushes fluid from the right side of the embryo to the left. On the node's left-hand rim, other cilia sense this fluid flow and activate specific genes on the embryo's left side. These genes direct the cells to make certain proteins, and in just a few hours, the right and left sides of the embryo are chemically different. Even though they still look the same, these chemical differences are eventually translated into asymmetric organs. Asymmetry shows up in the heart first. It begins as a straight tube along the center of the embryo, but when the embryo is around three weeks old, the tube starts to bend into a c-shape and rotate towards the right side of the body. It grows different structures on each side, eventually turning into the familiar asymmetric heart. Meanwhile, the other major organs emerge from a central tube and grow towards their ultimate positions. But some organisms, like pigs, don't have those embryonic cilia and still have asymmetric internal organs. Could all cells be intrinsically asymmetric? Probably. Bacterial colonies grow lacy branches that all curl in the same direction, and human cells cultured inside a ring-shaped boundary tend to line up like the ridges on a cruller. If we zoom in even more, we see that many of cells' basic building blocks, like nucleic acids, proteins, and sugars, are inherently asymmetric. Proteins have complex asymmetric shapes, and those proteins control which way cells migrate and which way embryonic cilia twirl. These biomolecules have a property called chirality, which means that a molecule and its mirror image aren't identical. Like your right and left hands, they look the same, but trying to put your right in your left glove proves they're not. This asymmetry at the molecular level is reflected in asymmetric cells, asymmetric embryos, and finally asymmetric organisms. So while symmetry may be beautiful, asymmetry holds an allure of its own, found in its graceful whirls, its organized complexity, and its striking imperfections.

**P316 2016-01-20 Why are human bodies asymmetrical - Leo Q. Wan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=316)

翻译人员: Tianchang Luo 校对人员: Gabriella Hu对称性在大自然中随处可见并且我们往往将对称与美联系起来一片完全对称的叶子或者一只拥有对称且花纹复杂翅膀的蝴蝶但是事实上，不对称的现象也是十分重要的并且比你想象的还要常见例如螃蟹有一只钳子比另外一只大再例如蜗牛的螺纹总是朝着一个方向旋转还有一些豆类作物顺时针缠绕在藤架上而其它的则是逆时针方向即使人体外部看上去十分对称，但是我们的体内构造确是另一番景象我们体内的很多重要器官的位置都是不对称的我们的心脏，胃，脾和胰腺都位于我们身体的左侧而我们的胆囊和大部分的肝脏则在身体的右侧即使是你的肺也是不对称的我们的左肺有两瓣肺叶，右肺则有三瓣你的左右半脑虽然看上去很相似 但是他们的功能是不一样的保证这样的不对称性正确地 分布在身体中是非常关键的如果你人体内部器官的位置互换了 这种情况我们称为内脏异位这往往是没有危害的但是不完全的逆转就会导致生命的危害特别是心脏发生了倒位（心脏长在身体右侧）但是不对称性是如何产生的呢？鉴于一个新的胚胎是左右完全相同的其中有一个理论就聚焦到了胚胎中的一个凹点我们叫它结点 （比如淋巴结）结点和一种叫纤毛的很细的体毛相连纤毛倾斜向一侧并快速的旋转式生长所有都朝着同一个方向体液会随着这种同步旋转从胚胎的右边流向左边在瘤点的左侧边缘其他纤毛感受到了体液的流动并且激活了在胚胎左侧特定的基因这些基因可以促使细胞创造特定的蛋白质因此几小时之内左右两侧的胚胎在化学成分上就已经产生了差异即使他们看上去还是一样的这些化学成分的差异直接导致了器官的不对称性不对称性首先体现在心脏上心脏是由胚胎中心的一个直管状器官发育而来当胚胎大概三个月大的时候这根直管开始弯曲成C型并且向身体的右侧旋转于是两边的构造也发生了不同的变化最终形成了我们所熟悉的不对称的心脏与此同时， 人体其他的主要器官也是从中心的一根管状器官发育而来之后向着最终的位置发育然而有些生物，比如猪的胚胎 没有这种能感应体液变化的纤毛但是它们却仍有能发育成不对称的内脏器官那是不是细胞本身就是拥有不对称性？这很有可能的细菌的菌群的边缘会长出 沿着同一方向弯曲的网眼状分支人体细胞也有一层像戒指形状的边界这个边界像馅饼突出的地方一样排列如果我们放大看我们会发现很多细胞的基本组成物质例如：核酸，蛋白质和糖类 他们的组成也是不对称的蛋白质有着十分复杂的不对称的结构而且正是这些蛋白质控制着细胞移动的方向还决定胚胎纤毛的旋转方向这些生物分子都拥有”手征性“的特征这意味着这些看似一样的分子本质上是不一样的就像你的左右手，虽然他们看上去一样但是你却无法把你的右手放进左手的手套中这些分子层面上的不对称性就反应在的细胞层面上产生了不对称胚胎最终形成不对称的有机体所以对称的事物也许是美好的我们可以发现不对称性也同样有着独特的魅力在其流畅旋转的曲线中在其复杂的设计中以及在它明显的”缺陷“。

**P317 2016-01-25 How science fiction can help predict the future - Roey Tzezana**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=317)

Would you like to know what's in our future? What's going to happen tomorrow, next year, or even a millennium from now? Well, you're not alone. Everyone from governments to militaries to industry leaders do, as well, and they all employ people called futurists who attempt to forecast the future. Some are able to do this with surprising accuracy. In the middle of the 20th century, a think tank known as the RAND Corporation consulted dozens of scientists and futurists who together forecast many of the technologies we take for granted today, including artificial organs, the use of birth control pills, and libraries able to look up research material for the reader. One way futurists arrive at their predictions is by analyzing movements and trends in society, and charting the paths they are likely to follow into the future with varying degrees of probability. Their work informs the decisions of policymakers and world leaders, enabling them to weigh options for the future that otherwise could not have been imagined in such depth or detail. Of course, there are obvious limits to how certain anyone can be about the future. There are always unimaginable discoveries that arise which would make no sense to anyone in the present. Imagine, for example, transporting a physicist from the middle of the 19th century into the 21st. You explain to him that a strange material exists, Uranium 235, that of its own accord can produce enough energy to power an entire city, or destroy it one fell swoop. "How can such energy come from nowhere?" he would demand to know. "That's not science, that's magic." And for all intents and purposes, he would be right. His 19th century grasp of science includes no knowledge of radioactivity or nuclear physics. In his day, no forecast of the future could have predicted X-rays, or the atom bomb, let alone the theory of relativity or quantum mechanics. As Arthur C. Clarke has said, "Any sufficiently advanced technology is indistinguishable from magic." How can we prepare, then, for a future that will be as magical to us as our present would appear to someone from the 19th century? We may think our modern technology and advanced data analysis techniques might allow us to predict the future with much more accuracy than our 19th century counterpart, and rightly so. However, it's also true that our technological progress has brought with it new increasingly complex and unpredictable challenges. The stakes for future generations to be able to imagine the unimaginable are higher than ever before. So the question remains: how do we do that? One promising answer has actually been with us since the 19th century and the Industrial Revolution that laid the foundation for our modern world. During this time of explosive development and invention, a new form of literature, science fiction, also emerged. Inspired by the innovations of the day, Jules Verne, H.G. Wells, and other prolific thinkers explored fantastic scenarios, depicting new frontiers of human endeavor. And throughout the 20th century and into the 21st, storytellers have continued to share their visions of the future and correctly predicted many aspects of the world we inhabit decades later. In "Brave New World," Aldous Huxley foretold the use of antidepressants in 1932, long before such medication became popular. In 1953, Ray Bradbury's "Fahrenheit 451," forecast earbuds, "thimble radios," in his words. And in "2001: A Space Odyssey," Arthur C. Clarke described a portable, flat-screen news pad in 1968. In works that often combine entertainment and social commentary, we are invited to suspend our disbelief and consider the consequences of radical shifts in familiar and deeply engrained institutions. In this sense, the best science fiction fulfills the words of philosopher Michel Foucault, "I'm no prophet. My job is making windows where there were once walls." Free from the constraints of the present and our assumptions of what's impossible, science fiction serves as a useful tool for thinking outside of the box. Many futurists recognize this, and some are beginning to employ science fictions writers in their teams. Just recently, a project called iKnow proposed scenarios that look much like science fiction stories. They include the discovery of an alien civilization, development of a way for humans and animals to communicate flawlessly, and radical life extension. So, what does the future hold? Of course, we can't know for certain, but science fiction shows us many possibilities. Ultimately, it is our responsibility to determine which we will work towards making a reality.

**P317 2016-01-25 How science fiction can help predict the future - Roey Tzezana**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=317)

翻译人员: YuFei Liang 校对人员: Coco Shen你想知道未来么？明天，明年，甚至千年之后， 都会发生什么呢？好吧，你不是第一个这样思考的人。任何人，从政府及军方到私企老板 都和你一样想要知道，他们都雇佣了同一种人，未来主义者。——就是那些可以预言未来的人。他们中的一些人预言的精准度令人惊叹，在20世纪中期，有一个出名的智囊团，兰德公司，拥有众多科学家及未来主义者。他们一起预言了许多我们如今认为是理所当然的科技技术。比如人造器官，避孕药的使用，以及图书馆能协助读者查寻资料库的技术，未来主义者能够准确预言的方法之一是分析社会变迁及大趋势，并预测出他们在未来发生的不同程度的可能性。他们的工作成果影响着政策制定者和领袖们，使他们能够权衡影响未来的决定，否则他们的思想无法 达到如此深又精细的地步。当然，任何人所能预测的未来都是有限的。超出预计的新发现总在出现这些发现或许对于现在的我们毫无意义。想象一下，比如，将一位来自十九世纪中期的物理学家传送到二十一世纪。你将一种奇特的物质介绍给他，鈾235，它自身裂变的能量 就能供给于一整座城市的需求，也能在一瞬间摧毁它。“这样的能量如何能无中生有？” 他一定会想知道。“这不是科学，是魔法。”从任何角度上讲， 他都是对的。他十九世纪的科学知识中没有任何关于放射性亦或核物理的知识。在那时，没有任何预言能够预言到X光射线，或者原子弹，更不用说相对论或是量子力学。就像亚瑟.克拉克所说，“任何足够先进的技术 都难于和魔术区分开来。”我们如何才能为一个 几近于魔术般的未来做准备呢？就如同某个来自于 十九世纪的人看着现在的我们。我们或许认为现代技术和数据分析相对十九世纪的技术与人们可以使我们更准确的预测未来，是这样没错。但是同时，我们的技术进步也面对着前所未有的挑战和复杂性。对于未来的人们来说， 预测未来的困难度将是盈千累万的。所以问题依旧存在：我们如何为未来做准备？一个成功的答案 其实从十九世纪及工业革命——基奠了现代社会 基础的时期就开始出现了。在这段充斥着大量发现与发明的时期，一种新的小说形式， 科幻小说因运而生了。当时的创新启发了 儒勒·凡尔纳和赫伯特·乔治·威尔斯以及其他思想家一同寻找不真实的情景，并描绘出人类世界的新边界。纵观20至21世纪，故事家从不曾断绝分享他们对于未来的看法并且成功预言了许多 几个世纪之后我们的世界所发生的事。在《美丽新世界》这本书中，1932年，阿道斯·雷歐那德·赫胥黎 预言到了抗抑郁药的使用，这是在这种药剂普及开来的很久以前。1953年，雷·布萊伯利 在《华氏451度》中预言到了耳机，“顶针式无线电，”他这样描述。在电影"2001年：太空漫游" 中生活在1968年的亚瑟·克拉克描绘了一个 便携式平板新闻发射台（Pad）。拥有娱乐及社交实况报道 双重功能的作品鼓励我们，暂停自己的难以置信 并结合现实情况考虑发生在熟悉的事物 与根深蒂固的传统上巨大的变化。这样说，最好的科幻小说 诠释了哲学家米歇尔·福柯的话：”我不是预言家。 我的工作是为墙面制作一扇窗户。“摆脱“现实”的束缚以及 对于事情是”不可能发生的“的假设，科幻小说是一个让我们摆脱思维定式的工具。许多预言家都发现了这点，他们中的一些人 开始为团队雇佣科幻小说家，就在最近， 一个叫做”iKnow“的项目提出了假设，一个看上去更像是科幻故事的假设，他们囊括了外星文明的发现，发展处一种可以让 动物与人类无障碍交流的方法，以及延长有限的生命。所以，未来到底会有什么？当然，我们现在还无法获知，但科幻小说给予了我们许多可能性。最终，努力实现其中的某一种，是我们的责任。

**P318 2016-01-26 How to make your writing funnier - Cheri Steinkellner**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=318)

Did you ever notice how many jokes start with, "Did you ever notice?" And what's the deal with, "What's the deal?" There's a lot of funny to be found by simply noticing the ordinary, everyday things you don't ordinarily notice everyday. So if you'd like to add a little humor to that story, or speech, or screenplay you're writing, here are a few tips and tricks for finding the funny. All great storytelling, including comedy writing, consists of a handful of basic ingredients: who, what, when, where, why, and how. Writers have been asking these questions since at least the 1st century BC, yet none can be answered with a simple yes or no. They demand details, and the more specific the details, the funnier the story. Let's start with the who, the comedic character. Think about the books, TV shows, and movies that make you laugh. They're usually filled with funny types, or archetypes. The know-it-all, the loveable loser, the bad boss, the neurotic, the airhead. Incidentally, these are all stock characters found in Commedia Dell'Arte, or the artists comedy of late Renaissance Italy, and they have yet to get old. The Commedia rule for creating comic characters is find the flaw, then play it up. Or you can try playing with opposites. When the smartest guy in the room does the stupidest thing, or the doofus outwits the brainiac, we tend to laugh because we didn't see that coming. Ancient Greek funnyman Aristotle is said to have said, "The secret to humor is surprise." This surprise, or incongruity theory of humor, says we laugh at things that seem out of place or run up against our expectations, like a frog dating a pig, or a lizard selling insurance, a baby disco dancing, a nun disco dancing, a cat disco dancing. Actually, a baby, a nun, or a cat doing pretty much anything, especially involving disco. One fun way to find incongruities is by drawing connections. Actually drawing them with a mind map. Start small. Pick a word, I choose pickle. Jot it down, then quick as you can, try making connections. What do pickles make me think of? Who eats pickles? What treasured pickle memories do I have from childhood? Another great way to generate comedic material is to shift from observation to imagination. Try going from "what is" to "what if?" Like, what if instead of a horse, for example, you just had a pair of coconuts? Okay, let's think of some other memorable moments in history, literature, or film. Now, what if they featured coconuts? Get wild, let it go. Even if an idea seems overdone, or too obvious, or just plain dumb, try jotting it down, anyway. What's obvious to you may not be to the next person. And the opposite of the dumbest idea might just turn out to be the smartest. What about all that dumb stuff that happens in real life? Have you ever noticed how much comedy revolves around things that irritate, frustrate, and humiliate us? Will Rodgers said, "Everything's funny as long as it happens to somebody else." So if you're having a crummy morning, imagine it happening to a character you're writing about, and by afternoon, you may at least get a funny story out of it. Once you've got your characters and story, here are a few quick and easy comedy writing tricks to make them zing. The rule of three, or zig zig zag. Try setting up an expected pattern, zig zig, then flip it, zag. A rabbi, a priest, and a coconut walk into a bar. The punchline rule says put your punch at the end of the line. A rabbi, a priest, and a coconut walk into a disco. That brings up the rule of K. For some reason, words with a k-sound catch our ears and are considered comical. Coconut, disco, pickles, crickets? Okay, so we don't always get the laugh. Humor is subjective. Comedy is trial and error. Writing is rewriting. Just keep trying. Find the flaws, discover the details, insert incongruities, incorporate k-words, and remember the most important rule of writing funny: have fun. As Charles Dickins said, "There is nothing in the world so irresistibly contagious as laughter and good humor." And disco.

**P318 2016-01-26 How to make your writing funnier - Cheri Steinkellner**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=318)

翻译人员: 一鸣 胡 校对人员: Tianchang Luo你知道吗 很多笑话都是以“你知道吗”为开头的这时候一般就接着会说 “怎么回事儿”这就是很多笑话的开场白仅仅只要注意身边的事还有那些你平常很容易忽略的小事那么 如果你想加一些小幽默在你写的故事、演讲稿或者剧本里面以下这些小建议和技巧能帮你捕捉身边的趣事所有好故事的讲述，包括喜剧的创作都必不可少包含以下几个基本要素人物事情时间地点起因还有经过从公元前1世纪开始 作家们就一直在想这些问题至今而言 这些问题都不足以简单的是否来回答而是要细节故事里有趣的细节越多 故事就会越能逗笑别人先来说“人物” 即故事的主角好好想想那些 让你发笑的书、电视节目还有电影里面人物往往都会各种搞笑，这就是“原创搞笑”无所不知的学霸讨人怜爱的屌丝脾气糟糕的老板神经过敏的人还有那些没脑子的人巧合的是，这些都是出现在喜剧作品中的人物或者出现在文艺复兴后期的意大利喜剧中而且经久不衰创作一个好的喜剧人物的办法就是找到他的缺点然后好好把玩它或者来一些反转一间房间里最聪明的人却做了最蠢的事或者傻帽的人做了件逆天的事人们就笑了，因为我们没有预料到据说，古希腊的幽默 作家亚里士多德曾经说过幽默的秘诀就是惊喜这种惊喜，或说是 不协调 的幽默论认为我们会觉得一些存在反差的或者出乎意料的事情十分好笑例如青蛙和猪勾搭上了还是说一只蜥蜴在上门推销保险一个小婴儿在跳迪斯科一个修女在跳迪斯科一只猫在跳迪斯科其实，小宝贝、修女、猫在一起就已经很逗了尤其是他们还在跳迪斯科一种建立不协调的方法就是构造关系网给他们画一张关系图画个圈随便选个词那就“泡菜”吧画好了之后 用最快的速度试着建立关系“泡菜”让我想到什么什么人会吃“泡菜”我的童年有什么关于“泡菜”的事情另一种形成喜剧效果的办法就是把事实变成虚构试着把真实变成如果例如，怎样能替代一匹马的出现你只需要一副椰子壳好 我们再来想下历史上其他值得一提的时刻文学作品或电影那 如果他们都专注于椰子随意，你开心就好即使这个想法显得有点过头了或者太做作甚至故作卖傻那也无论如何把它写下来别人或许和你有不同的看法你觉得最蠢的想法对别人来说可能是最赞的要是那些倒霉事全部都在现实生活中发生了呢你有没有注意过身边有多少好笑有趣的事情呢对自己而言却是恼怒的、失望的、和害羞的威尔·罗杰斯说 “ 每件事都很滑稽 只要是发生在别人身上 ”如果你上午过得很不好那把它放在你正在创作的人物当中去那到了下午 说不定你就写完了一个搞笑的故事一旦你想清了人物和情节这有一些简捷的小办法 能让你的故事变得让人眼前一亮三步走战略也叫转折法（zig-zig-zag）先找两个相似的，成为zig-zig然后蹦一个，zag犹太法师，牧师和椰子走进了酒吧这里的规则是东西到你面前你就得喝犹太法师、牧师和椰子走进了迪斯科舞厅这就要说到我们的K原则某种原因上来说 我们总是会注意到那些带有K的音的词并且这些词会被认为是很有趣的椰子迪斯科泡菜蟋蟀好吧...我们并不是总能被逗笑幽默是主观的喜剧是尽善尽美的写作是需要不断修改的坚持就好了去发现那些糟糕的事去发现细节嵌入不协调再带上那些有K的音的单词记住创作笑话最重要的一条规则就是自己也能感受快乐查尔斯·狄更斯说过世界上没有什么比好的幽默和笑声更有感染力当然还要有迪斯科

**P319 2016-01-29 Can you solve the temple riddle - Dennis E. Shasha**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=319)

You've found the hidden switches, evaded the secret traps, and now your expedition finally stands at the heart of the ancient temple inside The Lost City. But as you study the inscriptions in the near total darkness, two of the eight graduate students accompanying you bump into the alter. Suddenly, two whisps of green smoke burst forth and the walls begin to shake. Fleeing for your lives, you come to a room you passed before with five hallways, including the one to the altar and the one leading back outside. The giant sandglass in the center is now flowing, with less than an hour before it empties, and the rumbling tells you that you don't want to be around when that happens. From what you recall of your way here, it would take about 20 minutes to reach the exit at a fast pace. You know this is the last junction before the exit, but your trail markings have been erased, and no one remembers the way. If nine of you split up, there should be just enough time for each group to explore one of the four halls ahead and report back to this room, with everyone then making a run down the correct path. There's just one problem; the inscriptions told of the altar's curse: the spirits of the city's King and Queen possessing intruders and leading them to their doom through deception. Remembering the green smoke, you realize two of the students have been cursed. At any time, one or both of them might lie, though they also might tell the truth. You know for sure that the curse didn't get you, but you don't know which students can't be trusted, and because the possessed students may lie only occasionally, there is no guaranteed way to test them to determine which are cursed. Can you figure out a way to ensure that you all escape? Don't worry about the possessed students attacking or otherwise harming the others. This curse only affects their communication. Pause the video now if you want to figure it out by yourself! Answer in: 3 Answer in: 2 Answer in: 1 The first thing to realize is that since you know you aren't possessed, you can explore one of the halls alone. This leaves eight students for the remaining three paths. Sending groups of four down just two of the paths won't work because if one group came back split two versus two, you'd have to guess who to trust. But splitting them into one pair and two trios would work every time, and here's why. The possessed students might lie, or they might not, but you know there are only two of them, while the other six will always tell the truth. When each group returns to the hall, all of its members will either give the same report or argue about whether they found the exit. If a trio returns in total agreement, then you know none of them are lying. With the pair, you can't be sure either way, but all you need is reliable evidence about three of the four paths. The fourth you can figure out using the process of elimination. Of course, none of this matters if you're lucky enough to find the exit yourself, but otherwise, putting everything together leaves you with three possibilities. If each group gives a consistent answer, either everyone is telling the truth, or the two possessed students are paired together. In either case, ignore the duo. If there's only one group arguing, both others must be telling the truth, and if there are two conflicts, then the possessed students are in separate groups and you can safely trust the majority in both trios since at least two people in each will be truthful. The temple collapses behind you as greenish vapors escape from two of the students. You're all safe and free from the curse. After that ordeal, you tell your group they all deserve a vacation, and you just happen to have another expedition coming up.

**P319 2016-01-29 Can you solve the temple riddle - Dennis E. Shasha**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=319)

翻译人员: Emma Gao 校对人员: Mingyu Cui你找到了隐藏的开关，躲避了暗中的陷阱，现在你的探险队终于到达了失落之城神殿的中心。但当你在黑暗中研究铭文时，一起来的八个研究生中的两个撞着了祭坛。突然，两团绿色的烟雾喷了出来，墙壁开始颤抖。逃命要紧，你回到曾经过的房间，它连有五条通道，包括一条通向祭坛的，和一条通向外界的。房间中心巨大的沙漏正在流动，它将一个小时之内流尽。轰隆隆的声响表明你应该在沙漏流尽之前离开。根据你来时的记忆，快速到达出口需要20分钟。你知道这里是出口前最后一个岔口，但是你的路标不见了，没有人记得该走哪条路。如果你们九个分开，时间应该足够让每一组探索一条然后返回，接下来所有人沿着正确的道路跑出来。但这里还有一个问题。铭文记载了祭坛的诅咒：神殿的国王和皇后幽灵诅咒了入侵者，通过欺骗将他们引向毁灭。想起绿色的烟雾，你意识到两位学生受到了诅咒。在任何时候，他们中有人可能说谎，也可能说真话。你确信诅咒并未降临在你的身上，但是你不知道哪些学生可以信任。因为被诅咒的学生只是偶尔可能说谎，没有可靠的检验方法来发现谁被诅咒了。你能找到一个方法确保你们逃离吗？不必担心被诅咒的学生会发动攻击，或者伤害别人。这个诅咒仅仅影响了交流。马上暂停视频，如果你想自己解决它！答案将会在3秒之后呈现答案将会在2秒之后呈现答案将会在1秒之后呈现首先，因为你知道你没有被诅咒，你可以独自探索一条通道，其他八个学生探索余下的三条通道。向两条通道分别派出4人组是行不通的，因为如果一组回来后分成2V2两个阵营，你不得不去猜谁可以被信任。而分成一个两人组、两个三人组 在任何情况下都是可行的，原因如下：被诅咒的学生也许说谎，也许没说谎，但是你知道只有两个被诅咒了，其他六个学生始终说真话。当一组返回房间时，这一组的所有成员或者观点一致，或者争论他们是否找到了出口。如果三人组观点一致，那么你知道他们都没有说谎。至于两人组，你无法确定他们是否说谎，但是你仅仅需要任意三条通道的可靠信息，第四条通道可以通过排除法来确定。当然，如果你足够幸运，自己找到出口， 那么这些困难都迎刃而解。否则，把一切联系起来，剩下三种可能：如果每一组观点一致，那么或者所有人都在说真话，或者两个被诅咒的学生在两人组中。无论哪种情况，忽略两人组。如果只有一组观点不一致 那么其他两组都在说真话。如果有两组观点不一致，那么被诅咒的学生不在同一组，你可以相信三人组中大多数人的观点，因为每个三人组中至少两人说真话。神殿在你们身后坍塌，绿色烟雾从两个学生身上离开了。你们都安全了，并且摆脱了诅咒。历经生死考验之后，你告诉大家，他们应该好好放一个假，而且你刚好想到了新一场探险之旅。

**P320 2016-02-02 History vs. Napoleon Bonaparte - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=320)

After the French Revolution erupted in 1789, Europe was thrown into chaos. Neighboring countries' monarchs feared they would share the fate of Louis XVI, and attacked the New Republic, while at home, extremism and mistrust between factions lead to bloodshed. In the midst of all this conflict, a powerful figure emerged to take charge of France. But did he save the revolution or destroy it? "Order, order, who's the defendant today? I don't see anyone." "Your Honor, this is Napoléon Bonaparte, the tyrant who invaded nearly all of Europe to compensate for his personal stature-based insecurities." "Actually, Napoléon was at least average height for his time. The idea that he was short comes only from British wartime propaganda. And he was no tyrant. He was safeguarding the young Republic from being crushed by the European monarchies." "By overthrowing its government and seizing power himself?" "Your Honor, as a young and successful military officer, Napoléon fully supported the French Revolution, and its ideals of liberty, equality, and fraternity. But the revolutionaries were incapable of real leadership. Robespierre and the Jacobins who first came to power unleashed a reign of terror on the population, with their anti-Catholic extremism and nonstop executions of everyone who disagreed with them. And The Directory that replaced them was an unstable and incompetent oligarchy. They needed a strong leader who could govern wisely and justly." "So, France went through that whole revolution just to end up with another all-powerful ruler?" "Not quite. Napoléon's new powers were derived from the constitution that was approved by a popular vote in the Consulate." "Ha! The constitution was practically dictated at gunpoint in a military coup, and the public only accepted the tyrant because they were tired of constant civil war." "Be that as it may, Napoléon introduced a new constitution and a legal code that kept some of the most important achievements of the revolution in tact: freedom of religion abolition of hereditary privilege, and equality before the law for all men." "All men, indeed. He deprived women of the rights that the revolution had given them and even reinstated slavery in the French colonies. Haiti is still recovering from the consequences centuries later. What kind of equality is that?" "The only kind that could be stably maintained at the time, and still far ahead of France's neighbors." "Speaking of neighbors, what was with all the invasions?" "Great question, Your Honor." "Which invasions are we talking about? It was the neighboring empires who had invaded France trying to restore the monarchy, and prevent the spread of liberty across Europe, twice by the time Napoléon took charge. Having defended France as a soldier and a general in those wars, he knew that the best defense is a good offense." "An offense against the entire continent? Peace was secured by 1802, and other European powers recognized the new French Regime. But Bonaparte couldn't rest unless he had control of the whole continent, and all he knew was fighting. He tried to enforce a European-wide blockade of Britain, invaded any country that didn't comply, and launched more wars to hold onto his gains. And what was the result? Millions dead all over the continent, and the whole international order shattered." "You forgot the other result: the spread of democratic and liberal ideals across Europe. It was thanks to Napoléon that the continent was reshaped from a chaotic patchwork of fragmented feudal and religious territories into efficient, modern, and secular nation states where the people held more power and rights than ever before." "Should we also thank him for the rise of nationalism and the massive increase in army sizes? You can see how well that turned out a century later." "So what would European history have been like if it weren't for Napoléon?" "Unimaginably better/worse." Napoléon seemingly unstoppable momentum would die in the Russian winter snows, along with most of his army. But even after being deposed and exiled, he refused to give up, escaping from his prison and launching a bold attempt at restoring his empire before being defeated for the second and final time. Bonaparte was a ruler full of contradictions, defending a popular revolution by imposing absolute dictatorship, and spreading liberal ideals through imperial wars, and though he never achieved his dream of conquering Europe, he undoubtedly left his mark on it, for better or for worse.

**P320 2016-02-02 History vs. Napoleon Bonaparte - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=320)

翻译人员: Kaitlyn Yu 校对人员: Menglu Zhang1789年，法国大革命爆发后，欧洲陷入了一片混乱之中。邻国君主们担心自己 也会遭到路易十六被推上断头台的命运，对新共和国群起而攻，而此时法国各党派中的极端主义和叛乱份子的 杀戮暴行，又让国内血流成河。在这场混战当中，一位强大的领袖诞生了， 开始执掌法国政权。但他究竟是挽救还是破坏了这场革命呢？“肃静，肃静，今日被告是何人？ 为何缺席法庭？”“法官大人，被告是拿破仑・波拿巴，那个侵略了几乎所有欧洲国家的暴君，只为了弥补个人身高缺陷造成的不安全感。”“实际上，拿破仑的身高 至少达到了那个时代的平均水平。”他所谓的矮，仅是一种英国 战期宣传时的说法。况且，他并不是个暴君。他保卫了年轻的共和国不被欧洲的君主们毁灭。”“通过推翻政府， 独揽军政大权来保卫共和国？”“（咳咳）法官大人，作为一名年轻有为的军官，拿破仑竭尽全力支持法国大革命，及其自由，平等，博爱的精神。但是之前的革命者们 都没能掌握真正的领导权。先掌权的罗伯斯庇尔和雅各宾派对民众进行了白色恐怖统治，他们借用反天主教极端思想对每个反对者赶尽杀绝。而取代雅各宾派政权的 是个内政混乱又软弱无能的寡头组织。他们需要一个强有力的领导者， 既有治国韬略又能兼济各方。”“所以，法国经历了革命的种种，结局只是变成另一个 集权的君主统治国家？”“也不尽然。拿破仑的新政权由宪法授予，而宪法则是经过民主投票后 由国会通过的。”“哼！那个宪法基本上是 在政变军队枪口威胁下口述出来的，民众之所以接受那个暴君只是因为他们已经不愿忍受 接连不休的内战了。”“就算是这样，拿破仑引入了新的宪法及一部法典，让法国大革命的重要成就得以完整保留：即，宗教自由，废除世袭特权，及法律面前人人（男人）平等。”“确实是‘男人’平等。他剥夺了大革命中赋予女性的权利，甚至在法国殖民地恢复了奴隶制。海地在之后的几个世纪里 还依然挣扎着从奴隶制的阴影中恢复。这算什么平等？”“这是当时唯一一种 能稳定保持的平等状况了，还超越了许多邻国。”“说到邻国，它们是怎么被侵略的？““问得好，法官大人。”“我们要谈的是哪场侵略呢？侵略法国的那些周边帝国，企图恢复君主专制体制，防止自由观念在欧洲传播，在拿破仑执政前两次侵略法国。作为这些法国保卫战中的一名战士和将军，他知道最好的防守就是伺机进攻。”“对抗整个欧洲大陆的进攻？1802年，和平局势稳固下来，其他欧洲势力也认可了 这个法国新政权的地位。但是除非掌控整个欧陆， 否则波拿巴不肯罢休，当时的他只知征战各方。他曾试图强制欧洲各国对英国进行封锁，对所有不服从的国家进行侵略。发动更多的战争， 想将他获得的一切紧握于手。但结果又如何呢？欧洲百万人在战乱中丧生，国际秩序动荡不安。““你忘了另一个后果：民主和自由的观点传遍欧洲。幸而有了拿破仑， 整个欧洲才得以从混乱中重振，从支离破碎的封建割据， 及被宗教恐怖包围的混乱残局中重建成一个个富有生产力的， 现代化的，稳固的单民族国家，在这里，民众拥有着前所未有的 巨大权力和各种权益。”“我们难道还得感谢他 促成民族主义的崛起和大规模的扩大军备？”你会意识到，这些在一个世纪后 发展成了什么‘好结果’。”“那么，如果没有拿破仑， 欧洲的历史会变成怎样？”“出人意料的蒸蒸日上。” “难以想象的江河日下。”拿破仑看似锐不可当的势头在 俄罗斯的冬雪中消磨殆尽，随葬的还有他绝大部分军队。但即便在被废黜和流放后，他也并未就此放手，他从监狱里逃出， 企图大胆发起战争，复辟他的帝国，然而，他的军队再次， 也是最后一次被击溃。波拿巴的统治里充满了矛盾，通过强施专制独裁以保卫民主革命，通过帝国战争来传播自由理念，尽管他从未实现征服整个欧洲的梦，但无论光荣显赫或臭名昭著， 他都无疑在历史上留下了浓墨重彩的一笔。

**P321 2016-02-02 The origins of ballet - Jennifer Tortorello and Adrienne Westwood**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=321)

Can you imagine a party where every movement, from the slightest gesture to walking across the room, and every visual detail, from furniture to hemline length, were governed by a complex system of rules and procedures? For centuries, such rituals were commonplace for European nobility. And while they've gone out of fashion, we recognize the components under a familiar label: ballet. Ballet, from Italian "balletto," or little dance, originated in Renaissance Italy as a combination of social dance and choreographed display at aristocratic gatherings. In many aspects, it was a way of controlling people in court with acceptable forms of behavior, such as the manner in which people stepped, bowed, or took someone's hand. It also involved rules governing everything from attire to where one could walk or sit in relation to the King. Over time, the study of ballet became a central element of court life, and proper grasp of the etiquette could make or break one's success as a courtier. Many of these court gestures can still be seen in modern ballet techniques. Ballet was brought to France in the 16th century by Catherine de' Medici, the Italian wife of King Henry II. As celebrations became more lavish, so did the dance, with dancing masters teaching elaborate steps to young nobles and story elements providing a unifying theme. The focus shifted from participation to performance, and the form acquired more theatrical trappings, such as professionally designed sets and a slightly raised platform or stage with curtains and wings. But it was in the 17th century court of Louis XIV that ballet was refined into the art we know today. Louis himself had been trained in ballet from childhood. His early role as the sun god Apollo at age fifteen cemented the central role ballet would play during his reign. It also earned him the title of Sun King, with his splendid golden costume and choreography that promoted the idea of the king as a divinely ordained ruler. Louis would go on to perform 80 roles in 40 major ballets, either as a majestic lead, or sometimes playing minor or comedic parts before emerging in the lead role as the end. He trained daily in ballet, as well as fencing and riding, and through his example, dancing became an essential skill for all gentlemen of the era. But Louis XIV's main contribution to ballet was not as a performer. His founding of the Royal Academy of Dance in 1661 shifted control of ballet from local guilds to the royal court. As director, he appointed his personal ballet master and frequent performance partner Pierre Beauchamp, who codified the five main positions of the body still used today. Through is collaborations with Jean-Baptiste Lully, the director of the Royal Music Academy, and famed playwright Molière, Beauchamp helped establish ballet as a grand spectacle. And in 1669, a separate ballet academy was founded. The Paris Opera Ballet survives today as the oldest ballet company in the world. Ballet moved away from the royal court to the theater and survived the democratic revolutions and reforms that followed over the next century. With the advent of the romantic movement, fantasy and folklore themes became common motifs. And though the influence of ballet in France would decline, other countries, such as Russia, would play a major role in its further development. Fortunately, today most of us don't have to learn a complicated set of steps just to socialize at a wedding. Instead, we can go to the theater to see professionals who spend their lives training rigorously to perform feats that would have been unimagineable in Louis XIV's day.

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翻译人员: Nellie Bi 校对人员: Gabriella Hu你能想象在一场派对上， 每一个动作，不管是轻微摆个姿势， 还是走过整个房间，所见之处每一细节，不管是家具还是裙摆长度，都要遵循一套复杂的规则程序？几个世纪以来， 这些礼节都是欧洲贵族的家常便饭。即使这些礼节现已退出历史舞台，我们仍能在一个 熟悉的舞台上认出他们：芭蕾舞。芭蕾一词，源于意大利语里的 “balletto”，小舞蹈的意思，起源于文艺复兴时的意大利， 是贵族聚会上交际舞和编排舞蹈的融合。从多方面来说， 它用以保证宫中人士行为举止得体，比如如何迈步、鞠躬、牵手。同时还有关于衣着装扮，国王在场时他人行走、坐位的规定。久而久之，学习芭蕾 成为了宫廷生活的重中之重，对宫中规矩的掌握程度 甚至可决定你宫廷生涯的成败。许多宫廷中的姿势 仍能在现代芭蕾舞技巧中看到。在16世纪， 有人把芭蕾舞带到法国她是凯瑟琳·德·美第奇，亨利二世国王的意大利籍妻子。随着庆典日益奢华， 舞蹈也华丽起来，舞蹈大师为年轻贵族精心排舞加入故事情节来统一舞蹈主题。舞蹈重心从参与转变为表演，而且表演形式也更加戏剧化，如专业设计的布景，有些舞台稍微抬高， 有些舞台配有帷幕和侧面待场区。不过直到17世纪， 在路易十四国王的宫廷芭蕾舞才完善成为 我们今天所知的艺术形式。路易十四自小就接受芭蕾舞训练。他在十五岁时 出演过太阳神阿波罗，因此巩固了芭蕾舞 在他的统治时期中的重要地位。这也为他赢得了太阳王的称号，用他的壕金服饰和华丽编舞昭告天下自己就是 天之骄子、九五之尊。路易十四担任过 40部大型芭蕾舞剧中的80个角色，有时是气场逼人的主角，有时是小角色或谐星配角，为最终主角登场作铺垫。他每天练习芭蕾舞，也练习击剑和骑术，他以身作则，使舞蹈成为当时绅士的必备技能。不过路易十四对芭蕾的主要贡献 不是因为他的表演，而是他在1661年创立了皇家舞蹈学院，将对芭蕾的掌控权 从地方同业协会转移到了宫廷之中。身为院长，他委派其个人芭蕾舞老师及老搭档，皮耶尔·波尚任职，波尚编排的 五个芭蕾舞基本姿势也沿用至今。通过与让·巴普蒂斯特·吕丽，即皇家音乐学院院长，及著名剧作家莫里哀的合作，波尚将芭蕾舞发扬光大。在1669年， 另一家芭蕾舞学院成立了。巴黎歌剧院芭蕾舞团开办至今， 是世界上最古老的芭蕾舞团。芭蕾舞也走出宫廷来到了剧场，逃过了下一世纪民主革命和改革动荡不安的年月。随着浪漫主义运动的来临，一些民间传说和怪谈成了常见的主题。虽然芭蕾舞在法国的影响力式微，但其他国家，比如俄罗斯，对芭蕾舞继续发扬光大 产生了重要的影响。幸好现在我们不必学习复杂的舞步，只为在婚礼上交际。取而代之的是， 我们可以走进剧场观赏专业舞者令人惊叹的表演， 台下十年功，台上一分钟，现在芭蕾舞者的技艺， 路易十四恐难望其项背。

**P322 2016-02-04 The immortal cells of Henrietta Lacks - Robin Bulleri**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=322)

Imagine something small enough to float on a particle of dust that holds the keys to understanding cancer, virology, and genetics. Luckily for us, such a thing exists in the form of trillions upon trillions of human lab-grown cells called HeLa. Let's take a step back for a second. Scientists grow human cells in the lab to study how they function, understand how diseases develop, and test new treatments without endangering patients. To make sure that they can repeat these experiments over and over, and compare the results with other scientists, they need huge populations of identical cells that can duplicate themselves faithfully for years, but until 1951, all human cell lines that researchers tried to grow had died after a few days. Then a John Hopkins scientist named George Gey received a sample of a strange looking tumor: dark purple, shiny, jelly-like. This sample was special. Some of its cells just kept dividing, and dividing, and dividing. When individual cells died, generations of copies took their place and thrived. The result was an endless source of identical cells that's still around today. The very first immortal human cell line. Gey labeled it "HeLa" after the patient with the unusual tumor, Henrietta Lacks. Born on a tobacco farm in Virginia, she lived in Baltimore with her husband and five children. She died of aggressive cervical cancer a few months after her tumorous cells were harvested, and she never knew about them. So what's so special about the cells from Henrietta Lacks that lets them survive when other cell lines die? The short answer is we don't entirely know. Normal human cells have built-in control mechanisms. They can divide about 50 times before they self destruct in a process called apoptosis. This prevents the propagation of genetic errors that creep in after repeated rounds of division. But cancer cells ignore these signals, dividing indefinitely and crowding out normal cells. Still, most cell lines eventually die off, especially outside the human body. Not HeLa, though, and that's the part we can't yet explain. Regardless, when Dr. Gey realized he had the first immortal line of human cells, he sent samples to labs all over the world. Soon the world's first cell production facility was churning out 6 trillion HeLa cells a week, and scientists put them to work in an ethically problematic way, building careers and fortunes off of Henrietta's cells without her or her family's consent, or even knowledge until decades later. The polio epidemic was at its peak in the early 50s. HeLa cells, which easily took up and replicated the virus, allowed Jonas Salk to test his vaccine. They've been used to study diseases, including measles, mumps, HIV, and ebola. We know that human cells have 46 chromosomes because a scientist working with HeLa discovered a chemcial that makes chromosomes visible. HeLa cells themselves actually have around 80 highly mutated chromosomes. HeLa cells were the first to be cloned. They've traveled to outer space. Telomerase, an enzyme that helps cancer cells evade destruction by repairing their DNA, was discovered first in HeLa cells. In an interesting turn of fate, thanks to HeLa, we know that cervical cancer can be caused by a virus called HPV and now there's a vaccine. HeLa-fueled discoveries have filled thousands of scientific papers, and that number is probably even higher than anyone knows. HeLa cells are so resilient that they can travel on almost any surface: a lab worker's hand, a piece of dust, invading cultures of other cells and taking over like weeds, countless cures, patents and discoveries all made thanks to Henrieta Lacks.

**P322 2016-02-04 The immortal cells of Henrietta Lacks - Robin Bulleri**

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翻译人员: Cissy Yun 校对人员: Sally Zhang想象一种小到可以漂浮在一粒灰尘上的东西它是人们理解癌症，病毒，和基因的关键之物幸运的是有亿万个此物以人类实验室培育细胞的形式存在 它的名字叫海拉细胞（HeLa）让我们先退一步来看科学家在实验室中培育人类细胞 来学习它们如何起作用理解疾病是如何产生的和在避免危害病人的情况下 试验新研制的药物为了确保科学家可以重复这些试验以及与其他科学家比较试验结果他们需要大量相同细胞的储备这些细胞需要年复一年的不断分裂但1951年前，所有科学家尝试培育的人类细胞在几天之内就会死亡后来，一位约翰霍普金斯医院的研究者George Gey收到了一份样子奇怪的肿瘤样本深紫色，有光泽的，胶状的物体这是个十分特殊的样本其中的一些细胞不断不断不断的分裂当单个细胞死去时它一代代的复制品代替了它 并且继续兴盛生长最后便有了如今还存在的“无尽”相似细胞第一种永生的人类细胞系Gey将它命名为海拉细胞（HeLa） 名从携带这不寻常肿瘤的病人 Henrietta Lacks她出生于弗吉尼亚州的一个烟草农场与她的丈夫和五个孩子住在巴尔迪莫她在她的肿瘤细胞被获取后的几个月后死于侵略性宫颈癌但她从不知道自己的细胞被移去Henrietta Lacks的细胞到底有什么特别之处能让它在其他细胞系都死去时 可以唯独生存下来简单来说 我们也不是很清楚正常的人类细胞之中有调节机制在它们分裂大约五十次时就会以细胞凋亡的形式自我毁灭这种机制阻止了在多次分裂后可形成的基因缺陷的传播但是癌细胞会无视这种信号 永无止境的分裂并将正常细胞挤走但是，一般的细胞系，特别是在人体外的 最终会死去海拉细胞就不同了 可是，这也是我们无法解释的地方不管怎样，当Gey博士意识到自己发现了 第一条永生人类细胞系时他讲这些样本寄送到了世界各地的实验室马上，世界上第一个细胞生产设备在一个星期中生产出了六万亿个海拉细胞可是，在利用海拉细胞的过程中，科学家没有遵守伦理标准他们在拓展事业与收获财富前并没有获得Henrietta和她家人的同意 甚至在几十年过后才告诉他们小儿麻痹症的蔓延度在五十年代到达了顶峰海拉细胞很快占据并复制了这病毒让Jonas Salk得以试验他的疫苗海拉细胞被用于对疾病的研究其中包括麻疹腮腺炎艾滋和伊波拉病毒我们所知道的人类细胞拥有46条染色体是因为一位科学家利用海拉细胞 发现了一种化学物质能使染色体可见海拉细胞自己拥有大约八十条高度变异的染色体海拉细胞是第一个被克隆的细胞它们还曾到过外太空端粒酶这个酶会修复癌细胞的DNA, 避免癌细胞的死亡在海拉细胞中被第一次发现还有一场有趣的命运的转折感谢海拉细胞，我们才得知宫颈癌是由一种叫做 人乳头状瘤病毒（HPV）的病毒造成的现在也有了针对其的疫苗有几千份海拉细胞引导的科学论文这个数字很有可能比我们知道的还多海拉细胞非常有弹性，这让他们可以在任何表面上流动在一个实验室工作人员的手上在一片灰尘上"侵入"其他细胞的培养，并向杂草一样蔓延并代取无数种疗法药物，专利和发现 这些都要感谢Henrietta Lacks

**P323 2016-02-08 How miscommunication happens (and how to avoid it) - Katherine Hampst**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=323)

Have you ever talked with a friend about a problem only to realize that he just doesn't seem to grasp why the issue is so important to you? Have you ever presented an idea to a group and it's met with utter confusion? Or maybe you've been in an argument when the other person suddenly accuses you of not listening to what they're saying at all? What's going on here? The answer is miscommunication, and in some form or another, we've all experienced it. It can lead to confusion, animosity, misunderstanding, or even crashing a multimillion dollar probe into the surface of Mars. The fact is even when face-to-face with another person, in the very same room, and speaking the same language, human communication is incredibly complex. But the good news is that a basic understanding of what happens when we communicate can help us prevent miscommunication. For decades, researchers have asked, "What happens when we communicate?" One interpretation, called the transmission model, views communication as a message that moves directly from one person to another, similar to someone tossing a ball and walking away. But in reality, this simplistic model doesn't account for communication's complexity. Enter the transactional model, which acknowledges the many added challenges of communicating. With this model, it's more accurate to think of communication between people as a game of catch. As we communicate our message, we receive feedback from the other party. Through the transaction, we create meaning together. But from this exchange, further complications arise. It's not like the Star Trek universe, where some characters can Vulcan mind meld, fully sharing thoughts and feelings. As humans, we can't help but send and receive messages through our own subjective lenses. When communicating, one person expresses her interpretation of a message, and the person she's communicating with hears his own interpretation of that message. Our perceptual filters continually shift meanings and interpretations. Remember that game of catch? Imagine it with a lump of clay. As each person touches it, they shape it to fit their own unique perceptions based on any number of variables, like knowledge or past experience, age, race, gender, ethnicity, religion, or family background. Simultaneously, every person interprets the message they receive based on their relationship with the other person, and their unique understanding of the semantics and connotations of the exact words being used. They could also be distracted by other stimuli, such as traffic or a growling stomach. Even emotion might cloud their understanding, and by adding more people into a conversation, each with their own subjectivities, the complexity of communication grows exponentially. So as the lump of clay goes back and forth from one person to another, reworked, reshaped, and always changing, it's no wonder our messages sometimes turn into a mush of miscommunication. But, luckily, there are some simple practices that can help us all navigate our daily interactions for better communication. One: recognize that passive hearing and active listening are not the same. Engage actively with the verbal and nonverbal feedback of others, and adjust your message to facilitate greater understanding. Two: listen with your eyes and ears, as well as with your gut. Remember that communication is more than just words. Three: take time to understand as you try to be understood. In the rush to express ourselves, it's easy to forget that communication is a two-way street. Be open to what the other person might say. And finally, four: Be aware of your personal perceptual filters. Elements of your experience, including your culture, community, and family, influence how you see the world. Say, "This is how I see the problem, but how do you see it?" Don't assume that your perception is the objective truth. That'll help you work toward sharing a dialogue with others to reach a common understanding together.

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翻译人员: Yadi Zhang 校对人员: 易帆 余你有没有遇到过这样的情况， 当你跟一个朋友聊起自己的困难，你发现他好像无法明白 这事为什么对你这么重要？当你表达自己的想法给一群人， 结果却发现没人能明白？或者跟别人辩论，对方突然指责起你来，说你根本没有在听他们在说什么？这是怎么回事呢？答案是交流不畅，而且不管是哪种形式（的交流不畅），我们都遇到过。它会让人糊涂，产生仇恨，引起误会，甚至使一个价值数百万的 探测器在火星坠毁。其实，即便人们当面聊天，在同一个房间，说同一种语言，人类的交流 依然是极为复杂的。好在，当我们交流时，对当下情况的基本理解可以帮我们避免交流不畅。数十年来，科学家们不断探索 “当我们交流时，到底发生了什么？”有一种解释是“传递模式”出问题，它视这种交流模式是一种 将讯息只做单向的传递而已。这就好比，A 向 B 扔了一个球， 然后走掉了但是，这个简易的模式 并不能用来解释复杂的交流。另一种解释是“交换模式”，它承认交流中的附加障碍。这个模式更准确地形容，就好比把人与人的交流 比喻成一场接球游戏。当我们在交流信息时， 我们会收到对方的反馈。通过这样的信息交换， 双方共同建立语义。但是这样的交换 也会有复杂性产生。它不像星际迷航裡面的演员可以心灵感应，可以完全准确地传递想法。相反，人类只能通过主观视角 来发送和接收信息。在交流中，A按照 她自己的理解去表达信息，而B则会用自己的方式 去理解该信息。所以，我们的“感知过滤器” 一直在改变语言的含义。还记得刚刚的接球游戏吗？让我们把球想像成 一块软软的黏土。当每个人接到它时会受很多因素的影响，每个人会把它捏成 符合自己独特知觉的形状。这些影响因素包括 阅历，年龄，种族，性别，民族，宗教，或家庭背景。与此同时，人们会根据自己与对方的关系以及自己对语言的独特解释来理解对方说的话。人们有时也会 被其他事物分心，比如堵车，肚子在叫了，甚至情绪也会 干扰人们对事物的理解。而且， 当谈话的参与人数增加，每个人都带着主观性，交流的复杂程度 就会飙升。当黏土块在人们之间不断传递，重塑，变形，难怪我们的讯息有时会变成 一堆交流不畅的烂泥巴。但幸运的是， 一些练习能帮助我们掌控日常互动 从而达到顺畅交流。练习一：首先你要意识到，被动聆听 和主动聆听是有区别的。要积极去感受 他人言语和非言语信息，并通过调整你的表达 来促使对方更好地理解你。练习二：聆听时要用到你的 眼，耳，甚至内脏。记住，交流并不仅限于 文字交流。练习三：理解他人和试图被他人理解 都要慢慢来。如果急于表达自己的看法，就容易忘记 交流其实是双向的。要善于接受对方可能说的话。最后，练习四：要意识到自己的“感知过滤器”。你的阅历，包括文化，社群和家庭环境，都会影响你如何看待这个世界。你要说：“我是这样 看这个问题的，你呢？”不要以为你的主观看法 都是客观真理。这个练习可以 帮你改进与他人的谈话从而达成互相理解。

**P324 2016-02-10 The science of skin color - Angela Koine Flynn**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=324)

When ultraviolet sunlight hits our skin, it affects each of us a little differently. Depending on skin color, it will take only minutes of exposure to turn one person beetroot-pink, while another requires hours to experience the slightest change. So what's to account for that difference and how did our skin come to take on so many different hues to begin with? Whatever the color, our skin tells an epic tale of human intrepidness and adaptability, revealing its variance to be a function of biology. It all centers around melanin, the pigment that gives skin and hair its color. This ingredient comes from skin cells called melanocytes and takes two basic forms. There's eumelanin, which gives rise to a range of brown skin tones, as well as black, brown, and blond hair, and pheomelanin, which causes the reddish browns of freckles and red hair. But humans weren't always like this. Our varying skin tones were formed by an evolutionary process driven by the Sun. In began some 50,000 years ago when our ancestors migrated north from Africa and into Europe and Asia. These ancient humans lived between the Equator and the Tropic of Capricorn, a region saturated by the Sun's UV-carrying rays. When skin is exposed to UV for long periods of time, the UV light damages the DNA within our cells, and skin starts to burn. If that damage is severe enough, the cells mutations can lead to melanoma, a deadly cancer that forms in the skin's melanocytes. Sunscreen as we know it today didn't exist 50,000 years ago. So how did our ancestors cope with this onslaught of UV? The key to survival lay in their own personal sunscreen manufactured beneath the skin: melanin. The type and amount of melanin in your skin determines whether you'll be more or less protected from the sun. This comes down to the skin's response as sunlight strikes it. When it's exposed to UV light, that triggers special light-sensitive receptors called rhodopsin, which stimulate the production of melanin to shield cells from damage. For light-skin people, that extra melanin darkens their skin and produces a tan. Over the course of generations, humans living at the Sun-saturated latitudes in Africa adapted to have a higher melanin production threshold and more eumelanin, giving skin a darker tone. This built-in sun shield helped protect them from melanoma, likely making them evolutionarily fitter and capable of passing this useful trait on to new generations. But soon, some of our Sun-adapted ancestors migrated northward out of the tropical zone, spreading far and wide across the Earth. The further north they traveled, the less direct sunshine they saw. This was a problem because although UV light can damage skin, it also has an important parallel benefit. UV helps our bodies produce vitamin D, an ingredient that strengthens bones and lets us absorb vital minerals, like calcium, iron, magnesium, phosphate, and zinc. Without it, humans experience serious fatigue and weakened bones that can cause a condition known as rickets. For humans whose dark skin effectively blocked whatever sunlight there was, vitamin D deficiency would have posed a serious threat in the north. But some of them happened to produce less melanin. They were exposed to small enough amounts of light that melanoma was less likely, and their lighter skin better absorbed the UV light. So they benefited from vitamin D, developed strong bones, and survived well enough to produce healthy offspring. Over many generations of selection, skin color in those regions gradually lightened. As a result of our ancestor's adaptability, today the planet is full of people with a vast palette of skin colors, typically, darker eumelanin-rich skin in the hot, sunny band around the Equator, and increasingly lighter pheomelanin-rich skin shades fanning outwards as the sunshine dwindles. Therefore, skin color is little more than an adaptive trait for living on a rock that orbits the Sun. It may absorb light, but it certainly does not reflect character.

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翻译人员: Yi Li 校对人员: Leo Wei当紫外线照射到皮肤上时，它对我们的影响因人而异。取决于肤色， 一个人只在阳光下暴露几分钟，就会晒成甜菜根般的红色，而另一个人，需要几小时的暴露，才能体现轻微的肤色改变。到底怎样解释这种差异呢？我们的皮肤又是怎样呈现出如此多不同的肤色呢？无论怎样的肤色，我们的皮肤都在讲述一段人类无惧和适应性的史诗般的故事。肤色的多变性是一项生物学功能，这一切都围绕着黑色素，这种颜料赋予皮肤和头发的颜色。这种成分来源于被称为 黑素细胞的皮肤细胞。它具有两种形式。其中一种叫真黑色素,它产生一系列的褐色皮肤，以及黑色，棕色以及金色的头发。另一种是伪黑色素， 则生成褐色雀斑和红色头发。但人类并不总是这样，我们不同色调的皮肤是受太阳驱动的进化过程中形成的。它大约起源于五万年前， 当我们的祖先从非洲北上，迁移到欧洲与亚洲时。这些远古人类生活在赤道 和南回归线之间，这部分地域充满了紫外线。当皮肤被长期暴露于紫外线中，紫外线会损坏细胞中的基因， 皮肤开始烧伤。如果损伤足够严重,细胞突变可导致黑素瘤，这是一种由皮肤中的黑色素细胞形成的致命癌症。我们今天所知的防晒霜， 在五万年前并不存在。那么我们的祖先是如何应对大量的紫外线照射的呢？生存的关键在于他们自身的防晒霜，也就是皮下产生的黑色素。你们皮肤中黑色素的种类和数量，决定了你在受太阳照射时， 是多，还是少的受保护程度。这取决于阳光照射时皮肤的反应。当暴露在紫外线下时，将触发被称为紫膜质的特殊感光受体。它促进黑色素的产生， 以保护细胞免受损伤。对于肤色偏浅的人来说, 额外的黑色素 会使肤色加深变为黄褐色。经历无数代后，生活在非洲阳光饱和的纬度的人们已经进化到拥有更高的 黑色素的生产阈值和更多真黑素，使皮肤拥有更深的色调。这种自身的防太阳光紫外线保护层 可防止黑素瘤的形成，他们为适应环境而进化，并且将这种特性代代相传。但是不久，部分适应日晒的 祖先们离开了热带区域，往北上移居，他们广泛的迁移到世界各地。他们越往北，看见到的阳光就越少。这有一个问题，因为尽管紫外线会损伤皮肤，同时它对人体有一个重要的益处。紫外线帮助身体产生维素D，这种物质可以强化骨骼， 并帮助我们吸收重要的矿物质，比如钙，铁，镁，磷酸盐，锌。没有它，人体会感到极为疲乏且骨骼脆弱，这种状况被称为佝偻病。对于那些深色皮肤有效地阻止了任何阳光的人，在北方维生素D缺乏将造成严重威胁。但是他们中的一些人正好产生较少黑色素。他们暴露在少量的阳光下， 是不大可能产生黑色素瘤的，并且他们的浅色皮肤能更好地吸收紫外线。因此他们得益于维生素D，发育出强健的骨骼，并能更好的生存，繁衍健康的后代。经过很多代的自然选择后，居住在那些区域的人的肤色逐渐淡化。作为我们祖先适应的结果，如今我们的地球上充满了各种肤色的人，通常，黑色素丰富的深色皮肤的人 生活在炎热的，阳光充足的赤道带；从赤道呈扇形越往外阳光越少， 含有伪黑色素的皮肤的人肤色也越来越浅。因此，肤色仅仅是 生活在围绕太阳运行的地球上的人们的适应特征。它可以吸收阳光，但肯定不反应品格。

**P325 2016-02-11 Why do we love A philosophical inquiry - Skye C. Cleary**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=325)

Ah, romantic love - beautiful and intoxicating, heartbreaking and soul-crushing, often all at the same time. Why do we choose to put ourselves through its emotional wringer? Does love make our lives meaningful, or is it an escape from our loneliness and suffering? Is love a disguise for our sexual desire, or a trick of biology to make us procreate? Is it all we need? Do we need it at all? If romantic love has a purpose, neither science nor psychology has discovered it yet. But over the course of history, some of our most respected philosophers have put forward some intriguing theories. Love makes us whole, again. The ancient Greek philosopher Plato explored the idea that we love in order to become complete. In his "Symposium", he wrote about a dinner party, at which Aristophanes, a comic playwright, regales the guests with the following story: humans were once creatures with four arms, four legs, and two faces. One day, they angered the gods, and Zeus sliced them all in two. Since then, every person has been missing half of him or herself. Love is the longing to find a soulmate who'll make us feel whole again, or, at least, that's what Plato believed a drunken comedian would say at a party. Love tricks us into having babies. Much, much later, German philosopher Arthur Schopenhauer maintained that love based in sexual desire was a voluptuous illusion. He suggested that we love because our desires lead us to believe that another person will make us happy, but we are sorely mistaken. Nature is tricking us into procreating, and the loving fusion we seek is consummated in our children. When our sexual desires are satisfied, we are thrown back into our tormented existences, and we succeed only in maintaining the species and perpetuating the cycle of human drudgery. Sounds like somebody needs a hug. Love is escape from our loneliness. According to the Nobel Prize-winning British philosopher Bertrand Russell, we love in order to quench our physical and psychological desires. Humans are designed to procreate, but without the ecstasy of passionate love, sex is unsatisfying. Our fear of the cold, cruel world tempts us to build hard shells to protect and isolate ourselves. Love's delight, intimacy, and warmth helps us overcome our fear of the world, escape our lonely shells, and engage more abundantly in life. Love enriches our whole being, making it the best thing in life. Love is a misleading affliction. Siddhārtha Gautama, who became known as the Buddha, or the Enlightened One, probably would have had some interesting arguments with Russell. Buddha proposed that we love because we are trying to satisfy our base desires. Yet, our passionate cravings are defects, and attachments, even romantic love, are a great source of suffering. Luckily, Buddha discovered the eight-fold path, a sort of program for extinguishing the fires of desire so that we can reach Nirvana, an enlightened state of peace, clarity, wisdom, and compassion. The novelist Cao Xueqin illustrated this Buddhist sentiment that romantic love is folly in one of China's greatest classical novels, "Dream of the Red Chamber." In a subplot, Jia Rui falls in love with Xi-feng who tricks and humiliates him. Conflicting emotions of love and hate tear him apart, so a Taoist gives him a magic mirror that can cure him as long as he doesn't look at the front of it. But of course, he looks at the front of it. He sees Xi-feng. His soul enters the mirror and he is dragged away in iron chains to die. Not all Buddhists think this way about romantic and erotic love, but the moral of this story is that such attachments spell tragedy, and should, along with magic mirrors, be avoided. Love lets us reach beyond ourselves. Let's end on a slightly more positive note. The French philosopher Simone de Beauvoir proposed that love is the desire to integrate with another and that it infuses our lives with meaning. However, she was less concerned with why we love and more interested in how we can love better. She saw that the problem with traditional romantic love is it can be so captivating, that we are tempted to make it our only reason for being. Yet, dependence on another to justify our existence easily leads to boredom and power games. To avoid this trap, Beauvoir advised loving authentically, which is more like a great friendship. Lovers support each other in discovering themselves, reaching beyond themselves, and enriching their lives and the world together. Though we might never know why we fall in love, we can be certain that it will be an emotional rollercoaster ride. It's scary and exhilarating. It makes us suffer and makes us soar. Maybe we lose ourselves. Maybe we find ourselves. It might be heartbreaking, or it might just be the best thing in life. Will you dare to find out?

**P325 2016-02-11 Why do we love A philosophical inquiry - Skye C. Cleary**

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翻译人员: Emma Gao 校对人员: Qiaoyu Lu啊...浪漫的爱情啊，美好又令人痴醉，伤心又断魂，通常所有的感觉 会同时汇集在一起。我们为什么总是用它来折磨自己呢？爱会让我们的生命有意义吗？亦或它使我们从孤寂和痛苦中解脱？还是用来掩饰我们对性的欲望吗？还是说它是身体戏弄我们去繁衍后代的 一个手段？爱是一切吗？我们真的需要爱吗？如果说爱情是有目的，自然科学和心理学上 至今却对此都没什么发展。但在历史的长河中，一些我们敬佩的哲学家 曾推出过一些有趣的理论。爱情使我们再一次变得完整。古希腊哲学家柏拉图探索了“爱让我们变得完整”这一理念在《会饮篇》中， 他描述了一个晚餐派对，派对上，一位喜剧演员，阿里斯托芬，讲了如下这个故事来娱乐在场的宾客：人类曾是拥有四个臂膀， 四条腿和两张脸的生物。有一天，他们惹到了众神，于是宙斯就把他们都一劈两半从此以后， 每个人都缺失着自己的另一半。爱是渴望找到一个能让我们 再次感到完整的灵魂伴侣。至少，这是柏拉图所相信的 一个喝醉的喜剧演员在派对上讲的话爱哄骗着我们有了小宝宝。很久很久以后， 德国的哲学家亚瑟·叔本华坚称爱是基于性欲的，它是一种撩人的幻想。他提出我们相爱是因为 我们的欲望引导我们相信另外一个人能让我们快乐， 但我们其实错了。我们的本性在 诱使着我们繁衍后代，我们所寻找的爱的融合 结生出我们的儿女。当我们的性欲得到满足时，我们会重返我们 痛苦焦灼的存在我们繁衍只是为了延续我们的种族然后持续循环着 这人生的痛苦听着好像有人需要抱抱了呢。爱是从孤单中的解脱。根据诺贝尔获奖者， 英国哲学家，博特兰·罗素所言我们用爱来慰藉 我们身体和心理上的欲望人类生来就是为了繁衍的，但没有充满激情的爱 来做迷幻剂的话，性也是无法令人满足的。我们对冰冷又残酷的恐惧 促使我们修炼出坚硬的外壳来保护并隔绝我们自己。爱的愉悦，亲密，和温暖 帮助我们克服对这世界的恐惧，逃脱我们孤独的外壳，让我们更完全的参与到生活中来。爱让我们整个人感到富足， 所以它成了生命中最棒的东西。爱是种容易被误解的苦难。悉达多·乔达摩，那个为人所知修成佛的，成功受到教化的人，或许能和罗素 有一段很有趣的争论。佛说，我们爱是为了 满足我们最基本的欲望但是，我们充满激情的渴望 反而成为我们的缺陷，负担，尽管是浪漫的爱情， 也会成为强大的痛苦源头。幸运的是， 佛发现了八正道，一个能使我们 消除杂欲的套路这样我们才能达到重生，一个令人愉悦的境界， 充满了平和，清静，智慧和热情小说家曹雪芹描述了这样一种佛教信仰浪漫的爱情 在一本名著里是充满讽刺性的，红楼梦在书中的一个情节中，贾瑞爱上了王熙凤尽管她戏弄并羞辱了他。爱和厌恶的矛盾让他近乎崩溃一个道士给了他一个魔镜， 告诉他这个墨镜可以帮他度过这个痛苦只要他不去看这面镜子但是贾瑞不出意外的看了这面镜子他在镜子中看到了王熙凤。他的灵魂进入了这面镜子，肉体便被死神的锁链拉走了。但不是所有的佛教徒都这样理解 浪漫的爱情和性欲但是整个故事的伦理尤其是这个充斥着魔法的悲剧和这个邪恶的魔镜一样，应该被消除。爱情让我们找到更棒的自己让我们在一个更积极一点的理论中结束。法国哲学家，西蒙娜·德·波伏娃提出，爱情是探索彼此的欲望，并且让人们的生活更有意义。但是，她并没怎么解释相爱的原因她更关心我们怎么样能更好的相爱。她发现了爱情中常见的问题，那就是爱情让人过于沉沦，我们往往倾向于把爱情，这种彼此依靠当作自身存在的理由这便很容易引起厌倦和控制欲。为了避免这个问题，波伏娃建议 人们应该相爱得更真实把爱情看成更高一层次的友谊爱人间支持彼此的同时发掘自身的潜力，达到更好的自己，充实自己的生活并让这世界变得更好尽管我们不知道我们为何相爱，我们可以确定的是这将是一场起伏颇多的旅程。他会变的可怕， 亦或是令人兴奋。会让我们痛苦，也会让我们心情高涨。也许我们会失去自我。也许会让我们找到更好的自己。会让我们心碎，也会成为最好的一段经历。你敢不敢试试？

**P326 2016-02-12 The controversial origins of the Encyclopedia - Addison Anderson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=326)

Denis Diderot left a dungeon outside Paris on November 3, 1749. He'd had his writing burned in public before, but this time, he'd gotten locked up under royal order for an essay about a philosopher's death bed rejection of God. To free himself, Denis promised never to write things like that again. So he got back to work on something a little like that, only way worse, and much bigger. In 1745, publisher André le Breton had hired Diderot to adapt the English cyclopedia, or a universal dictionary of arts and sciences for French subscribers. A broke writer, Diderot survived by translating, tutoring, and authoring sermons for priests, and a pornographic novel once. Le Breton paired him with co-editor Jean le Rond d'Alembert, a math genius found on a church doorstep as a baby. Technical dictionaries, like the cyclopedia, weren't new, but no one had attempted one publication covering all knowledge, so they did. The two men organized the French Enlightenment's brightest stars to produce the first encyclopedia, or rational dictionary of the arts, sciences, and crafts. Assembling every essential fact and principle in, as it turned out, over 70,000 entries, 20,000,000 words in 35 volumes of text and illustrations created over three decades of researching, writing, arguging, smuggling, backstabbing, law-breaking, and alphabetizing. To organize the work, Diderot adapted Francis Bacon's "Classification of Knowledge" into a three-part system based on the mind's approaches to reality: memory, reason, and imagination. He also emphasized the importance of commerce, technology, and crafts, poking around shops to study the tools and techniques of Parisian laborers. To spotlight a few of the nearly 150 philosoph contributers, Jean Jacques Rousseau, Diderot's close friend, wrote much of the music section in three months, and was never reimbursed for copy fees. His entry on political economy holds ideas he'd later develop further in "The Social Contract." D'Alembert wrote the famous preliminary discourse, a key statement of the French Enlightenment, championing independent investigative reasoning as the path to progress. Louis de Jaucourt wrote a quarter of the encyclopedia, 18,000 articles, 5,000,000 words, unpaid. Louis once spent 20 years writing a book on anatomy, shipped it to Amsterdam to be published uncensored, and the ship sank. Voltaire contributed entries, among them history, elegance, and fire. Diderot's entries sometimes exhibit slight bias. In "political authority," he dismantled the divine right of kings. Under "citizen," he argued a state was strongest without great disparity in wealth. Not surprising from the guy who wrote poetry about mankind strangling its kings with the entrails of a priest. So Diderot's masterpiece wasn't a hit with the king or highest priest. Upon release of the first two volumes, Louie XV banned the whole thing but enjoyed his own copy. Pope Clement XIII ordered it burned. It was "dangerous," "reprehensible," as well as "written in French," and in "the most seductive style." He declared readers excommunicated and wanted Diderot arrested on sight. But Diderot kept a step ahead of being shut down, smuggling proofs outside France for publication, and getting help from allies in the French Regime, including the King's mistress, Madame de Pompadour, and the royal librarian and censor, Malesherbes, who tipped Diderot off to impending raids, and even hid Diderot's papers at his dad's house. Still, he faced years of difficulty. D'Alembert dropped out. Rousseau broke off his friendship over a line in a play. Worse yet, his publisher secretly edited some proofs to read less radically. The uncensored pages reappeared in Russia in 1933, long after Diderot had considered the work finished and died at lunch. The encyclopedia he left behind is many things: a cornerstone of the Enlightenment, a testament to France's crisis of authority, evidence of popular opinions migration from pulpit and pew to cafe, salon, and press. It even has recipes. It's also irrepressibly human, as you can tell from Diderot's entry about a plant named aguaxima. Read it yourself, preferably out loud in a French accent.

**P326 2016-02-12 The controversial origins of the Encyclopedia - Addison Anderson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=326)

翻译人员: Qi Wang 校对人员: Gabriella Hu1749年11月3日，Denis Diderot 从巴黎郊外的监狱出狱过去他的文学作品曾当着公众的面被焚烧但是这一次，因为一篇关于哲学家临终时对神的反抗的文章， 皇家下令把他锁起来为使自己自由，Denis保证再也不写这样的文章因此他得以继续工作完成比之前更加艰巨的工作在1745年，出版商 André le Breton，雇佣Diderot按照英国百科全书改写，也就是一个艺术与科学综合大辞典供法国读者使用穷困潦倒的Diderot靠翻译家教为牧师创作布道维生甚至一度创作色情小说Le Breton找来一个小时候在教堂门阶被发现的数学天才Jean le Rond d'Alembert和Diderot一起工作像百科全书这样的技术辞典并不是史无前例的但是从来没有人尝试完成一个包含所有知识的出版物所以他们完成了这两个人组织起了法国启蒙运动最闪亮的新星人物共同编辑第一本百科全书也就是对艺术科学和手工艺专业知识的合理解释书中收集了所有的重要事实和原理，最终，在35卷书的文字和插图中创造了超过70,000个条目20,000,000个单词花费了超过三十年的时间去查阅资料写作，探讨走私偷运暗算与背叛，违反法律和最终排序完成为了组织这次工作Diderot借鉴了培根的 "知识分类"的思想并将其应用于从思维方法到实现的三大系统记忆推理和想象同时，通过走访商店学习巴黎劳动者的工具和技术他也强调了商业技术和手工艺的发展为了强调将近150位哲学家的贡献Diderot的好友卢梭在三个月的时间里创作了许多音乐片段并且从未要求报酬卢梭在政治经济领域的涉足最后发展为社会契约论D'Alembert 创作了著名的初步论成为法国启蒙的关键指导支持将独立的调查推理作为取得进步的方法Louis de Jaucourt 完成了百科全书的四分之一共计18,000篇文章5,000,000个单词没有收取报酬Louis曾花费20年写一本关于解剖学的书为了这本书完整地出版， Louis将其海运到阿姆斯特丹然后船沉了Voltaire贡献了许多条目包括历史高雅，还有火Diderot的条目有时候带有轻微的偏见在"政治的权力"中，他分散了国王神圣的权利在"公民"中他认为最强大的州应该没有贫富差距从一个能够写诗讲述人类用牧师的大肠扼杀国王的家伙得到这种言论并没有什么惊讶的所以Diderot的作品对国王或最高祭祀并不是一个打击在最早的两卷书发表的时候路易十五禁止发行全书但是很喜欢关于自己的那一册教宗克莱门特十三下令将其焚烧此书是"危险的""该被谴责的"也是"用法语写成"并且具有"最有诱导力的风格"他发表声明要将读者们逐出教会并且将Diderot立即逮捕但是Diderot在被停止之前继续前进将样张走私出法国出版还在法国政体中得到了支持者的帮助包括国王路易十五的情妇，庞巴度夫人和王室的图书管理员，Malesherbes他疏通关系让Diderot躲过了即将到来的袭击甚至把Diderot的材料藏在自己父亲的家中然而，Diderot还是度过了许多年的艰难生活D'Alembert退出了Rousseau在关于戏剧中某行话的争吵中与Diderot闹翻最糟的是 他的出版商偷偷地编辑了一些样张使它们读起来不那么激进Diderot认为竣工后，在饭桌上辞世了很久之后，未经审查的部分于1933年在俄罗斯再次出现他留下的百科全书意味着很多是启蒙的基石是法国权威遭到危机的证明是民众的意见从讲坛和皮尤研究中心迁移到咖啡馆，沙龙和媒体的证据它甚至包括食谱它同时也是一个精力充沛的人类从Diderot的一条关于名为aguaxima的植物的条目就可以看出这一点自己去阅读它吧，最好用法国口音大声朗读

**P327 2016-02-16 Why are there so many insects - Murry Gans**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=327)

If insects suddenly morphed into large beings, and decided to wage war on us, there's no doubt that humans would lose. We'd simply be crushed by their sheer numbers. There are an estimated 10 quintillion individual insects on Earth. That's a one followed by 19 zeroes. So, compared with our population of about 7 billion, these invertebrates outnumber us by more than a billion to one. Their astounding numbers exist at the species level, as well. There are more than 60,000 vertebrate species on the planet. But the class of insects contains a million known species, and many others that haven't been classified. In fact, these critters make up approximately 75% of all animals on Earth. So, what's their secret to success? Insect abundance comes down to many things that together make them some of the most adaptable and resilient creatures, beginning with their impressive ability to breed. Many species can produce hundreds of offspring within their lifetimes. Most offspring will die, but more than enough will survive into adulthood to reproduce. Offspring also mature very rapidly, so the cycle of reproduction resumes quickly, and can occur over and over again in a short time. These numbers mean that as a class, insects harbor a tremendous amount of genetic diversity. The different species contain a wealth of genetic data that give them the necessary adaptations they need to thrive in a range of environments across the planet. Even some of the most extreme environments are in bounds; Flat bark beetles can live at -40 degrees Fahrenheit, Sahara Desert ants can venture out when surface temperatures exceed 155 degrees, and some bumblebees can survive 18,000 feet above sea level. Insect exoskeletons also work like body armor, protecting insects against the outside world and helping them cope with habitats that other creatures can't. Even their small size, which we might see as a disadvantage, is something they use to their benefit. Because most species are so tiny, millions of insects can inhabit a small space and make use of all the available resources within it. This means they can occupy hundreds of different niches across ecosystems. Some insects survive by eating the roots, stems, leaves, seeds, pollen, and nectar of specific plants. Others, like wasps, make use of live insects by paralyzing the victims and laying their eggs inside so that when the hatchlings emerge, they can eat their way out and get nourishment. Mosquitos and biting flies feed on blood, taking advantage of this unusual resource to ensure their survival. And a whole bunch of other insects have built a niche around feces. Flies lay their eggs there, and some beetles even build large balls out of animal dung, which they eat and use as accommodation for their eggs. And then there's the insects' mighty power of metamorphosis. This trait not only transforms insects, but also helps them maximize the available resources in an ecosystem. Take butterflies. In their larval caterpillar form, they chomp hungrily through leaves at a rapid rate to help them grow and spin cocoons. But when they emerge as butterflies, these insects feed only on flower nectar. Metamorphosis means the larvae and adults of one species will never compete for the same resource, so they successfully share an ecological niche without limiting their own success. This process is so efficient that an incredible 86% of insect species undergo complete metamorphosis. We're big and they're small, so it's easy to forget that these critters are moving in their millions all around us, all the time. But examine almost any patch of ground, and you're sure to find them there. Their numbers are immense, and their success is unmatched. We may have to accept that it's insects, not us, that are the true conquerors of the planet.

**P327 2016-02-16 Why are there so many insects - Murry Gans**

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翻译人员: Candice Tang 校对人员: Gabriella Hu如果有一天，所有的昆虫突然都变大了并且要和我们开战那我们人类必输无疑我们会轻易地败给它们庞大的数量据估计，地球上有一千亿亿个昆虫个体就是1后面有19个零人类人口是70亿这些无脊椎动物的数量与我们相比是十亿比一它们惊世骇俗的数量也在物种层面有所体现地球上有超过六万种脊椎动物但是昆虫纲包括了一百万种已知的物种以及许多还未被分类的物种事实上，这些生物大约占据了 地球上75%的动物数量那么，它们如此大量的秘诀是什么？昆虫的巨大数量归因于许多方面这些因素使得昆虫成为适应性最强、 最有弹性的生物第一条就是它们极强的繁育能力许多种类的昆虫在一生中可以繁育出上百个后代大多数幼虫会死亡但存活下来并长成成虫继续繁育的幼虫数量 足以保证这个物种繁衍生息幼虫的生长速度也非常快所以一个繁衍周期的轮回很快在短时间内可以一遍又一遍地循环这些数字说明了昆虫纲拥有非常丰富的遗传多样性不同的物种有着大量的基因组使得它们能获得在世界各种生存环境中得以繁衍生息所需的适应能力即使是一些最恶劣的环境 也在它们的承受范围之内扁甲虫可以在-40°F（-40°C）的 环境中生存撒哈拉沙漠蚁在地表温度超过155°F（68°C）时还能活动自如一些黄蜂甚至可以在18000英尺（5486米）的 地区生存昆虫的外骨骼就像保护身体的盔甲一样抵御外部环境的伤害帮助它们应对其他生物不能生存的栖息地即使它们体型很小我们也许把这个看做一项劣势，有时候它们也利用这点成为一项优势由于大部分种类的昆虫都非常小数百万的昆虫可以栖息在一个很小的地方并且这地方所有的资源都可以为它们所用这意味着它们可以在整个生态系统中占据 成百上千的小生境一些昆虫靠吃某种植物的根生存一些吃茎或是叶子种子花粉以及花蜜另一些昆虫，比如胡蜂会利用其它昆虫麻痹受害者，把卵产在它的体内当卵孵化成功以后幼虫就可以通过啃食尸体获得养分蚊子和蛰蝇以血为食依靠这种特别的食物得以生存还有很多其它昆虫以粪便为存活的依靠苍蝇在其中产卵有些甲虫甚至会把动物的粪便滚成球作为食物以及卵的孵化场下面要说的是昆虫强大的变态能力这一特征不仅让昆虫变形、进化更可以让它们最大限度地利用生态系统中的 可用资源以蝴蝶为例在处于毛毛虫的幼虫阶段它们会不停地、快速地啃食树叶来帮助它们生长并结茧但当它们变成蝴蝶后它们只吃花粉了生物变态意味着同一个物种的幼虫期和成虫期绝对不会抢夺相同的食物它们可以完美地共享同一个生态环境又不会限制自己的生长这一过程是非常高效的所以有86%的昆虫物种会经历完全变态人类比较大，而昆虫非常小有时候我们很容易忘记这些生物一直在我们的周围活动几百万几百万为一群但如果你随便翻看一小块土地都能看到它们的身影它们的数量是巨大的， 它们的成功是无可比拟的我们必须接受这样的事实昆虫才是这个星球真正的主宰者而不是人类

**P328 2016-02-24 How ancient art influenced modern art - Felipe Galindo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=328)

The term modern art sounds like it means art that is popular at the moment, but in fact, modern art is a style that originated over 150 years ago, and includes artists that by now have attained classic status, such as Picasso, Matisse, and Gauguin. And what's even more ironic is that the movement they pioneered, considered revolutionary and even scandalous at the time, was inspired largely by an object of a traditional and ancient design. As far back as the Renaissance, the primary European art movements emphasized conventional representation and adherence to classical forms. But that began to change in the late 19th century as artists like Van Gogh and Cézanne expanded the boundaries of painting. Soon, a movement arose that sought to create an entirely new style of art, and one way of doing so was to look beyond Western civilization. For example, Paul Gauguin moved to the island of Tahiti in the 1890s. There, he found inspiration in the island's inhabitants, landscape, and culture to create artwork that intertwined European themes and Polynesian lore. Others looked the cultures of the Islamic world, but the most influential inspiration would come from Sub-Saharan Africa. As European empires expanded deeper into the African continent, its artifacts and artworks made their way into the hands of museums and collectors. One such collector was Henri Matisse, who showed his friend Picasso a mask he had acquired made by the Dan tribe of the Ivory Coast. The mask awoke Picasso's curiosity, leading him to visit the Trocadéro Ethnographic Museum in Paris in 1907. Founded to house acquisitions from colonial conquests, the museum boasted a collection of African art, with stylized figures and masks made of wood and decorated with simple colors and materials. The visit was a revelation for Picasso, who proclaimed that African masks were what painting was all about. At this time, Picasso had been working on a painting of five nude women in a style that would later come to be known as Cubism. And while three of these ladies show facial features found in ancient Iberian art, a nod to Picasso's Spanish heritage, the faces of the two on the right closely resemble African masks. Created in 1907 after hundreds of sketches and studies, "Les Demoiselles d'Avignon" has been considered the first truly 20th century masterpiece, breaking with many previously held notions in art. It was at once aggressive and abstract, distorted yet primal in its raw geometry, a new artistic language with new forms, colors, and meanings. And these avant-garde qualities caused a sensation when the painting was first exhibited almost ten years later. The public was shocked, critics denounced it as immoral, and even Picasso's own friends were simultaneously surprised, offended, and mesmerized at his audacity. More artists soon followed in Picasso's footsteps. Constantin Brâncuși and Amedeo Modigliani in Paris, as well as the German Expressionists, all drew on the aesthetics of African sculptures in their work. Others looked to a different continent for their inspiration. British sculptor Henry Moore based many of his semi-abstract bronze sculptures on a replica of a chacmool, a distinctive reclining statue from the Toltec-Maya culture. Pre-Columbian art was also a major influence for Josef Albers. He created a series of compositions, such as the geometrical series Homage to the Square, that were inspired by pyramids and local art he encountered on his frequent visits to Mexico. Inspiration from ancient cultures initiated one of the most revolutionary movements in art history, but were these artists playing the role of explorers or conquistadors, appropriating ideas and profiting from cultures they considered primitive? Questions like this deserve scrutiny, as artists continue to redefine standards. Perhaps not too long from now, the bold innovations of modern art will seem like stale orthodoxies, ready to be overturned by a new set of radical trailblazers drawing inspiration from another unlikely source.

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翻译人员: Mingyu Cui 校对人员: Gabriella Hu“现代艺术”这个词的字面意思是： 现下流行的艺术，但是事实上，现代艺术是一种 起源于150多年以前的艺术形式，更具有讽刺意味的是， 现在被称作“经典”的艺术家们，例如毕加索、马蒂斯和高更，他们发起的这场在当时 被认为是革命性的甚至可耻的运动，受到了许多传统古老样式物品的启发。早在文艺复兴时期，主要的欧洲艺术运动强调传统的表现方式 和对经典样式的依附。但随着像梵高和塞尚的艺术家拓宽了绘画的界限，这种情况在19世纪后期开始改变。很快，一个致力于创造一种 新艺术形式的运动开始了，其方法之一是，关注西方文明之外。例如，保罗·高更 在19世纪90年代搬到了塔西提岛。他从那里的居民、景观和文化中受到启发，创造了既有欧洲主题又有波利尼西亚文化的艺术品。其他的一些人关注伊斯兰世界文化，最具有影响力的灵感来源于撒哈拉以南的非洲。随着欧洲帝国向非洲大陆内部的扩张，它的工艺品和艺术品被博物馆和收藏家收藏。亨利·马蒂斯就是其中一个收藏家，他向朋友毕加索展示了一个 他得到的由科特迪瓦的吉奥部落制造的面具。这个面具引起了毕加索的好奇，于是他在1907年参观了 巴黎特罗卡德罗地区（夏乐宫地区）的人种博物馆。这座博物馆收藏了殖民征服战争的战利品，拥有大量非洲艺术品，有风格一致的图案和木制的面具，简单的颜色和材料装饰着它们。这些启发了毕加索，他认为非洲面具具有绘画的全部含义。此时的毕加索正在创作一幅五个裸体女人的画，这幅画的风格在后来被叫做立体主义。其中的三个女人有古老的伊比利亚艺术的脸部特征，这反映了毕加索是西班牙的后裔，另外，靠右的两个女人的脸则特别像非洲面具。1907年创造，在几百次的素描和思忖之后，《亚维农的少女》("Les Demoiselles d'Avignon")被认为是20世纪的第一个真正的杰作，它打破了许多人们先前对于艺术的认识。这幅画曾被认为具有侵略性并且抽象，扭曲并且具有原始的几何图形，是具有新形式、色彩和意义的新艺术语言。当这幅画在十年后第一次展出时，这些先锋派的特点引起了轰动。公众震惊了，批评家抨击它不道德，甚至毕加索的朋友也表示惊讶，感到冒犯，被他胆大鲁莽的行为惊呆了。很快，更多的艺术家追随了毕加索的脚步。巴黎的康斯坦丁·布朗库西和 阿美迪欧·莫蒂里安尼，还有德国的表现派画家们，都在自己的画作中加入了 非洲雕像的美学元素。其他人从不同来源获得灵感：英国雕塑家亨利·摩尔以一个查克穆尔的复制品 作为其半抽象铜雕的基础，查克穆尔是一个与众不同的 从托尔特克文化和玛雅文化中的倾斜雕塑；约瑟夫·亚伯斯受到了前哥伦布时代艺术极大的影响。他创作的一系列作品，例如几何系列《向正方形致敬》，受到了金字塔和他在频繁造访墨西哥途中 遇到的当地艺术启发的。从古老文化中来的灵感 开启了艺术史中最革命性的运动之一，但这些艺术家是否扮演着探险家和征服者的角色，利用自认为原始的文化并从中获利？像这样的问题应该仔细思考， 因为艺术家们一直在重新定义标准。也许不久以后，现代艺术的大胆革新也会成为陈旧的观念，将被一群从另一个不大可能的资源中获得灵感的新先驱者彻底推翻。授课：菲利普·加林多，旁白：阿迪森·安德森，动画：TED-教育完整课程在ed.ted.com

**P329 2016-02-25 Can wildlife adapt to climate change - Erin Eastwood**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=329)

Rising temperatures and seas, massive droughts, changing landscapes. Successfully adapting to climate change is growing increasingly important. For humans, this means using our technological advancement to find solutions, like smarter cities and better water management. But for some plants and animals, adapting to these global changes involves the most ancient solution of all: evolution. Evolutionary adaptation usually occurs along time scales of thousands to hundreds of thousands of years. But in cases where species are under especially strong selective conditions, like those caused by rapidly changing climates, adaptive evolution can happen more quickly. In recent decades, we've seen many plants, animals, and insects relocating themselves and undergoing changes to their body sizes, and the dates they flower or breed. But many of these are plastic, or nonheritable changes to an individual's physical traits. And there are limits to how much an organism can change its own physiology to meet environmental requirements. That's why scientists are seeking examples of evolutionary changes coded in species' DNA that are heritable, long-lasting, and may provide a key to their future. Take the tawny owl. If you were walking through a wintry forest in northern Europe 30 years ago, chances are you'd have heard, rather than seen, this elusive bird. Against the snowy backdrop, its plumage would have been near impossible to spot. Today, the landscape is vastly different. Since the 1980s, climate change has led to significantly less snowfall, but you'd still struggle to spot a tawny owl because nowadays, they're brown. The brown color variant is the genetically dominant form of plumage in this species, but historically, the recessive pale gray variant triumphed because of its selective advantage in helping these predators blend in. However, less snow cover reduces opportunities for camouflage, so lately, this gray color variant has been losing the battle against natural selection. The offspring of the brown color morphs, on the other hand, have an advantage in exposed forests, so brown tawny owls are flourishing today. Several other species have undergone similar climate-change-adaptive genetic changes in recent decades. Pitcher plant mosquitoes have rapidly evolved to take advantage of the warmer temperatures, entering dormancy later and later in the year. Two spot ladybug populations, once comprised of equal numbers of melanic and non-melanic morphs, have now shifted almost entirely to the non-melanic color combination. Scientists think that keeps them from overheating. Meanwhile, pink salmon have adapted to warmer waters by spawning earlier in the season to protect their sensitive eggs. And wild thyme plants in Europe are producing more repellent oils to protect themselves against the herbivores that become more common when it's warm. These plants and animals belong to a group of about 20 identified species with evolutionary adaptations to rapid climate change, including snapping turtles, wood frogs, knotweed, and silver spotted skipper butterflies. However, scientists hope to discover more species evolving in response to climate change out of 8.7 million species on the planet. For most of our planet's astounding and precious biodiversity, evolution won't be the answer. Instead, many of those species will have to rely on us to help them survive a changing world or face extinction. The good news is we already have the tools. Across the planet, we're making on-the-ground decisions that will help entire ecosystems adapt. Critical climate refuges are being identified and set aside, and projects are underway to help mobile species move to more suitable climates. Existing parks and protected areas are also doing climate change check-ups to help their wildlife cope. Fortunately, it's still within our power to preserve much of the wondrous biodiversity of this planet, which, after all, sustains us in so many ways.

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翻译人员: Zhaohan Li 校对人员: Cho Well日渐升高的温度和海平面严重的干旱变化的地形这一切都让使成功适应气候变化的能力变得更为重要对于我们人类来说，是使用先进的科技，去找寻解决的方案例如更加智能的城市和更加完善的水资源管理但是对于动物和植物来说要想适应这些变化，需要最为古老的方式那就是，进化进化通常需要几亿甚至是几十亿年的时间但是在例如急速的气候变化之类的极其严苛的淘汰环境下物种正在进行着迅速的进化在最近的几十年里我们见证了很多植物动物昆虫的迁移他们经历了体型大小的变化以及开花、繁殖时间的变化但是对于个体的生理特征来说，许多变化都是可塑的即不能够遗传的变化而且一个生物体为了适应环境要求所能改变自己生理机能的能力是有限的这就是为什么科学家们正在从物种的DNA中找寻进化的例子这些进化出来的变化是可遗传的是持久的并且对物种的未来意味着很多以灰林鸮为例如果30年前，你行走在北欧寒风刺骨的森林里你可能看不到这种难觅踪迹的鸟而只可能听到它们的声音在白雪的背景下它们的羽毛难以被发现今天，情况大为不同自从上世纪80年代气候变化导致降雪量急剧减少但你还是很难找到灰林鸮因为现在它们变成棕色了这种棕色变异是这种物种的显性性状但历史上是浅灰色隐性性状占了上风因为这些有选择性的特殊的优势，这些捕食者得以融入环境但是，降雪量减少让它们的伪装效果下降所以在最近的自然选择里灰色变异只占了下风然而，那些有着棕色变异的后代在暴露的森林里具有优势棕色的灰林鸮越来越多其他的一些物种在最近几十年也经历了类似的适应气候变化的变异猪笼草蚊快速地进化它们越来越晚的进入冬眠以利用更加温暖的天气之前有同等数量黑色和非黑色变异的二星瓢虫现在完全变成了非黑色科学家认为这有利于使它们身体温度不会过高与此同时，那些通过更早产卵来保护脆弱的卵的细磷大马哈鱼适应了更加温暖的水域欧洲的野百里香分泌了更多的防护油来保护自己免受因为温暖天气产生的越来越多的食草动物的侵扰这些物种属于一个有20种明确物种的种群这些物种有着包括蛇鳄龟在内的为了适应气候变化而产生进化的物种如林蛙紫菀科植物以及银斑弄蝶然而，科学家们希望在地球上的八千七百万物种中发现更多帮助适应气候变化的物种进化因为对于我们星球珍贵惊人的生物多样性来说进化不是最终的答案反之，很多物种需要依靠我们去帮助它们在一个变化的世界生存下来否则，它们将会灭亡好消息是我们已经有了一些工具全球范围内，我们已经做出了一些实实在在的决定那些决定将会帮助整个生态系统去适应那些受气候变化影响极大的气候“难民”正在被鉴定和保护那些帮助迁徙物种的计划正在进行它们可以迁徙到更加合适的气候环境中去现有的公园和保护区正在开展气候变化调查来帮助野生动物适应幸运的是，这一切还在我们的控制之内我们还能够保护这个星球上奇异的生物多样性，毕竟它们正在通过各种方式支持着我们人类的生存

**P330 2016-02-25 Can you solve the frog riddle - Derek Abbott**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=330)

So you're stranded in a huge rainforest, and you've eaten a poisonous mushroom. To save your life, you need the antidote excreted by a certain species of frog. Unfortunately, only the female of the species produces the antidote, and to make matters worse, the male and female occur in equal numbers and look identical, with no way for you to tell them apart, except that the male has a distinctive croak. And it may just be your lucky day. To your left, you've spotted a frog on a tree stump, but before you start running to it, you're startled by the croak of a male frog coming from a clearing in the opposite direction. There, you see two frogs, but you can't tell which one made the sound. You feel yourself starting to lose consciousness, and realize you only have time to go in one direction before you collapse. What are your chances of survival if you head for the clearing and lick both of the frogs there? What about if you go to the tree stump? Which way should you go? Press pause now to calculate odds yourself. 3 2 1 If you chose to go to the clearing, you're right, but the hard part is correctly calculating your odds. There are two common incorrect ways of solving this problem. Wrong answer number one: Assuming there's a roughly equal number of males and females, the probability of any one frog being either sex is one in two, which is 0.5, or 50%. And since all frogs are independent of each other, the chance of any one of them being female should still be 50% each time you choose. This logic actually is correct for the tree stump, but not for the clearing. Wrong answer two: First, you saw two frogs in the clearing. Now you've learned that at least one of them is male, but what are the chances that both are? If the probability of each individual frog being male is 0.5, then multiplying the two together will give you 0.25, which is one in four, or 25%. So, you have a 75% chance of getting at least one female and receiving the antidote. So here's the right answer. Going for the clearing gives you a two in three chance of survival, or about 67%. If you're wondering how this could possibly be right, it's because of something called conditional probability. Let's see how it unfolds. When we first see the two frogs, there are several possible combinations of male and female. If we write out the full list, we have what mathematicians call the sample space, and as we can see, out of the four possible combinations, only one has two males. So why was the answer of 75% wrong? Because the croak gives us additional information. As soon as we know that one of the frogs is male, that tells us there can't be a pair of females, which means we can eliminate that possibility from the sample space, leaving us with three possible combinations. Of them, one still has two males, giving us our two in three, or 67% chance of getting a female. This is how conditional probability works. You start off with a large sample space that includes every possibility. But every additional piece of information allows you to eliminate possibilities, shrinking the sample space and increasing the probability of getting a particular combination. The point is that information affects probability. And conditional probability isn't just the stuff of abstract mathematical games. It pops up in the real world, as well. Computers and other devices use conditional probability to detect likely errors in the strings of 1's and 0's that all our data consists of. And in many of our own life decisions, we use information gained from past experience and our surroundings to narrow down our choices to the best options so that maybe next time, we can avoid eating that poisonous mushroom in the first place.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=330)

翻译人员: Jessie Lan 校对人员: Gabriella Hu假如你被困在一个巨大的热带雨林里，然后你吃了一个毒蘑菇。想要自救， 你需要由青蛙分泌的一种解药。不幸的是，只有雌性青蛙才能分泌这种解药。然而更糟糕的是，雌雄青蛙数目一样且长相一样。你没有办法区分他们。除了雄性青蛙有不一样的叫声。可能只是你运气好，在你的左边， 你看到一只青蛙在树桩上。但在你冲向它之前，你被一只雄性青蛙的叫声吓到了，声音很明显来自相反的方向的空地。在那里有两只青蛙，但是你并不能分辨是哪一只青蛙叫的。你感觉到自己开始逐渐失去意识，并且意识到在你晕倒之前你只有足够的时间往一个放向去。你的生存几率是什么呢，如果你去空地然后舔那里的两只青蛙？去树桩的生存几率又是多少呢？你应该去哪一边？请暂停视频思考两个选择的利与弊。三二一如果你选择去空地，你的选择是正确的。但是困难的是如何正确的计算几率。有两个常见的不正确的解决办法第一个：假设雌雄青蛙数量大致相同，一只青蛙是雌或是雄的概率是零点五或者百分之五十因为所有的青蛙都是独立的个体在你选择的时候，任意一只青蛙是雌性的可能性应该仍为百分之五十对于树桩部分，这个逻辑其实是正确的但是对于空地来说不是第二个错误答案：首先，你看到空地有两只青蛙，现在你知道至少其中一只是雄性，但是两只都是的可能性是多少呢？如果任意一只青蛙是雄性的几率是百分之五十，把两个可能性相乘，得到零点二五。也就是四分之一或百分之二十五。这么说，百分之七十五的可能性其中一只是雌性青蛙然后你能获得解药。正确答案是：去空地你能获得三分之二的生存几率，百分之六十七如果你在想这怎么可能是正确答案，是因为条件可能性让我们来看看为什么当我们一开始看到两只青蛙的时候，有几个可能的雌雄组合，如果我们把所有可能性写出来，就有数学家所谓的样本空间就像我们看到的一样，在四个可能性中，只有一个可能性有两只雄青蛙那为什么百分之七十五的答案是错误的呢？因为青蛙叫给了我们额外的信息当我们知道了其中一只是雄性的时候，这就告诉我们这其中不可能有两只雌性青蛙也就是说我们可以从样本空间中删除那一个可能性。留给我们的是三个可能的组合其中一个是两个雄性所以有雌性青蛙的概率是三分之二或者是百分之六十七这就是条件概率。一开始， 你有一个很大的样本空间， 其中包含每一种可能性。但是每一则额外的信息可以让你删除一些可能性。样本空间逐渐减小，获得一个特定的组合几率则增大。要点是：信息会影响可能性。条件可能性并不只是抽象的数学游戏它在现实生活中会出现电脑和其他的装置会使用条件可能性在1 和 0 中 来侦测我们数据中的潜在错误在我们的日常生活中，我们会利用过去经历和周边环境获得的信息来缩小选择以获得最佳选项所以可能下次，我们可以在最开始的时候避免吃那个有毒的蘑菇。

**P331 2016-03-01 This is Sparta - Fierce warriors of the ancient world - Craig Zimmer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=331)

In ancient Greece, violent internal conflict between bordering neighbors and war with foreign invaders was a way of life, and Greeks were considered premier warriors. Most Greek city-states surrounded themselves with massive defensive walls for added protection. Sparta in its prime was a different story, finding walls unnecessary when it had an army of the most feared warriors in the ancient world. So what was Sparta doing differently than everyone else to produce such fierce soldiers? To answer that question, we turn to the written accounts of that time. There are no surviving written accounts from Spartans themselves, as it was forbidden for Spartans to keep records, so we have to rely on those of non-Spartan ancient historians, like Herodotus, Thucydides, and Plutarch. These stories may be embellished and depict Sparta at the apex of its power, so take them with a grain of salt. For Spartans, the purpose for their existence was simple: to serve Sparta. On the day of their birth, elder Spartan leaders examined every newborn. The strong healthy babies were considered capable of fulfilling this purpose, and the others may have been left on Mount Taygetus to die. Every Spartan, boy or girl, was expected to be physically strong, mentally sharp, and emotionally resilient. And it was their absolute duty to defend and promote Sparta at all costs. So in the first years of their lives, children were raised to understand that their loyalty belonged first to Sparta, and then to family. This mindset probably made it easier for the Spartan boys, who upon turning seven, were sent to the agoge, a place with one main purpose: to turn a boy into a Spartan warrior through thirteen years of relentless, harsh, and often brutal training. The Spartans prized physical perfection above all else, and so the students spent a great deal of their time learning how to fight. To ensure resilience in battle, boys were encouraged to fight among themselves, and bullying, unlike today, was acceptable. In order to better prepare the boys for the conditions of war, the boys were poorly fed, sometimes even going days without eating. They also were given little in the way of clothing so that they could learn to deal with different temperatures. Spartan boys were encouraged to steal in order to survive, but if they were caught, they would be disciplined, not because they stole, but because they were caught in the act. During the annual contest of endurance in a religious ritual known as the diamastigosis, teenage boys were whipped in front of an altar at the Sanctuary of Artemis Orthia. It was common for boys to die on the altar of the goddess. Fortunately, not everything was as brutal as that. Young Spartans were also taught how to read, write, and dance, which taught them graceful control of their movements and helped them in combat. While the responsibilities for the girls of Sparta were different, the high standards of excellence and expectation to serve Sparta with their lives remained the same. Spartan girls lived at home with their mothers as they attended school. Their curriculum included the arts, music, dance, reading, and writing. And to stay in peak physical condition, they learned a variety of sports, such as discus, javelin, and horseback riding. In Sparta, it was believed that only strong and capable women could bear children that would one day become strong and capable warriors. To all Spartans, men and women, perhaps the most important lesson from Spartan school was allegiance to Sparta. To die for their city-state was seen as the completion of one's duty to Sparta. Upon their death, only men who died in battle and women who died in childbirth were given tombstones. In the eyes of their countrymen, both died so that Sparta could live.

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翻译人员: Cissy Yun 校对人员: Mingyu Cui在古希腊，邻国之间暴力的内部冲突和与外侵者的战争是家常便饭。而希腊人被看作是顶尖的战士。大多数希腊城邦在边界筑起严实的城墙作为附加的保护措施。最健壮的斯巴达勇士则是另一回事。在古代，当有一只令人恐惧的军队时，城墙便没有了必要性。那么斯巴达是用什么独特的方式来训练如此矫勇善战的士兵的呢？我们可以从当时的文献中寻找答案 来解答这个问题。斯巴达人没有任何书写的文献留存 ，因为保留记录是被斯巴达人禁止的。所以我们只能依靠非斯巴达的古代历史学家的记录比如希罗多德，修昔底德和普鲁塔克。这些故事或许被润色过，描述的是斯巴达在战争中的顶峰状态，所以我们对这些故事持保留态度。对一斯巴达人来说，他们的存在目的非常简单：即服务于斯巴达。在他们出生的那天，年长的斯巴达领导会测试每一个新生儿。强壮健康的宝宝会被认为可以 训练成斯巴达勇士来保卫城邦，其他的可能会被遗弃在塔吉图斯山上等死。每一个斯巴达人，无论男女 ， 都被期望拥有强健的身躯、敏锐的头脑、和极强的韧性。不论付出多大的代价， 他们的唯一义务就是保卫和扩大斯巴达。在他们的幼年，孩子就开始被要求理解 他们首先需忠于斯巴达，其次忠于家庭。这种认知也许让斯巴达男孩 更容易地理解他们的未来满七岁的男孩要被送到“斯巴达教育营”，为了一个目的：通过十三年不休的、艰苦的、甚至残酷的训练，将他们变成一个斯巴达勇士。斯巴达人最嘉奖体能的强健，所以学生们用大多时间来学习如何战斗。为了确保他们在一场战斗中持久性，男孩们被鼓励打架，而与今天不同，欺凌是被接受的。为了更好地让这些男孩 提前适应战场上的情况，给这些男孩的伙食都非常差，有时很多天都不进食。他们常常衣衫褴褛，为的是让他们去适应不同的温度。斯巴达男孩常常被鼓励 “为了生存，可以偷窃”，但是如果他们被抓了现行，就会被惩罚；惩罚的并非偷窃本身，而是偷窃被人逮到。在一场名为“惩戒赛”的一年一度的宗教性忍耐力比赛里，青少年男孩们会在阿尔忒弥斯神庙中的圣坛上被鞭挞。男孩们在圣坛中被鞭挞致死是很常见的事。幸运的是，还有一些不那么残忍的事。年轻的斯巴达人也会学习阅读、写作、舞蹈。这些都会教会他们优雅地控制动作，帮助他们更好的战斗。虽然斯巴达女孩肩负的责任有所不同，高标准、严要求，和一生奉献给斯巴达城的目标是不变的。斯巴达女孩上学时与母亲住在家里。她们的课程包括艺术、音乐、舞蹈、阅读和写作。为了使身体一直处于巅峰状态， 她们学习一系列运动，比如说铁饼、标枪与马术。在斯巴达，人们相信只有强壮和有能力的女人，才能孕育出可以成为强壮厉害的士兵的孩子。对于所有的斯巴达人来说，无论男女，学校里教的最重要的一课便是对斯巴达的忠诚。为城邦而亡被看做完成斯巴达人人生的一项重要责任。他们死后，只有在战场上牺牲的烈士和难产的母亲可以有墓碑。因为在人们眼中， 他们的牺牲都是为了斯巴达的长盛。

**P332 2016-03-02 What is metallic glass - Ashwini Bharathula**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=332)

Steel and plastic. These two materials are essential to so much of our infrastructure and technology, and they have a complementary set of strengths and weaknesses. Steel is strong and hard, but difficult to shape intricately. While plastic can take on just about any form, it's weak and soft. So wouldn't it be nice if there were one material as strong as the strongest steel and as shapeable as plastic? Well, a lot of scientists and technologists are getting excited about a relatively recent invention called metallic glass with both of those properties, and more. Metallic glasses look shiny and opaque, like metals, and also like metals, they conduct heat and electricity. But they're way stronger than most metals, which means they can withstand a lot of force without getting bent or dented, making ultrasharp scalpels, and ultrastrong electronics cases, hinges, screws; the list goes on. Metallic glasses also have an incredible ability to store and release elastic energy, which makes them perfect for sports equipment, like tennis racquets, golf clubs, and skis. They're resistant to corrosion, and can be cast into complex shapes with mirror-like surfaces in a single molding step. Despite their strength at room temperature, if you go up a few hundred degrees Celsius, they soften significantly, and can be deformed into any shape you like. Cool them back down, and they regain the strength. So where do all of these wondrous attributes come from? In essence, they have to do with metallic glass' unique atomic structure. Most metals are crystalline as solids. That means that if you zoomed in close enough to see the individual atoms, they'd be neatly lined up in an orderly, repeating pattern that extends throughout the whole material. Ice is crystalline, and so are diamonds, and salt. If you heat these materials up enough and melt them, the atoms can jiggle freely and move randomly, but when you cool them back down, the atoms reorganize themselves, reestablishing the crystal. But what if you could cool a molten metal so fast that the atoms couldn't find their places again, so that the material was solid, but with the chaotic, amorphous internal structure of a liquid? That's metallic glass. This structure has the added benefit of lacking the grain boundaries that most metals have. Those are weak spots where the material is more susceptible to scratches or corrosion. The first metallic glass was made in 1960 from gold and silicon. It wasn't easy to make. Because metal atoms crystallize so rapidly, scientists had to cool the alloy down incredibly fast, a million degrees Kelvin per second, by shooting tiny droplets at cold copper plates, or spinning ultrathin ribbons. At that time, metallic glasses could only be tens or hundreds of microns thick, which was too thin for most practical applications. But since then, scientists have figured out that if you blend several metals that mix with each other freely, but can't easily crystallize together, usually because they have very different atomic sizes, the mixture crystallizes much more slowly. That means you don't have to cool it down as fast, so the material can be thicker, centimeters instead of micrometers. These materials are called bulk metallic glasses, or BMGs. Now there are hundreds of different BMGs, so why aren't all of our bridges and cars made out of them? Many of the BMGs currently available are made from expensive metals, like palladium and zirconium, and they have to be really pure because any impurities can cause crystallization. So a BMG skyscraper or space shuttle would be astronomically expensive. And despite their strength, they're not yet tough enough for load-bearing applications. When the stresses get high, they can fracture without warning, which isn't ideal for, say, a bridge. But when engineers figure out how to make BMGs from cheaper metals, and how to make them even tougher, for these super materials, the sky's the limit.

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翻译人员: Emma Gao 校对人员: Mingyu Cui钢铁和塑料，这两种材料对于基础设施和科学技术都很重要，并且他们有互补的优点和缺点。钢铁又硬又坚韧，但是却很难塑造出复杂的造型。塑料很容易被塑造成各种形状，但是又脆又软。所以，如果这个世界上有一种材料能像钢铁一样坚硬又能像塑料一样容易塑形，那该多好？因此，很多科学家和技术人员都为一个新发明而感到兴奋－－金属玻璃，它同时拥有这两个优点！金属玻璃看着像金属一样闪闪发光，并且不透明，同时还可以像金属一样导热和导电。但是它要比大多数金属坚硬得多，这也就意味着它们可以承受很强的力，却不会被折弯或折断，所以它们可以被用来制作超锋利的手术刀、超耐摔的电子产品、铰链、螺钉，它可以制作的东西还不止于此。金属玻璃还有一个超牛的本领它可以储备并且释放弹性势能，这个优点让它们成为制造体育用品优越的材料。比如网球拍、高尔夫球杆和雪杖。它不易被腐蚀，并且可以塑造出有着光滑表面的复杂造型。而这些，仅仅需要模具塑形。尽管它在常温下很坚韧，如果你把它放在几百度的高温下它便能很快的变软，并且塑造出各种各样你喜欢的形状。当把它冷却下来，就又会恢复之前的强度。它的这些奇妙之处都从哪里来的呢？从本质上来看，这些都归根于它奇特的分子结构。大多数金属都是晶体般的的固体结构，这也就意味着当你把它放在显微镜下放大去观察它的分子结构，分子是整齐地周期性排列着的，排满整块金属。冰、钻石、还有盐，都是晶体。如果你把以上这些加热并且融化，他们的分子就被释放出来并可以自由移动，但当你再一次把它冷却下来，这些原子便自发的重新排列起来，重新变成晶体结构。但是如果你可以很快地融化这些金属，快到原子们找不到它们应在的位置，那么这时，金属虽然变成了固体，但是却拥有像液体一样混乱的非晶体结构。这便是金属玻璃。这种结构优点还有：它没有晶粒边界，大多数金属有晶粒边界。晶粒边界是大多数金属最容易被刮破的脆弱的地方，这些地方也容易被腐蚀。【加州理工学院】 金属玻璃最初是由金子和硅在1960年做出来的。这并不容易。因为金属原子结晶极为迅速，所以科学家们必须极快地把合金冷却，大概是以一百万开氏度每秒，他们把微粒射向冷铜片或者极薄的旋转带。在那时，金属玻璃只能有几十或几百微米厚，这在应用中非常不切实际。但是在那时以后，科学家们便发现如果你将几种可以任意混合的金属混合在一起，它们便很难在一起结晶，这往往归因于它们的原子大小不同，它们的混合体结晶就慢了很多。这也就意味着你不需要那么快降温，所以最后得到的材料变得厚了很多，可以达到几厘米厚。这种材料被叫做块状金属玻璃，或BMGs。现在我们有几百种不同的BMG，但是我们为什么不用他们做桥，做车呢？已知的玻璃金属都是用昂贵材料做的，比如钯和锆，并且用的都是极纯净的金属，因为任何杂质都会加速结晶。所以不管是用玻璃金属制作摩天大楼还是航天飞机都过于昂贵。尽管它们坚硬，可它们的韧性还不足以做承重类的应用。当压力很大的时候，它们容易毫无预兆地折断，这对于造桥可并不理想。但是如果工程师们可以想出怎么能用便宜的金属制造金属玻璃，同时也想出怎么能让它们的韧性变强，那么这些材料便把人类的极限推到了天界的尽头。

**P333 2016-03-03 Why is this painting so captivating - James Earle and Christina Bozsi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=333)

On first glance, this painting might not seem terribly special, but it's actually one of the most analyzed paintings in the history of art. It's called "Las Meninas," or "The Maids of Honor," painted by Diego Velázquez in 1656, and it depicts a scene in the life of the Spanish Royal Court. A well-dressed child princess refuses a glass of water from a handmaid, while a dwarf teases a dog. A second dwarf stands next to them, while the artist himself pauses at his canvas. Two more people whisper in the background, while a third appears to be exiting the room, and why wouldn't he when there seems to be so little going on? Even the dog looks bored. But look more closely. The two people reflected in the blurry mirror at the back, easily missed at first glance, are none other than King Philip IV and Queen Mariana, seemingly changing the scene from a simple depiction of court life to that of a royal portrait. And with this piece of information, we can begin to understand far more about the painting and why it has captivated viewers for centuries. First, there's the historical context. When "Las Meninas" was painted at the end of Philip's reign, the Spanish Empire was in a period of decline, having suffered defeat in The Thirty Years War, as well as economic and political difficulties. The King himself had also suffered misfortune, losing both his first wife and his only heir to the throne before remarrying. But the painting obscures their struggle to provide food for their household. Even the monarch's advanced age is concealed through the blurring of the mirror. What we do see in the geometric center of the canvas, brightly illuminated by the light from the window, in the Infanta Margarita Teresa, the King's only living legitimate child at the time. Her glowing and healthy appearance is an idealized view of the struggling empire's future. However, the Infanta is not the only center of the painting. Through the clever use of perspective, as well as painting the work life-sized, on a 10.5 x 9 foot canvas, Velázquez blurs the boundary between art and reality, creating the sense of a three-dimensional picture that we can walk into. The line between the ceiling and the wall converges to the open door, further creating the perception of the painting as a physical space seen from the viewer's perspective. In this sense, the audience and the real world are the focus, underlined by the three figures looking straight at the viewer. But there is still another focal point. The line formed by the light fixtures leads to the center of the back wall to the mirror reflecting the royal couple. And its positioning relative to the viewer has led to radically different interpretations of the entire work. The mirror could be reflecting the King and Queen posing for their portrait, or is it reflecting the canvas? And what do we make of the fact that Velázquez never painted the royal portrait implied here? Could the painting actually be depicting its own creation instead? With the incorporation of the mirror into his work, Velázquez elevated the art of painting from its perception as a simple craft to an intellectual endeavor. With its three competing center points, "Las Meninas" captures the contrast between the ideal, the real, and the reflected worlds, maintaining an unresolved tension between them to tell a more complex story than any mirror can provide.

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翻译人员: Qi Wang 校对人员: Zhuo Wang初看上去，这幅油画并没什么特别之处但它却是艺术史上最令人费解的油画之一这幅画叫做《宫女》，又名《美尼娜》作者迭戈·委拉斯开兹，创作于1656年它描绘了西班牙皇室的生活情景一个穿着华丽的小公主拒绝了仆人递来的一杯水同时一个矮人在旁边逗狗另一个矮人站在旁边画家自己也在画布上还有两个人在后面说悄悄话第三个人似乎要走出房间--他何必留在屋里呢 屋里没什么事情甚至狗也无精打采的仔细看的话就会在后面的镜里看到两个模糊的人影一开始很难注意到他们他们就是国王菲利普四世和玛丽雅娜皇后二人似乎将场景从对皇室生活的简单描绘变为了为皇室画肖像有了这条线索我们就能更理解此画从而明白几个世纪以来它何以如此吸引人首先是这幅画的历史背景《宫女》创作于菲利普统治的末期西班牙皇室日趋衰落遭遇了 “三十年战争” 失败之后经济和政治都受到打击国王自己也遭遇了厄运再婚前 他同时失去了他的第一任妻子和王位唯一继承人但画里掩盖了他们家庭的拮据即使是君主的老态也通过模糊的镜子掩盖了我们真正从画布的几何中心看到的是透过窗户的耀眼光线照亮的玛格丽塔特蕾莎公主她是国王唯一在世的继承人她耀眼和健康的外表是对这个挣扎中帝国的前途的理想化描述然而，公主并不是这幅画的唯一中心通过巧妙的使用透视技巧将油画画在和真实场景一样大小的10.5 x 9英尺的画作上委拉斯开兹模糊了现实与艺术的界限创造出让观众如临其境的三维立体感天花板和墙壁之间的线条汇集到那扇开着的门加强了油画带给观众的立体真实感从这一点来说 画中三位人物面向观众进一步佐证了观众和真实世界才是真正的焦点但是，画中还有另外一个焦点顶灯形成的线条汇集于后墙正中的镜子上镜中的皇室夫妇和镜子相对于观众的位置可以使读者对整幅画的解读产生分歧画中的镜子反射出的是国王和皇后正在为肖像画摆姿势还是画布中的皇室夫妇肖像而委拉斯开兹从未给皇室画过肖像画的事实又在暗示我们什么呢这幅油画会不会是画家自己臆想的创作呢将镜子加入到他的画作中委拉斯开兹将人们对油画艺术的认知从简单工艺品提升到智力成果的高度画中的三个中心点《宫女》捕捉到了理想现实和反射中世界的对比这三者之间无法调和的冲突凝聚于此描述了一个任何镜面都无法表述的复杂故事

**P334 2016-03-04 5 tips to improve your critical thinking - Samantha Agoos**

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Every day, a sea of decisions stretches before us. Some are small and unimportant, but others have a larger impact on our lives. For example, which politician should I vote for? Should I try the latest diet craze? Or will email make me a millionaire? We're bombarded with so many decisions that it's impossible to make a perfect choice every time. But there are many ways to improve our chances, and one particularly effective technique is critical thinking. This is a way of approaching a question that allows us to carefully deconstruct a situation, reveal its hidden issues, such as bias and manipulation, and make the best decision. If the critical part sounds negative that's because in a way it is. Rather than choosing an answer because it feels right, a person who uses critical thinking subjects all available options to scrutiny and skepticism. Using the tools at their disposal, they'll eliminate everything but the most useful and reliable information. There are many different ways of approaching critical thinking, but here's one five-step process that may help you solve any number of problems. One: formulate your question. In other words, know what you're looking for. This isn't always as straightforward as it sounds. For example, if you're deciding whether to try out the newest diet craze, your reasons for doing so may be obscured by other factors, like claims that you'll see results in just two weeks. But if you approach the situation with a clear view of what you're actually trying to accomplish by dieting, whether that's weight loss, better nutrition, or having more energy, that'll equip you to sift through this information critically, find what you're looking for, and decide whether the new fad really suits your needs. Two: gather your information. There's lots of it out there, so having a clear idea of your question will help you determine what's relevant. If you're trying to decide on a diet to improve your nutrition, you may ask an expert for their advice, or seek other people's testimonies. Information gathering helps you weigh different options, moving you closer to a decision that meets your goal. Three: apply the information, something you do by asking critical questions. Facing a decision, ask yourself, "What concepts are at work?" "What assumptions exist?" "Is my interpretation of the information logically sound?" For example, in an email that promises you millions, you should consider, "What is shaping my approach to this situation?" "Do I assume the sender is telling the truth?" "Based on the evidence, is it logical to assume I'll win any money?" Four: consider the implications. Imagine it's election time, and you've selected a political candidate based on their promise to make it cheaper for drivers to fill up on gas. At first glance, that seems great. But what about the long-term environmental effects? If gasoline use is less restricted by cost, this could also cause a huge surge in air pollution, an unintended consequence that's important to think about. Five: explore other points of view. Ask yourself why so many people are drawn to the policies of the opposing political candidate. Even if you disagree with everything that candidate says, exploring the full spectrum of viewpoints might explain why some policies that don't seem valid to you appeal to others. This will allow you to explore alternatives, evaluate your own choices, and ultimately help you make more informed decisions. This five-step process is just one tool, and it certainly won't eradicate difficult decisions from our lives. But it can help us increase the number of positive choices we make. Critical thinking can give us the tools to sift through a sea of information and find what we're looking for. And if enough of us use it, it has the power to make the world a more reasonable place.

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翻译人员: Irene Jin 校对人员: Zhuo Wang无时不刻，我们都在做各种各样的决定，有些微不足道，有些则对我们的一生都有很大影响。比如说，我该投票给哪个政客？要不要试试最新的减肥食谱？或是，这封电邮会让我成为百万富翁吗？我们被大量的决定围攻着，很多时候都没法做出最好的决定。但还有很多提高正确几率方法，其中最有效的方法之一就是 批判性思维，这种解决问题的思维方式，能让我们更仔细地分析形势，发现隐藏的问题，比如一些偏见和操纵，并作出更好的选择。如果你觉得“批判性”有点儿否定意味， 那正说明它在起作用。一个具有批判性思维的人，不会因为哪个听起来不错就选哪个，而会仔细审查每一个选择，并抱有怀疑态度。他们会用一切手段排除其他选项只留下最有用最有用、最值得信赖的信息。有很多运用批判性思维的方法，这里讲的方法，只需五步，可以帮你解决各种问题。第一：明确你的问题。换句话说，知道你想要什么这有时并不如想象中的直接比如说，你在考虑尝试最近流行的饮食方法，这种方法声称”两周内就能看到效果”你的初衷可能被其它因素而遮盖但如果你面对选择时 有更明晰的观点你真正想要通过这个饮食方法达到什么效果——为了减重也好，为了更均衡的营养也好，或是为了更有活力，就使你更批判地筛选信息，从而找到你真正想要的答案，决定这个点子是否能真正符合你的需要。第二：搜集信息。信息无所不在，所以明晰你的问题 可以帮你决定哪些信息是有用的。如果你想通过饮食方式来摄取更多营养，你可以咨询下营养师，或是向他人寻求经验。搜集帮助你权衡不同方案，使你做出更接近目标的决定。第三：运用信息，可以通过问关键性问题对信息加以运用面对一个选择时，问问自己 “哪些概念要用到？”“存在几种假设？”“我对信息的解读符合逻辑吗？”比如，一个邮件声称能让你成为百万富翁，你可以考虑下面几个问题： “什么因素决定我对此做出判断？”“我认为发件人说的是实话吗？”“从现实来看，我有可能赢钱吗？”第四，考虑后果及影响。想象一下现在是大选期，你选择支持一个候选人是因为他承诺 要让汽油更便宜。初听上去还不错。但长期来讲会对环境造成什么影响？如果不用高价限制汽油的使用，大气污染将变得极其严重，而这是必须考虑的一个意外后果。第五：了解其他观点。问问自己为什么那么多人被对方候选人政策吸引。即使你一点都不认同那个候选人所说的，你也要探究他的一系列观点，弄清楚为什么他的政策你觉得没用，但别人喜欢。你就让你能进一步探究其他选择，衡量你自己的选项，最后做出更好的决定。这五个步骤仅仅是工具，也不可能完全消除我们所面对的难题。但却可以帮我们做出更多更好的决定批判性思维方式能帮我们筛选信息，找到我们真正想要的而且如果更多的人具备批判性思维的能力，这个世界将变得更加理性。

**P335 2016-03-04 Is radiation dangerous - Matt Anticole**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=335)

When we hear the word radiation, it's tempting to picture huge explosions and frightening mutations, but that's not the full story. Radiation also applies to rainbows and a doctor examining an x-ray. So what is radiation really, and how much should we worry about its effects? The answer begins with understanding that the word radiation describes two very different scientific phenomena: electromagnetic radiation and nuclear radiation. Electromagnetic radiation is pure energy consisting of interacting electrical and magnetic waves oscillating through space. As these waves oscillate faster, they scale up in energy. At the lower end of the spectrum, there's radio, infrared, and visible light. At the higher end are ultraviolet, X-ray, and gamma rays. Modern society is shaped by sending and detecting electromagnetic radiation. We might download an email to our phone via radio waves to open an image of an X-ray print, which we can see because our screen emits visible light. Nuclear radiation, on the other hand, originates in the atomic nucleus, where protons repel each other due to their mutually positive charges. A phenomenon known as the strong nuclear force struggles to overcome this repulsion and keep the nucleus intact. However, some combinations of protons and neutrons, known as isotopes, remain unstable, or radioactive. They will randomly eject matter and/or energy, known as nuclear radiation, to achieve greater stability. Nuclear radiation comes from natural sources, like radon, a gas which seeps up from the ground. We also refine naturally occurring radioactive ores to fuel nuclear power plants. Even bananas contain trace amounts of a radioactive potassium isotope. So if we live in a world of radiation, how can we escape its dangerous effects? To start, not all radiation is hazardous. Radiation becomes risky when it rips atoms' electrons away upon impact, a process that can damage DNA. This is known as ionizing radiation because an atom that has lost or gained electrons is called an ion. All nuclear radiation is ionizing, while only the highest energy electromagnetic radiation is. That includes gamma rays, X-rays, and the high-energy end of ultraviolet. That's why as an extra precaution during X-rays, doctors shield body parts they don't need to examine, and why beach-goers use sunscreen. In comparison, cell phones and microwaves operate at the lower end of the spectrum, so there is no risk of ionizing radiation from their use. The biggest health risk occurs when lots of ionizing radiation hits us in a short time period, also known as an acute exposure. Acute exposures overwhelm the body's natural ability to repair the damage. This can trigger cancers, cellular dysfunction, and potentially even death. Fortunately, acute exposures are rare, but we are exposed daily to lower levels of ionizing radiation from both natural and man-made sources. Scientists have a harder time quantifying these risks. Your body often repairs damage from small amounts ionizing radiation, and if it can't, the results of damage may not manifest for a decade or more. One way scientists compare ionizing radiation exposure is a unit called the sievert. An acute exposure to one sievert will probably cause nausea within hours, and four sieverts could be fatal. However, our normal daily exposures are far lower. The average person receives 6.2 millisieverts of radiation from all sources annually, around a third due to radon. At only five microsieverts each, you'd need to get more than 1200 dental X-rays to rack up your annual dosage. And remember that banana? If you could absorb all the banana's radiation, you'd need around 170 a day to hit your annual dosage. We live in a world of radiation. However, much of that radiation is non-ionizing. For the remainder that is ionizing, our exposures are usually low, and choices like getting your home tested for radon and wearing sunscreen can help reduce the associated health risks. Marie Curie, one of the early radiation pioneers, summed up the challenge as follows: "Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less."

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翻译人员: 维康 廖 校对人员: Rebecca Wang当我们听到辐射这个词，我们会不禁想起大爆炸 和可怕的变异，但那并不完整。辐射同适用于彩虹和医生检测用的X射线。那么辐射到底是什么，对于它的影响我们又应该担心多少呢？答案从理解辐射这个描述两种完全不同的科学现象开始：电磁辐射和核辐射。电磁辐射是纯能量由相互作用的电磁波在空间中振动形成。这些波振动越快，能量也就成比例增加。在光谱的低频端的是无线电，红外线，和可见光。位于高频端的有紫外线，X射线和伽马射线。发射和检测电磁辐射构成了现代社会。我们可以通过无线电波下载一封邮件到手机上以打开X射线印出的一张图，我们可以看见这些是由于屏幕发出可见光。另一边呢，核辐射源于原子核，带有正电荷的质子正正相斥。一种叫做强核力的现象艰难地克服这种排斥并保持原子核完整。然而，一些质子和原子的组合，同位素，依然不稳定，换句话说，有放射性。它们会随机释放出物质和(或)能量，也就是核辐射，来使自己更稳定。核辐射来源于自然物质，例如氡，一种从地下渗出的气体。我们也提纯自然出现的放射性矿石来为核能工厂提供燃料。即使是香蕉都含有微量钾的放射性同位素。因此如果我们住在充满辐射的世界，我们怎么能躲开它的危害呢？首先，不是所有的辐射都有危险。当撞击将原子的电子分开时核辐射才有危险，这是一个可以损坏DNA的过程。这个叫做电离辐射因为一个已经失去或得到电子的原子叫做离子。所有的核辐射都是电离，然而电磁辐射只有最高能量的才是。那包括γ射线，X射线，和紫外线的高能末端。那就是为什么要在X射线时额外警惕，医生们把不需要检测的身体部分保护住，以及为什么常去海滩的人要用防晒霜。对比来看，手机和微波在光谱的低频端，因此使用它们没有电离辐射的危险。最大的健康危害发生在大量的电离辐射在短时间内击中我们时，或急性暴露。急性暴露压垮人体自然修复损害的能力。这可能引发癌症，细胞功能紊乱，甚至死亡。幸运的是，急性暴露很少见，但我们每天都暴露在较低级的电离辐射下既来自于自然，也来自于人造物质。科学家们很难给这些危害定量。你的身体经常修复小量电离辐射造成的损害。如果无法修复，损害带来的结果十年或更久都不会显现。科学家们区别电离辐射暴露的一个方法是一种叫西韦特的单位。一西韦特的急性暴露下可能会造成几个小时的恶心，四西韦特可以致命。不过，我们正常生活的暴露度要低好多。平均每个人每年累计接收6.2毫西韦特辐射大约三分之一是氡。口腔x光一次仅5微西韦特，你需要1200次以上的口腔X光才抵得上每年的量。还记得香蕉吗？如果你把香蕉所有的辐射都吸收了，你每天吃大约170根香蕉才能达到你一年的量。我们住在一个充满辐射的世界。然而，大多的辐射是非电离的。余下那些电离的，我们暴露度基本很低，而且像检测你家的氡含量和抹防晒霜这样的决策能够帮助减少相关的健康危害。玛丽·居里， 早期的辐射研究先驱之一，将挑战总结如下：“世上无可畏惧， 只是有待理解。现应当理解更多， 我们才可越无惧。”

**P336 2016-03-17 The physics of the 'hardest move' in ballet - Arleen Sugano**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=336)

In the third act of "Swan Lake," the Black Swan pulls off a seemingly endless series of turns, bobbing up and down on one pointed foot and spinning around, and around, and around 32 times. It's one of the toughest sequences in ballet, and for those thirty seconds or so, she's like a human top in perpetual motion. Those spectacular turns are called fouettés, which means "whipped" in French, describing the dancer's incredible ability to whip around without stopping. But while we're marveling at the fouetté, can we unravel its physics? The dancer starts the fouetté by pushing off with her foot to generate torque. But the hard part is maintaining the rotation. As she turns, friction between her pointe shoe and the floor, and somewhat between her body and the air, reduces her momentum. So how does she keep turning? Between each turn, the dancer pauses for a split second and faces the audience. Her supporting foot flattens, and then twists as it rises back onto pointe, pushing against the floor to generate a tiny amount of new torque. At the same time, her arms sweep open to help her keep her balance. The turns are most effective if her center of gravity stays constant, and a skilled dancer will be able to keep her turning axis vertical. The extended arms and torque-generating foot both help drive the fouetté. But the real secret and the reason you hardly notice the pause is that her other leg never stops moving. During her momentary pause, the dancer's elevated leg straightens and moves from the front to the side, before it folds back into her knee. By staying in motion, that leg is storing some of the momentum of the turn. When the leg comes back in towards the body, that stored momentum gets transferred back to the dancer's body, propelling her around as she rises back onto pointe. As the ballerina extends and retracts her leg with each turn, momentum travels back and forth between leg and body, keeping her in motion. A really good ballerina can get more than one turn out of every leg extension in one of two ways. First, she can extend her leg sooner. The longer the leg is extended, the more momentum it stores, and the more momentum it can return to the body when it's pulled back in. More angular momentum means she can make more turns before needing to replenish what was lost to friction. The other option is for the dancer to bring her arms or leg in closer to her body once she returns to pointe. Why does this work? Like every other turn in ballet, the fouetté is governed by angular momentum, which is equal to the dancer's angular velocity times her rotational inertia. And except for what's lost to friction, that angular momentum has to stay constant while the dancer is on pointe. That's called conservation of angular momentum. Now, rotational inertia can be thought of as a body's resistance to rotational motion. It increases when more mass is distributed further from the axis of rotation, and decreases when the mass is distributed closer to the axis of rotation. So as she brings her arms closer to her body, her rotational inertia shrinks. In order to conserve angular momentum, her angular velocity, the speed of her turn, has to increase, allowing the same amount of stored momentum to carry her through multiple turns. You've probably seen ice skaters do the same thing, spinning faster and faster by drawing in their arms and legs. In Tchaikovsky's ballet, the Black Swan is a sorceress, and her 32 captivating fouettés do seem almost supernatural. But it's not magic that makes them possible. It's physics.

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翻译人员: Yolanda Zhang 校对人员: Chen Zou在《天鹅湖》的第三幕中黑天鹅完成了一个似乎无止境的连续旋转用单脚足尖交替支撑，放平然后一直转啊转 一共32圈这是芭蕾舞中最难的连续动作之一而且在那大约30秒的时间内她像是只陀螺，无限地转下去这些精彩的旋转 叫做fouettés在法语中意思是”挥鞭转“描述了舞者连续转动的非凡能力但是在我们为此惊叹时， 我们能否解释它的物理原理呢？舞者用脚尖蹬地获取扭转力 来开始fouetté但是困难的部分是 保持转动的连续在她旋转的过程中脚尖和地板的摩擦力和她的身体所受到的空气阻力会减少她的动量那么她是如何做到持续旋转的呢？在每个旋转之间， 舞者会有一瞬间暂停并面向观众她会放下支撑脚再在踮起的过程中扭转蹬地以获取 微量的新的旋转动力与此同时，她的双臂向外展开 以保持平衡如果她的重心保持稳定 这些旋转最为流畅有经验的舞者能够保持她的 旋转轴垂直展开的双臂和 不断产生扭转力的足尖共同帮助完成这个“挥鞭转”的动作但真正的秘诀以及 你几乎没察觉到停顿的原因在于她的另一条腿从没有停止转动在她短暂的暂停之时舞者那只抬起的腿伸直 然后从前面转到旁边然后折叠回到膝盖通过持续动作 那条腿储存了一些旋转的动量当腿向着身体方向缩回之时那些储存的动量被转移回到舞者身上当她再次踮起脚尖时 动量推动她旋转随着芭蕾舞者在每次旋转中 伸缩她的腿动量在下肢与身体之间 来回转移使她保持持续转动一个优秀的芭蕾舞者能够通过 以下两种方式之一在每次下肢伸直时完成多于一圈的旋转：第一，她可以提早伸直她的腿她伸展腿的时间越长 所储存的动量就越多那么当下肢缩回之时 更多的动量可以回到舞者的身体更多的角动量意味着 她可以完成更多圈在补充必要的 因摩擦力损耗的动量之前另一个选择是当舞者再次踮脚时 将她的手臂或者腿缩得离身体更近些这为什么有效呢？就如其它芭蕾舞旋转动作一样挥鞭转由角动量（L）控制它等于角速度(ω)乘以旋转惯性（I）除了摩擦损耗的动量之外当舞者踮起脚尖时 角动量必须保持不变这被称作“角动量守恒定律”现在，旋转惯性可以被当做身体对旋转动作的抵制它在更多重量分布在 远离旋转轴的位置时增加在更多重量分布在 靠近旋转轴的位置时减少所以当舞者的手臂更靠近身体的时候她的旋转惯性减小为了保持角动量她的角速度 也就是旋转的速度需要增加从而保存相同的动量让她实现多次的连续旋转你可能见过滑冰的人 做过相同的动作通过收缩手臂和腿 来加速冰上的旋转在柴可夫斯基的芭蕾舞剧中 黑天鹅是女巫她迷人的32次挥鞭转 看起来就像是魔法但不是魔法 让这一切发生是物理学

**P337 2016-03-18 The invisible motion of still objects - Ran Tivony**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=337)

Many of the inanimate objects around you probably seem perfectly still. But look deep into the atomic structure of any of them, and you'll see a world in constant flux. Stretching, contracting, springing, jittering, drifting atoms everywhere. And though that movement may seem chaotic, it's not random. Atoms that are bonded together, and that describes almost all substances, move according to a set of principles. For example, take molecules, atoms held together by covalent bonds. There are three basic ways molecules can move: rotation, translation, and vibration. Rotation and translation move a molecule in space while its atoms stay the same distance apart. Vibration, on the other hand, changes those distances, actually altering the molecule's shape. For any molecule, you can count up the number of different ways it can move. That corresponds to its degrees of freedom, which in the context of mechanics basically means the number of variables we need to take into account to understand the full system. Three-dimensional space is defined by x, y, and z axes. Translation allows the molecule to move in the direction of any of them. That's three degrees of freedom. It can also rotate around any of these three axes. That's three more, unless it's a linear molecule, like carbon dioxide. There, one of the rotations just spins the molecule around its own axis, which doesn't count because it doesn't change the position of the atoms. Vibration is where it gets a bit tricky. Let's take a simple molecule, like hydrogen. The length of the bond that holds the two atoms together is constantly changing as if the atoms were connected by a spring. That change in distance is tiny, less than a billionth of a meter. The more atoms and bonds a molecule has, the more vibrational modes. For example, a water molecule has three atoms: one oxygen and two hydrogens, and two bonds. That gives it three modes of vibration: symmetric stretching, asymmetric stretching, and bending. More complicated molecules have even fancier vibrational modes, like rocking, wagging, and twisting. If you know how many atoms a molecule has, you can count its vibrational modes. Start with the total degrees of freedom, which is three times the number of atoms in the molecule. That's because each atom can move in three different directions. Three of the total correspond to translation when all the atoms are going in the same direction. And three, or two for linear molecules, correspond to rotations. All the rest, 3N-6 or 3N-5 for linear molecules, are vibrations. So what's causing all this motion? Molecules move because they absorb energy from their surroundings, mainly in the form of heat or electromagnetic radiation. When this energy gets transferred to the molecules, they vibrate, rotate, or translate faster. Faster motion increases the kinetic energy of the molecules and atoms. We define this as an increase in temperature and thermal energy. This is the phenomenon your microwave oven uses to heat your food. The oven emits microwave radiation, which is absorbed by the molecules, especially those of water. They move around faster and faster, bumping into each other and increasing the food's temperature and thermal energy. The greenhouse effect is another example. Some of the solar radiation that hits the Earth's surface is reflected back to the atmosphere. Greenhouse gases, like water vapor and carbon dioxide absorb this radiation and speed up. These hotter, faster-moving molecules emit infrared radiation in all directions, including back to Earth, warming it. Does all this molecular motion ever stop? You might think that would happen at absolute zero, the coldest possible temperature. No one's ever managed to cool anything down that much, but even if we could, molecules would still move due to a quantum mechanical principle called zero-point energy. In other words, everything has been moving since the universe's very first moments, and will keep going long, long after we're gone.

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翻译人员: Elvis Liu 校对人员: Tom Liu你周围许多物体看似是完全静止的，但请从微观原子结构上观察它们，你会发现一个永不停息运动着的世界。扩张着，压缩着，弹动着，抖动着，原子动来动去。即使这种运动看似混乱， 它们其实有规律可循。原子连接在一起，几乎构成了所有物质，按照一定规律在运动着。例如分子中原子有着共价的联系。分子以三种基本规律运动：旋转，平移，和振动，旋转和转化时分子在空间中运动，此时原子的间隙不变。然而振动会改变原子间距，实际上这改变了分子的形状。每种分子都有一定数量的运动方式。运动方式的多少与其自由度有关，用机械术语讲，就是我们为了全面了解一个整体而需要考虑的变量的数量。立体空间可用x,y,z轴描述。平移可让分子朝各个方向运动。这种运动方式在三个维度上都完全自由。分子也可以围绕这三个坐标轴旋转，这是另外三种运动方式，除非它是像二氧化碳一样的线型分子，线型分子的一种旋转方式是绕自己 的轴线旋转，由于它的原子位置不变 这种方式不纳入旋转方式的种类。振动就有一些复杂了。以氢分子为例它们的两原子间的间隙在不断变化，就像被弹簧连接一样。这种间隙的改变很微小 小于十亿分之一米。分子的原子越多 它的振动方式就越多。例如水分子有三个原子：一个氧原子，两个氢原子 和两个相联点。这种结构让它有了三种振动方式：对称拉伸，非对称拉伸，和弯折。更复杂的分子有更剧烈的振动方式，比如强振动，摇摆，和弯折。知道了分子中原子的个数 就能知道其振动的种类数量。当运动不受阻碍时，振动种类数量是原子数量的三倍。这是因为每个原子都可以从三个方向移动。三种运动种类属于平移，这时所有原子同方向移动。旋转有三种运动方式 （线型分子有两种）。其余的3N-6种（线型分子3n-5种）属于振动。那么这些运动由什么引起呢？分子吸收了周围的能量 而得以运动，这些能量主要以热量或电磁波的形式存在。当这些能量转移到分子上时，它们可能振动，可能旋转，或是更快地平移。更快的运动速度导致了粒子的动能增大。宏观上表现为温度升高， 内能增大。微波炉工作正是应用了这一原理。微波炉放射出电磁波 被分子吸收，尤其易被液体吸收。分子运动速度加快，相互碰撞后增大了食物温度和内能。温室效应则是另外一个例子。太阳的辐射照射着地球表面，被地表反射到大气层。水蒸气或二氧化碳之类的温室气体 将这些辐射吸收，运动速度加快。这些炽热，高速运动的分子 朝各个方向释放红外线，有一些红外线回到地球 使之升温。这种分子运动会停止吗？你可能认为 在绝对零度时这有可能发生，在可能到达的最低温度下。至今没有人曾创造出那样的低温环境，但是即使我们可以，根据量子力学的中零点能量的解释，分子在那样的情况下仍能运动。换句话说，自宇宙婴儿时期以来 万事万物就在不断运动，在我们消逝幻灭之后仍会继续。Subtitled by:Zhiyang Liu

**P338 2016-03-21 What would happen if you didn’t drink water - Mia Nacamulli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=338)

Water is virtually everywhere, from soil moisture and ice caps, to the cells inside our own bodies. Depending on factors like location, fat index, age, and sex, the average human is between 55-60% water. At birth, human babies are even wetter. Being 75% water, they are swimmingly similar to fish. But their water composition drops to 65% by their first birthday. So what role does water play in our bodies, and how much do we actually need to drink to stay healthy? The H20 in our bodies works to cushion and lubricate joints, regulate temperature, and to nourish the brain and spinal cord. Water isn't only in our blood. An adult's brain and heart are almost three quarters water. That's roughly equivalent to the amount of moisture in a banana. Lungs are more similar to an apple at 83%. And even seemingly dry human bones are 31% water. If we are essentially made of water, and surrounded by water, why do we still need to drink so much? Well, each day we lose two to three liters through our sweat, urine, and bowel movements, and even just from breathing. While these functions are essential to our survival, we need to compensate for the fluid loss. Maintaining a balanced water level is essential to avoid dehydration or over-hydration, both of which can have devastating effects on overall health. At first detection of low water levels, sensory receptors in the brain's hypothalamus signal the release of antidiuretic hormone. When it reached the kidneys, it creates aquaporins, special channels that enable blood to absorb and retain more water, leading to concentrated, dark urine. Increased dehydration can cause notable drops in energy, mood, skin moisture, and blood pressure, as well as signs of cognitive impairment. A dehydrated brain works harder to accomplish the same amount as a normal brain, and it even temporarily shrinks because of its lack of water. Over-hydration, or hyponatremia, is usually caused by overconsumption of water in a short amount of time. Athletes are often the victims of over-hydration because of complications in regulating water levels in extreme physical conditions. Whereas the dehydrated brain amps up the production of antidiuretic hormone, the over-hydrated brain slows, or even stops, releasing it into the blood. Sodium electrolytes in the body become diluted, causing cells to swell. In severe cases, the kidneys can't keep up with the resulting volumes of dilute urine. Water intoxication then occurs, possibly causing headache, vomiting, and, in rare instances, seizures or death. But that's a pretty extreme situation. On a normal, day-to-day basis, maintaining a well-hydrated system is easy to manage for those of us fortunate enough to have access to clean drinking water. For a long time, conventional wisdom said that we should drink eight glasses a day. That estimate has since been fine-tuned. Now, the consensus is that the amount of water we need to imbibe depends largely on our weight and environment. The recommended daily intake varies from between 2.5-3.7 liters of water for men, and about 2-2.7 liters for women, a range that is pushed up or down if we are healthy, active, old, or overheating. While water is the healthiest hydrator, other beverages, even those with caffeine like coffee or tea, replenish fluids as well. And water within food makes up about a fifth of our daily H20 intake. Fruits and vegetables like strawberries, cucumbers, and even broccoli are over 90% water, and can supplement liquid intake while providing valuable nutrients and fiber. Drinking well might also have various long-term benefits. Studies have shown that optimal hydration can lower the chance of stroke, help manage diabetes, and potentially reduce the risk of certain types of cancer. No matter what, getting the right amount of liquid makes a world of difference in how you'll feel, think, and function day to day.

**P338 2016-03-21 What would happen if you didn’t drink water - Mia Nacamulli**

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翻译人员: Sheryl Kao 校对人员: guy wu水存在于日常生活中的每个角落从土壤水分 冰层到人体细胞中的水分基于某些因素 如地理位置肥胖指数年龄和性别每个人体内平均含有55-60%的水刚出生的婴儿体内含水更多75%的含水量让他们看起来像在水里游的鱼但是他们的水含量会在一岁生日前降至65%那么 水在我们身体中扮演什么样的角色呢我们到底要喝多少水才能保持健康呢水在人体中的作用有缓冲和润滑关节调节温度滋养大脑和脊髓水不仅存在与我们的血液成人的大脑和心脏几乎有3/4是水几乎相当于香蕉中的含水量肺的含水量和苹果接近 有38%即使看起来很干燥的人的骨头也含有31%的水如果人类主要由水构成而且生活的环境中充满水那为什我们还需要喝这么多水？每天人体要流失2-3升的水 它们通过汗液尿液肠道运动甚至呼吸而流失虽然这些活动对于生存十分必要但我们也需要补充体液的流失维持水平衡十分重要 它能避脱水或过度脱水这两样都能损害人的整体健康一旦发现水含量过低下丘脑的感受器就会提示身体释放抗利尿激素当此激素到达肾脏 会打开水通道即一种特殊通道 它能够使血液吸收和保留水分导致尿液浓缩 引起黑尿加重的脱水能引起明显的乏力情绪低落皮肤干燥和血压降低以及认知障碍脱水的大脑要更加费力地运行才能完成正常大脑的工作而且脱水大脑甚至会萎缩这主要由缺水 过度脱水 或低钠血症引起通常在短时间内过度消耗水的情况下发生运动员通常是过度脱水的受害者因为一些并发症这些并发症由极端身体状况下水含量改变引起当脱水的大脑促进抗利尿激素生成时过度脱水的大脑会运行缓慢 甚至停止运行 并且把此激素释放到血液中人体中的钠电解液被稀释造成细胞膨胀在严重的情况下肾脏无法负荷被稀释的尿液的体积水中毒由此产生还有可能造成头疼呕吐少数情况下出现癫痫或死亡但这仅仅出现在非常极端的情况下在一般的日常生活中维持一个水平衡的身体系统是比较容易办到的因为我们足够幸运 可以获取干净的饮水长久以来 常识告诉我们一天要喝八杯水这个标准已经被微调了现在被普遍认同的说法是我们所需的饮水量主要取决于体重和所处环境推荐的每日摄入量是 男性2.5-3.7升女性2-2.7升这个范围可以适当增减 如果我们处于健康充满活力年老或发烧的状况下虽然水是最健康的湿润剂其他的饮料甚至是含咖啡因的咖啡和茶也能够补充体液食物中的水分占我们每日摄入水分总量的1/5水果和蔬菜 如草莓黄瓜甚至花椰菜的含水量都超过90%它们能在提供宝贵营养和膳食纤维的同时补充体液喝水也许还有许多长期的好处研究显示最佳的水平衡能降低中风的风险帮助控制肥胖已经可能减少某些癌症的风险无论如何 摄入适量的液体十分重要 它影响着你的感受思维以及日常活动

**P339 2016-03-30 How do glasses help us see - Andrew Bastawrous and Clare Gilbert**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=339)

Almost 2000 years ago, the Roman philosopher Seneca peered at his book through a glass of water. Suddenly, the text below was transformed. The words magically became clear. But it wasn't until a millennium later that that same principle would be used to create the earliest glasses. Today, glasses can help millions of people with poor vision due to uncorrected refractive errors. The key to understanding what that means lies with the term refraction, the ability of a transparent medium, like glass, water, or the eye to change the direction of light passing through it. The eye has two main refractive surfaces: the cornea and the lens. Ideally, these surfaces work together to refract light in a way that accurately focuses light onto the retina, the layer of light-sensitive tissue at the back of the eye that works with the brain to give rise to vision. But many people develop refractive errors, either during childhood as their eyes are growing, or in later life as their eyes age. Imperfections in the cornea and lens cause refracted light to be focused in front of or behind the retina, making images appear blurry. People with refractive errors can still see color, movement, and light, but the details of what they're looking at are out of focus. People experience refractive errors in different ways, owing to differences in their eyes. In some, light refracts too much, and in others, too little. Eyes with a focal point in front of the retina are called myopic, or short-sighted. They can see close objects clearly, but those far away are out of focus. But when the focus point is behind the retina, people are hyperopic, or long-sighted. For them, objects close up are unfocused, but distant objects are crystal clear. Finally, some people have a cornea with a non-spherical shape that causes astigmatism, a form of out-of-focus vision that makes all objects seem blurred, whether close or far. As we age, our eyes face new challenges. When we're young, the lens of the eye is flexible and can change shape to bring images into focus, something called accommodation. This keeps objects in focus when we shift our gaze from far to near. But as we get older, the lens becomes less flexible, and can't change shape when we want to look at near objects. This is called presbyopia, and it affects adults starting around the age of 40 years. Myopia, hyperopia, astigmatism, and presbyopia. Each of these is a refractive error. Nowadays we can fix them all with glasses or contact lenses, which work by refocusing light so it strikes the retina precisely. It's even possible to correct vision with surgery using lasers that change the shape of the cornea and alter its refractive properties. But glasses remain the most popular. By using carefully crafted lenses to steer light to exactly the right spot on the retina, a person's clear vision can be restored. We've come a long way since Seneca's discovery and the crude glasses of yesteryear. In 1727, a British optician named Edward Scarlett developed the modern style of glasses which are kept in place with arms which hook over each ear. Today's glasses take their inspiration from that design, but they're also much more precise and personal. Each pair is tailored for an individual to bring out their unique powers of sight. So if you're one of the 500 million people with a problem with close or far vision, or both, there's a pair of glasses out there waiting to reveal a whole new world that's hiding in plain view.

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翻译人员: Shufang Liu 校对人员: Jiawei Ni大约2000年前罗马哲学家塞涅卡（Seneca）透过一杯水撇看了他的书突然，下面的文字变形了文字神奇地变得很清楚但是直到一千年之后，同样的原理被用来创造出最早的眼鏡今天，眼鏡能够帮助数百万的视力差的人们归咎于未经矫正的屈光不正。理解这代表什么的关键取决于这个术语折光能力，一个透明媒体的能力，如玻璃水或者眼睛，当光穿过它时，来改变光的方向眼睛有两个主要的折射面角膜和晶状体理想情况下，这些面一起工作在某种程度上来折射光，准确地把光聚焦于视网膜视网膜是在眼睛后面，感光的一层薄膜它和大脑一起工作来提升視力但是很多人产生了屈光不正。或者在孩童时期当他们眼睛成长时，或者在在后面的时期当他们的眼睛变老角膜和晶状体的缺陷导致折射的光聚焦于视网膜的前面或者后面使得图像显示模糊有屈光不正的人仍然能够看到颜色移动和光但是他们正在的看的细节是模糊不清的人们通过不同的方式经历着屈光不正，由于他们的眼睛内部的不同在有些眼睛里，光折射太多而在另外一些，太少在视网膜前面有聚焦点的眼睛被称为近视或者短视他们能清楚地看到近的物体，但是看远的就很模糊但是当聚焦点在视网膜后面的话，这些人是远视的对他们来讲，近的物体是模糊的。但是远距离的物体十分清楚。最后，有些人有非球状的角膜这导致散光这种焦点没对准的视力使得所有的物体都是模糊的，不论是近的还是远的。随着我们变老，我们的眼睛面临着新的挑战。当我们年轻时，眼睛的晶状体是有弹性的可以改变形状使得图像在焦距内某种东西叫做适应性调节当我们从远到近移动我们的注视时，这使得物体保持聚焦但是随着我们变得老，晶状体变得弹性差些当我们想看近的物体时并不能改变形状这个叫做老花眼（远视眼）从40岁开始影响成年人近视远视散光老花眼每一个都是屈光不正现在我们可以校正他们用眼镜或者隐形眼镜重新聚焦光，从而使得光精确地能到达视网膜甚至可以通过外科手术来矫正视力通过激光来改变角膜的形状和改变它的折光特性。但是眼镜仍然是最流行的通过小心地运用精心制作的镜片来控制光线准确的定位在视网膜一个人的清楚的视力是可以被恢复的我们已经走了很长的路，从塞涅卡（Seneca）的发现和不久以前的未经加工的眼镜.在1727年，一个名叫Edward Scarlett英国的眼镜商开发了现代风格的眼镜通过镜臂钩架在耳朵上来固定现在的眼镜从那个设计取得灵感但是他们也更加精准和个性化每对眼镜为每一个人定制而显示出他们独特的视觉能力所以如果你是5亿有近视或者远视问题的人之一或者及近视又远视有一对眼镜等着呈现模糊景象背后的一个全新的世界

**P340 2016-03-30 How do schools of fish swim in harmony - Nathan S. Jacobs**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=340)

How do schools of fish swim in harmony? And how do the tiny cells in your brain give rise to the complex thoughts, memories, and consciousness that are you? Oddly enough, those questions have the same general answer: emergence, or the spontaneous creation of sophisticated behaviors and functions from large groups of simple elements. Like many animals, fish stick together in groups, but that's not just because they enjoy each other's company. It's a matter of survival. Schools of fish exhibit complex swarming behaviors that help them evade hungry predators, while a lone fish is quickly singled out as easy prey. So which brilliant fish leader is the one in charge? Actually, no one is, and everyone is. So what does that mean? While the school of fish is elegantly twisting, turning, and dodging sharks in what looks like deliberate coordination, each individual fish is actually just following two basic rules that have nothing to do with the shark: one, stay close, but not too close to your neighbor, and two, keep swimmming. As individuals, the fish are focused on the minutiae of these local interactions, but if enough fish join the group, something remarkable happens. The movement of individual fish is eclipsed by an entirely new entity: the school, which has its own unique set of behaviors. The school isn't controlled by any single fish. It simply emerges if you have enough fish following the right set of local rules. It's like an accident that happens over and over again, allowing fish all across the ocean to reliably avoid predation. And it's not just fish. Emergence is a basic property of many complex systems of interacting elements. For example, the specific way in which millions of grains of sand collide and tumble over each other almost always produces the same basic pattern of ripples. And when moisture freezes in the atmosphere, the specific binding properties of water molecules reliably produce radiating lattices that form into beautiful snowflakes. What makes emergence so complex is that you can't understand it by simply taking it apart, like the engine of a car. Taking things apart is a good first step to understanding a complex system. But if you reduce a school of fish to individuals, it loses the ability to evade predators, and there's nothing left to study. And if you reduce the brain to individual neurons, you're left with something that is notoriously unreliable, and nothing like how we think and behave, at least most of the time. Regardless, whatever you're thinking about right now isn't reliant on a single neuron lodged in the corner of your brain. Rather, the mind emerges from the collective activities of many, many neurons. There are billions of neurons in the human brain, and trillions of connections between all those neurons. When you turn such a complicated system like that on, it could behave in all sorts of weird ways, but it doesn't. The neurons in our brain follow simple rules, just like the fish, so that as a group, their activity self-organizes into reliable patterns that let you do things like recognize faces, successfully repeat the same task over and over again, and keep all those silly little habits that everyone likes about you. So, what are the simple rules when it comes to the brain? The basic function of each neuron in the brain is to either excite or inhibit other neurons. If you connect a few neurons together into a simple circuit, you can generate rhythmic patterns of activity, feedback loops that ramp up or shut down a signal, coincidence detectors, and disinhibition, where two inhibitory neurons can actually activate another neuron by removing inhibitory brakes. As more and more neurons are connected, increasingly complex patterns of activity emerge from the network. Soon, so many neurons are interacting in so many different ways at once that the system becomes chaotic. The trajectory of the network's activity cannot be easily explained by the simple local circuits described earlier. And yet, from this chaos, patterns can emerge, and then emerge again and again in a reproducible manner. At some point, these emergent patterns of activity become sufficiently complex, and curious to begin studying their own biological origins, not to mention emergence. And what we found in emergent phenomena at vastly different scales is that same remarkable characteristic as the fish displayed: That emergence doesn't require someone or something to be in charge. If the right rules are in place, and some basic conditions are met, a complex system will fall into the same habits over and over again, turning chaos into order. That's true in the molecular pandemonium that lets your cells function, the tangled thicket of neurons that produces your thoughts and identity, your network of friends and family, all the way up to the structures and economies of our cities across the planet.

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翻译人员: Jing Zhou 校对人员: Gabriella Hu鱼群是怎样和谐共游的呢？你大脑的微小细胞如何产生你的复杂思想，记忆和意识？奇怪的是，一个答案 能够回答这些问题:涌现，或是说一大群简单元素同时构建的复杂行为和功能。和许多动物一样，鱼类成群行动，不是因为人多热闹大，而是关乎生死。鱼群展示了能够 帮助他们逃离饥饿的捕食者的复杂群集行为一个落单的鱼会很快被捕食。所以是谁在指挥 他们聪明的鱼领袖呢？事实上，没人是又所有人都是。所以，这到底是什么意思？当一群鱼优雅的旋转， 扭转，躲避着鲨鱼，尽管看起来像是特意的编排每条鱼只是在遵循 最基本的两个规则这两条规则和鲨鱼无关。规则一：靠近但别太靠近旁边的鱼规则二：别停下。作为个体，这些鱼 集中在这些局部互动上，但如果足够多的鱼加入了这个群体， 非凡的事情就发生了。个体鱼的行动被新的实体覆盖：自己有着一套独特行为的鱼群。鱼群不被任何一条鱼控制。只要有足够数量的遵循正确规矩 的鱼聚在一起鱼群就会出现。就像一个意外一次又一次地发生，这样海洋所有的鱼 都可以可靠地避开猎杀。而且，不光是鱼涌现是许多交互元素的 复杂系统的一个基本特征。打个比方，数以万计的沙粒撞击并轮来轮去的特殊的方式几乎总是会产生 相同基本模式的涟漪。当潮湿的空气大气层冻住的时候水分子特定的结合特点可靠地产生了辐射状框架， 最终变成雪花。使涌现如此复杂的是你不能通过简单的 把它像汽车引擎一样拆开来理解它。把东西拆看是研究复杂系统 的一个良好的开端。但是如果你把一群鱼减少到个体，它就失去了逃离捕食者的能力，也就没有什么可研究的了。如果你把大脑减少 到独立的神经元，就只剩下一堆 特别不可靠的东西了，和我们如果思考及行动完全不沾边，至少大部分时候是这样的。不管怎样，不管你现在在想什么，都不是你大脑某个角落 的一个神经元在起作用。不如说，思想来源于许多许多神经元的集合活动。人体大脑中有上亿个神经元，这些神经元之间有数十亿的连接。当你打开这样一个复杂的系统时，他可以有各种稀奇古怪的表现， 但是事实上并没有。我们大脑里的脑细胞 遵循简单的规则，就像鱼类，所以以一个群体来说， 他们的行动自组织成可靠的模式，让你可以干好多事，比如识别面部，一遍又一遍地成功重复同一个任务，以及保持大家喜欢的 你的那些傻傻的小习惯。所以，对于大脑来说， 这些简单的规矩是什么呢？每个神经元的基本功能就是或使兴奋或抑制其他的神经元。如果你把几个神经元 围成一个简单的线路。你可以引起韵律性的行为模式，能够加强或者关掉 一个信号的反馈循环，巧合探测器，以及反抑制，也就是两个抑制性神经元 可以通过去除抑制闸来启动另一个神经元。当越来越多的神经元被关联，更加复杂的行为模式便从这个网涌现。不久，这么多神经元 同时用这么多不同的方式互相影响系统便变得混乱这网的行为轨迹无法简单地用之前描述的简易局部线路来解释然而，模式从这混乱中涌现然后一次又一次 以可复写的方式涌现在某一时刻， 这些涌现的行为模式变得足够复杂和好奇，来开始研究 它们自己的生物起源更不必说涌现了。我们在广大的不同规模的 “涌现”现象中所发现的是跟鱼群所表现的 一样的非凡的特征：“涌现”不需要某人或某物来指挥。如果适当的位置有正确的规则，且达到一些基本条件，一个复杂的系统将会 一次又一次落入同样的规律，转混乱为秩序。这是真的， 在让你的细胞工作的分子混乱局面中，缠结的神经元丛产生你的思想与身份，你的朋友圈和家庭，一直到全世界的城市的结构与经济。

**P341 2016-03-31 Why is Mount Everest so tall - Michele Koppes**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=341)

Every spring, hundreds of adventure-seekers dream of climbing Qomolangma, also known as Mount Everest. At base camp, they hunker down for months waiting for the chance to scale the mountain's lofty, lethal peak. But why do people risk life and limb to climb Everest? Is it the challenge? The view? The chance to touch the sky? For many, the draw is Everest's status as the highest mountain on Earth. There's an important distinction to make here. Mauna Kea is actually the tallest from base to summit, but at 8850 meters above sea level, Everest has the highest altitude on the planet. To understand how this towering formation was born, we have to peer deep into our planet's crust, where continental plates collide. The Earth's surface is like an armadillo's armor. Pieces of crust constantly move over, under, and around each other. For such huge continental plates, the motion is relatively quick. They move two to four centimeters per year, about as fast as fingernails grow. When two plates collide, one pushes into or underneath the other, buckling at the margins, and causing what's known as uplift to accomodate the extra crust. That's how Everest came about. 50 million years ago, the Earth's Indian Plate drifted north, bumped into the bigger Eurasian Plate, and the crust crumpled, creating huge uplift. Mountain Everest lies at the heart of this action, on the edge of the Indian-Eurasian collision zone. But mountains are shaped by forces other than uplift. As the land is pushed up, air masses are forced to rise as well. Rising air cools, causing any water vapor within it to condense and form rain or snow. As that falls, it wears down the landscape, dissolving rocks or breaking them down in a process known as weathering. Water moving downhill carries the weathered material and erodes the landscape, carving out deep valleys and jagged peaks. This balance between uplift and erosion gives a mountain its shape. But compare the celestial peaks of the Himalayas to the comforting hills of Appalachia. Clearly, all mountains are not alike. That's because time comes into the equation, too. When continental plates first collide, uplift happens fast. The peaks grow tall with steep slopes. Over time, however, gravity and water wear them down. Eventually, erosion overtakes uplift, wearing down peaks faster than they're pushed up. A third factor shapes mountains: climate. In subzero temperatures, some snowfall doesn't completely melt away, instead slowly compacting until it becomes ice. That forms the snowline, which occurs at different heights around the planet depending on climate. At the freezing poles, the snowline is at sea level. Near the equator, you have to climb five kilometers before it gets cold enough for ice to form. Gathered ice starts flowing under its own immense weight forming a slow-moving frozen river known as a glacier, which grinds the rocks below. The steeper the mountains, the faster ice flows, and the quicker it carves the underlying rock. Glaciers can erode landscapes swifter than rain and rivers. Where glaciers cling to mountain peaks, they sand them down so fast, they lop the tops off like giant snowy buzzsaws. So then, how did the icy Mount Everest come to be so tall? The cataclysmic continental clash from which it arose made it huge to begin with. Secondly, the mountain lies near the tropics, so the snowline is high, and the glaciers relatively small, barely big enough to widdle it down. The mountain exists in a perfect storm of conditions that maintain its impressive stature. But that won't always be the case. We live in a changing world where the continental plates, Earth's climate, and the planet's erosive power might one day conspire to cut Mount Everest down to size. For now, at least, it remains legendary in the minds of hikers, adventurers, and dreamers alike.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=341)

翻译人员: Yu Mingke 校对人员: Zihan Zhao-Holland每个春天成百的冒险者梦想着攀登珠穆朗玛峰也就是Mount Everest（别名）他们在山脚的大本营蹲守数月等待登上这高耸、致命山峰的最佳时机然而为什么人们会冒着生命危险攀登珠峰呢？是因为充满挑战？为了风光？为了有机会触碰蓝天？对很多人来说，是珠峰作为世界最高峰的地位吸引着他们在这里需要区分一点事实上（夏威夷的）莫纳科历山就从山脚到顶峰来说是最高的但仅比海平面高8850米珠峰则是地球上海拔最高的山峰要想知道其高峰是如何形成的我们需要深入地壳去看一看大陆板块在那里碰撞地球的表面就像是犰狳的盔甲一样一块块地壳板块持续移动相互重叠四处漂移对于如此巨大的大陆板块而言，这种运动相对迅速他们每年移动2至4厘米和指甲生长的速度差不多当两个板块碰撞时一块会被挤进或挤到另一块下面，在边缘皱缩并为了容纳多出的板块，产生的现象被称为板块的隆升这也是珠峰的来历五千万年前，地球印度板块向北漂移撞击较大的欧亚大陆板块地壳因此皱缩，产生巨大的隆升珠穆朗玛峰就位于这一活动发生的中心也就是印度-亚欧碰撞区的边缘但使山峰形态的形成的外力不止隆升随着陆地被抬高，气团同样被迫上升升高的空气温度降低，使其内部的水蒸气冷凝并形成降雨或降雪降水落下，侵蚀地表使岩石溶解或降解，也就是风化沿着山坡留下的水卷携被风化的物质腐蚀地面雕刻出幽深的山谷和参差的山峰隆升和侵蚀间的平衡为山峦赋予了形态但比一比喜马拉雅山的入云高峰和阿帕拉齐亚的舒缓山峦很明显，山并非都长一个样子那是因为时间也在其中起着作用当大陆板块最初碰撞时，隆升十分迅速山峰一边长高一边形成陡坡随着时间的流失，重力和水使其被磨平最终，侵蚀的作用反超隆升磨平山峰的速度超出其被推高的速度第三个塑造山峦的因素是——气候当温度在零下时，一些降雪并不完全融化而是逐渐变得紧密，直至成为冰这使雪线得以形成。地球上各处的雪线高度有所不同是依据气候所致的在寒冷的极地，雪线位于海平面在赤道附近，你不得不攀爬五千米才达到冷到足以形成冰的高度聚集起来的冰在因其巨大的质量开始流动形成一种缓慢移动的冻流，也就是冰川冰川打磨其下的岩石山越陡峭，冰移动的速度就越快冰雕磨下面岩石的速度就越快冰川能够比降雨和河流更快地侵蚀地表冰川紧附山峰之处，沙土流失得很快冰川就像一把巨大的冰雪锯子，切断山顶那么，寒冷的珠峰是如何长这么高的呢？灾难性的板块冲撞使其上升让它在最初十分巨大其次，这座山位于热带附近所以雪线较高，且冰川相对较小不太可能大到把它冲下来这座山所在之处的具有的自然条件对于保持其骄人外形而言堪称完美不过事情不总是这样我们处在一个不断变化的世界，大陆板块地球的气候以及侵蚀能力也许会在某一刻共同将珠峰削低至少在现在，它对于登山者、冒险家、和梦想家而言仍然是一个传奇

**P342 2016-04-04 How to spot a fad diet - Mia Nacamulli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=342)

Conventional wisdom about diets, including government health recommendations, seems to change all the time. And yet, ads routinely come about claiming to have the answer about what we should eat. So how do we distinguish what's actually healthy from what advertisers just want us to believe is good for us? Marketing takes advantage of the desire to drop weight fast, and be stronger, slimmer, and brighter. And in the big picture, diet plans promising dramatic results, known as fad diets, are just what they seem: too good to be true. So where do diet fads even come from? While the Ancient Greeks and Romans rallied behind large-scale health regimens centuries earlier, this phenomenon began in earnest in the Victorian Era with crazes like the vinegar diet and the Banting Diet. Since then, diets have advised us all sorts of things: to excessively chew, to not chew at all, to swallow a grapefruit per meal, non-stop cabbage soup, even consumption of arsenic, or tapeworms. If the idea of diet crazes has withstood history, could this mean that they work? In the short term, the answer is often yes. Low-carbohydrate plans, like the popular Atkins or South Beach Diets, have an initial diuretic effect. Sodium is lost until the body can balance itself out, and temporary fluid weight loss may occur. With other high-protein diets, you might lose weight at first since by restricting your food choices, you are dropping your overall calorie intake. But your body then lowers its metabolic rate to adjust to the shift, lessening the diet's effect over time and resulting in a quick reversal if the diet is abandoned. So while these diets may be alluring early on, they don't guarantee long-term benefits for your health and weight. A few simple guidelines, though, can help differentiate between a diet that is beneficial in maintaining long-term health, and one that only offers temporary weight changes. Here's the first tipoff: If a diet focuses on intensely cutting back calories or on cutting out entire food groups, like fat, sugar, or carbohydrates, chances are it's a fad diet. And another red flag is ritual, when the diet in question instructs you to only eat specific foods, prescribed combinations, or to opt for particular food substitutes, like drinks, bars, or powders. The truth is shedding pounds in the long run simply doesn't have a quick-fix solution. Not all diet crazes tout weight loss. What about claims of superfoods, cleanses, and other body-boosting solutions? Marketing emphasizes the allure of products associated with ancient and remote cultures to create a sense of mysticism for consumers. While so-called superfoods, like blueberries or açaí, do add a powerful punch of nutrients, their super transformative qualities are largely exaggeration. They are healthy additions to a balanced diet, yet often, they're marketed as part of sugary drinks or cereals, in which case the negative properties outweight the benefits. Cleanses, too, may be great in moderation since they can assist with jumpstarting weight loss and can increase the number of fresh fruits and vegetables consumed daily. Scientifically speaking, though, they've not yet been shown to have either a long-term benefit or to detox the body any better than the natural mechanisms already in place. Everywhere we look, we're offered solutions to how we can look better, feel fitter, and generally get ahead. Food is no exception, but advice on what we should eat is best left to the doctors and nutritionists who are aware of our individual circumstances. Diets and food fads aren't inherently wrong. Circumstantially, they might even be right, just not for everyone all of the time.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=342)

翻译人员: Rong Ma 校对人员: fuyu you对于健康食谱的普遍看法，以及政府发布的健康饮食指南，似乎随时都在变化。但是，广告总是在表明他们有解决我们该吃什么的答案。所以，我们该如何区分，什么是真正健康的什么是广告商想让我们相信它是健康的？市场抓住了人们期望， 快速减肥变得更强壮，更苗条，以及更聪明。整体而言，减肥计划给人以巨大变化的期望，也就是通常所说的流行餐，就像他们看起来一样：好到难以置信所以，流行餐到底从哪里来的呢？在几个世纪前，古希腊人和罗马人整合了庞大数量的养生之道，这个现象最早出现在维多利亚时期并伴随着时尚，比如喝醋减肥法节食减肥法。从那以后，减肥被宣传成各种各种的事：充分的咀嚼一下都不嚼每餐吞一个葡萄柚，必不可少的卷心菜汤，甚至服砷，吃绦虫。如果流行餐的办法经受住了历史考验，那就意味着他们是有效的嘛？在短时间内，他们常常有效。低碳水化合物饮食计划，就像流行的阿特金斯减肥法以及南滩减肥法，原本就有利尿的作用。钠被流失，直到身体能够平衡他们，并且会发生短暂的身体流体质量减轻。关于其他的高蛋白餐，你可能在一开始减重因为它限制了你的食物选择，减少了总体卡路里的摄入。但是你的身体之后会降低新陈代谢速率来适应调整，减肥的效果便逐渐减少并且如果放弃这种饮食，体重就会快速反弹。所以，这些饮食计划可能一开始吸引着你，他们并不能保证对你长期的健康以及体重有好处。有一些简单的指导，能帮助你来区分这个饮食计划是对维持长期健康有好处的，还是仅仅在短期内，体重上有所变化。这是第一个警告：如果一个饮食计划集中关注减少卡路里或者减少整个食物群像是脂肪，糖类或者碳水化合物，他们就有可能是流行餐。另一个危险信号是有模式的，那就是当这个饮食计划告诉你只吃特定的食物，规定的组合，或者去选择指定的食品替代物，像是饮料，棒状食物，或者粉末状的食物。事实就是长期减肥没有一个简单的速效对策。不是所有流行餐都以减少体重为卖点。那么关于保健食品，清洁食品和其他强化身体办法的意见呢？市场强调了产品关于古代和久远文化的魅力从而对消费者造成迷惑感。被叫做绿色超级食物的东西，比如蓝莓，巴西莓，确实加入了强力的营养物，他们的超级塑形能力被极大地夸大。对于平衡膳食，他们是健康的添加剂，但是经常被市场用作甜味饮料和谷物的成分在那种情况下，他们的坏处大于好处。清洁食品，同样也是，可能对节制有很大帮助因为他们可以帮助开始减少体重并且可以增加每天新鲜水果和蔬菜的摄入。但是，从科学角度，他们还没有被发现有长期的好处或者比通过自然机制排毒更有效。无论在哪里，都有解决让我们怎样看起来更好感觉更健康，并且总体上在进步的方法。食物没有例外，但是建议我们吃什么最好，应该留给了解我们个人情况的医生或者是营养师。饮食计划以及流行餐本质上没有错。有些时候，他们甚至是对的，但并不总适用于每个人。

**P343 2016-04-05 The surprising reason you feel awful when you're sick - Marco A. Soto**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=343)

It starts with a tickle in your throat that becomes a cough. Your muscles begin to ache, you grow irritable, and you lose your appetite. It's official: you've got the flu. It's logical to assume that this miserable medley of symptoms is the result of the infection coursing through your body, but is that really the case? What's actually making you feel sick? What if your body itself was driving this vicious onslaught? You first get ill when a pathogen like the flu virus gets into your system, infecting and killing your cells. But this unwelcome intrusion has another effect: it alerts your body's immune system to your plight. As soon as it becomes aware of infection, your body leaps to your defense. Cells called macrophages charge in as the first line of attack, searching for and destroying the viruses and infected cells. Afterwards, the macrophages release protein molecules called cytokines whose job is to recruit and organize more virus-busting cells from your immune system. If this coordinated effort is strong enough, it'll wipe out the infection before you even notice it. But that's just your body setting the scene for some real action. In some cases, viruses spread further, even into the blood and vital organs. To avoid this sometimes dangerous fate, your immune system must launch a stronger attack, coordinating its activity with the brain. That's where those unpleasant symptoms come in, starting with the surging temperature, aches and pains, and sleepiness. So why do we experience this? When the immune system is under serious attack, it secretes more cytokines, which trigger two responses. First, the vagus nerve, which runs through the body into the brain, quickly transmits the information to the brain stem, passing near an important area of pain processing. Second, cytokines travel through the body to the hypothalamus, the part of the brain responsible for controlling temperature, thirst, hunger, and sleep, among other things. When it receives this message, the hypothalamus produces another molecule called prostaglandin E2, which gears it up for war. The hypothalamus sends signals that instruct your muscles to contract and causes a rise in body temperature. It also makes you sleepy, and you lose your appetite and thirst. But what's the point of all of these unpleasant symptoms? Well, we're not yet sure, but some theorize that they aid in recovery. The rise in temperature can slow bacteria and help your immune system destroy pathogens. Sleep lets your body channel more energy towards fighting infection. When you stop eating, your liver can take up much of the iron in your blood, and since iron is essential for bacterial survival, that effectively starves them. Your reduced thirst makes you mildly dehydrated, diminishing transmission through sneezes, coughs, vomit, or diarrhea. Though it's worth noting that if you don't drink enough water, that dehydration can become dangerous. Even the body's aches make you more sensitive, drawing attention to infected cuts that might be worsening, or even causing your condition. In addition to physical symptoms, sickness can also make you irritable, sad, and confused. That's because cytokines and prostaglandin can reach even higher structures in your brain, disrupting the activity of neurotransmitters, like glutamate, endorphins, serotonin, and dopamine. This affects areas like the limbic system, which oversees emotions, and your cerebral cortex, which is involved in reasoning. So it's actually the body's own immune response that causes much of the discomfort you feel every time you get ill. Unfortunately, it doesn't always work perfectly. Most notably, millions of people worldwide suffer from autoimmune diseases, in which the immune system treats normal bodily cues as threats, so the body attacks itself. But for the majority of the human race, millions of years of evolution have fine-tuned the immune system so that it works for, rather than against us. The symptoms of our illnesses are annoying, but collectively, they signify an ancient process that will continue barricading our bodies against the outside world for centuries to come.

**P343 2016-04-05 The surprising reason you feel awful when you're sick - Marco A. Soto**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=343)

翻译人员: Jenny Hsu 校对人员: Tricia Tay开始时你的喉咙有一点痒，接着你开始咳嗽，肌肉变得疼痛，情绪莫名的急躁，变得没有胃口，这些症状表明你得流感了。我们理所当然的认为造成这一系列症状的原因是身体受到了感染但事实真的是这样吗？到底是什么让我们感到身体不适？如果是我们的身体在攻击它自己呢？当流感病毒这样的病原体进入体内感染并杀死细胞时你才会感到生病但这种并不受欢迎的侵入却有另一种作用它会使你身体的免疫系统注意于当下的状况只要发生感染，免疫系统便立刻作出反应巨噬细胞作为第一线的攻击者将会搜索并消灭病毒与受感染的细胞然后巨噬细胞会释放一种叫作细胞因子的蛋白质分子它会从免疫系统中征集并组织更多的细胞来杀死病毒如果这一阶段的协调作用足够强的话它会在你丝毫不知情的状态下清除感染但这只是你身体为一些实际行动所作出的准备在某些情况下，病毒进一步蔓延甚至进入血液和重要器官为了避免这种可能发生的危险你的免疫系统必须发起更强的进攻协调与大脑的活动这就是那些引起不适的症状来源。体温开始升高,身体疼痛,和昏昏欲睡。所以我们为何会经历这些？当免疫系统受到严重攻击时，它分泌更多细胞因子来触发两种反应:首先，贯穿整个身体的脑神经，迷走神经快速将信息传递到脑干路经一个控制疼痛过程的重要区域其次，细胞因子穿过身体到达下丘脑它是大脑中控制温度调节，口渴，饥饿，在其他事情中还有睡意。当下丘脑接受到这种信息它会产生另一种分子叫做前列腺素E2，在战争中发挥了重要的作用下丘脑发出信号来控制你的肌肉收缩并导致体温上升它还会让你昏昏欲睡感受不到饥饿和口渴但是这些不舒服的症状有什么意义呢？我们目前还不清楚但是有些理论认为这有助于恢复温度升高可以降低病毒活性帮助你的免疫系统摧毁病原体睡眠可以让你的身体积蓄更多能量来对抗感染。当你停止进食，你的肝脏可以吸收血液中大量的细菌赖以生存的铁有效的消灭细菌感觉不到口渴会使你轻微脱水减少通过打喷嚏，咳嗽，呕吐，和腹泻传播的病菌。不过值得注意的是，如果你没有喝足够的水脱水会变得十分危险。你会对身体的疼痛更加敏感，特别要注意受感染的伤口可能会恶化甚至影响你的整体状态。除了身体上表现出的症状疾病也会让你感到烦躁，伤心，和困惑。这是因为细胞因子和前列腺素可以到达你大脑中更高的结构破坏神经递质活性，如谷氨酸，内啡肽，血清素，和多巴胺。这种行为会影响控制情绪的大脑边缘系统和进行推理的大脑皮层所以它是人体自身的免疫反应导致你每次生病时的不适反应可惜，免疫系统并不是总能完美运行。最值得注意的是，全球数以百万计的人患有自身免疫性疾病因为他们的免疫系统将正常的身体信号视为威胁所以对自身进行攻击。但是对于大多数人，免疫系统历经数百万年的进化不会对自身产生排斥反应。我们自身疾病所引发的症状令人不适但总体来说，他们是一种古老的过程并将在未来的世纪中继续保护我们的身体不受外界影响。

**P344 2016-04-06 Does grammar matter - Andreea S. Calude**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=344)

You're telling a friend an amazing story, and you just get to the best part when suddenly he interrupts, "The alien and I," not "Me and the alien." Most of us would probably be annoyed, but aside from the rude interruption, does your friend have a point? Was your sentence actually grammatically incorrect? And if he still understood it, why does it even matter? From the point of view of linguistics, grammar is a set of patterns for how words are put together to form phrases or clauses, whether spoken or in writing. Different languages have different patterns. In English, the subject normally comes first, followed by the verb, and then the object, while in Japanese and many other languages, the order is subject, object, verb. Some scholars have tried to identify patterns common to all languages, but apart from some basic features, like having nouns or verbs, few of these so-called linguistic universals have been found. And while any language needs consistent patterns to function, the study of these patterns opens up an ongoing debate between two positions known as prescriptivism and descriptivism. Grossly simplified, prescriptivists think a given language should follow consistent rules, while descriptivists see variation and adaptation as a natural and necessary part of language. For much of history, the vast majority of language was spoken. But as people became more interconnected and writing gained importance, written language was standardized to allow broader communication and ensure that people in different parts of a realm could understand each other. In many languages, this standard form came to be considered the only proper one, despite being derived from just one of many spoken varieties, usually that of the people in power. Language purists worked to establish and propagate this standard by detailing a set of rules that reflected the established grammar of their times. And rules for written grammar were applied to spoken language, as well. Speech patterns that deviated from the written rules were considered corruptions, or signs of low social status, and many people who had grown up speaking in these ways were forced to adopt the standardized form. More recently, however, linguists have understood that speech is a separate phenomenon from writing with its own regularities and patterns. Most of us learn to speak at such an early age that we don't even remember it. We form our spoken repertoire through unconscious habits, not memorized rules. And because speech also uses mood and intonation for meaning, its structure is often more flexible, adapting to the needs of speakers and listeners. This could mean avoiding complex clauses that are hard to parse in real time, making changes to avoid awkward pronounciation, or removing sounds to make speech faster. The linguistic approach that tries to understand and map such differences without dictating correct ones is known as descriptivism. Rather than deciding how language should be used, it describes how people actually use it, and tracks the innovations they come up with in the process. But while the debate between prescriptivism and descriptivism continues, the two are not mutually exclusive. At its best, prescriptivism is useful for informing people about the most common established patterns at a given point in time. This is important, not only for formal contexts, but it also makes communication easier between non-native speakers from different backgrounds. Descriptivism, on the other hand, gives us insight into how our minds work and the instinctive ways in which we structure our view of the world. Ultimately, grammar is best thought of as a set of linguistic habits that are constantly being negotiated and reinvented by the entire group of language users. Like language itself, it's a wonderful and complex fabric woven through the contributions of speakers and listeners, writers and readers, prescriptivists and descriptivists, from both near and far.

**P344 2016-04-06 Does grammar matter - Andreea S. Calude**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=344)

翻译人员: Cheng Fu 校对人员: Lan Yi你正给朋友讲一个精彩的故事刚讲到最精彩的部分时 他突然打断了你说：应该是“外星人和我” 而不是“我和外星人”许多人都会对这种行为感到反感先抛开无礼的打断不谈来想一下你朋友说的有道理吗？你说的这句话从语法上讲 真的是错的吗？要是他依旧能理解你的意思 那么这样做又有什么意义呢？从语言学的角度来看语法就是一系列规则教你怎样在口语和写作中用单词构成短语和句子不同的语言有着不同的规则比如在英语中 主语通常放在最前面谓语动词跟在主语后面宾语则放在最后而在日语和其他许多语言中顺序却变成了主语、宾语和谓语动词一些学者尝试找到适用于所有语言的规则但是除了一些基本的属性比如所有语言都有名词和动词所谓的语言上的共性几乎是不存在的尽管所有语言都得按照一套固定的规则来但有两方观点在这些规则的研究上始终争论不休即规定主义和描写主义简单来说规定主义认为一门既定的语言要遵循固定的规则而描写主义则认为变化和调整是语言正常且必要的一部分绝大多数语言在其大部分历史时期中都是用于口头的交流不过随着人们相互之间联系的增多 书写的地位开始提升于是书面语开始规范化 以适用于更为广泛的交流同时也确保了不同地方的人能够理解这些语言所表达的意思对于大多数语言而言 这一标准形式被认为是唯一合适的但实际上它却是从众多不同的口语形式中脱颖而出且通常情况下来自掌权的一方通过将那个时代已有的一系列语法规则详尽记录下来语言纯粹主义者们开始建立并传播这一标准书面语言所涉及的语法同样也适用于口语而那些偏离了书面语语法的口语则被认为是错误的或者是社会地位低下的表现于是许多从小就按照这一规则说话的人被迫开始接受标准的语法规则直到最近语言学家才意识到口语和书面语完全是两码事口语有它自己的规律性和模式在我们还不能记事的时候 就开始学习说话了那个时候更多是通过下意识的行为来构建说话技能而不是记住那些规则由于口语也会用到语气和语调来传达意思所以它的结构更加地多样化会根据说话者和听者的需求进行调整这就意味着在说话时应该避免一些难以理解的复杂句子做出适当调整避免一些尴尬的发音或是通过略读让语速加快尝试去理解和比对语法上的这些差异却不定义对错的语言学方法被称为描写主义相比于决定该如何使用语言描写主义更倾向于叙述人们实际上是怎样使用语言的并追溯在这一过程中出现的一些新方法尽管描写主义和规定主义之间的争论会一直持续下去但它们二者之间并不是互相排斥的规定主义可以在某个特定的时间点告诉人们最为通用的确定模式这一点不仅在正式场合很重要也使得来自不同国家 不同背景的非母语人士交流起来更加容易另一方面描写主义会让我们看到自己的想法如何运作以及如何本能地构建自己的世界观从根本上说 语法顶多被认为是一系列不断被所有的语言使用者争论和改造的语言习惯就像语言本身就像一匹精美复杂的布经由从古至今的说话者和听众作者和读者规定主义者和描写主义者们的共同努力编织而成

**P345 2016-04-15 Why is being scared so fun - Margee Kerr**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=345)

Somewhere right now, people are lining up to scare themselves, maybe with a thrill ride or horror movie. In fact, in October of 2015 alone, about 28 million people visited a haunted house in the U.S. But many consider this behavior perplexing, asking the question, "What could possibly be fun about being scared?" Fear has a bad rap, but it's not all bad. For starters, fear can actually feel pretty good. When a threat triggers our fight or flight response, our bodies prepare for danger by releasing chemicals that change how our brains and bodies function. This automatic response jumpstarts systems that can aid in survival. They do this by making sure we have enough energy and are protected from feeling pain, while shutting down nonessential systems, like critical thought. Feeling pain-free and energized, while not getting caught up in worrisome thoughts that normally occupy our brains, that all sounds great, and it can be because this response is similar, though not exactly the same to what we experience in positive, high-arousal states, like excitement, happiness, and even during sex. The difference lays in the context. If we're in real danger, we're focused on survival, not fun. But when we trigger this high arousal response in a safe place, we can switch over to enjoying the natural high of being scared. It's why people on roller coasters can go from screaming to laughing within moments. Your body is already in a euphoric state. You're just relabeling the experience. And though the threat response is universal, research shows differences between individuals in how the chemicals associated with the threat response work. This explains why some are more prone to thrill-seeking than others. Other normal physical differences explain why some may love the dizziness associated with a loop-de-loop, while loathing the stomach-drop sensation of a steep roller coaster, or why some squeal with delight inside a haunted house, but retreat in terror if taken to an actual cemetery. Fear brings more than just a fun, natural high. Doing things that we're afraid of can give us a nice boost of self-esteem. Like any personal challenge, whether it's running a race or finishing a long book, when we make it through to the end, we feel a sense of accomplishment. This is true even if we know we're not really in any danger. Our thinking brains may know the zombies aren't real, but our bodies tell us otherwise. The fear feels real, so when we make it through alive, the satisfaction and sense of accomplishment also feel real. This is a great evolutionary adaptation. Those who had the right balance of bravery and wit to know when to push through the fear and when to retreat were rewarded with survival, new food, and new lands. Finally, fear can bring people together. Emotions can be contagious, and when you see your friend scream and laugh, you feel compelled to do the same. This is because we make sense of what our friends are experiencing by recreating the experience ourselves. In fact, the parts of the brain that are active when our friend screams are active in us when we watch them. This not only intensifies our own emotional experience, but makes us feel closer to those we're with. The feeling of closeness during times of fear is aided by the hormone oxytocin released during fight or flight. Fear is a powerful emotional experience, and anything that triggers a strong reaction is going to be stored in our memory really well. You don't want to forget what can hurt you. So if your memory of watching a horror film with your friends is positive and left you with a sense of satisfaction, then you'll want to do it over and over again.

**P345 2016-04-15 Why is being scared so fun - Margee Kerr**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=345)

翻译人员: Zhao Harry 校对人员: Lan Yi此时此刻，世界上的某个地方，人们正排着队的体验恐惧或许是刺激的游乐设施，或许是恐怖电影。事实上，仅仅2015年10月这一个月期间，美国就有近2800万人次选择到鬼屋寻求刺激。很多人认为这种寻求刺激惊吓的行为令人费解，他们提出了这样的问题：“感受恐惧，寻求刺激有那么好玩么？”诚然，“恐惧”这个词名声不佳，但也并非全无是处。对于新人而言，恐惧确实是个有趣的东西。当刺激活动引发了我们类似搏斗或飞行的反应时，我们的身体就会释放激素，改变大脑和身体的机能，以此来应对即将到来的危险或者说“恐惧".这套自发的快速反应系统能够帮助我们更好的生存。它通过关闭某些不必要的系统，如批判性思维等来确保我们有充足的能量，从而保护我们，减轻或免除我们的疼痛。想想吧，当我们充分感受着恐惧或痛苦，大脑中却未充斥着真正身处致命危机时的忧患思绪，这是多么爽的感受啊。而这是可行的，因为恐惧刺激产生的情绪和感受同那些常见的正向高唤醒情绪的反应大同小异，比如激动、高兴甚至性行为。他们的区别就在于处境不同，当真正身处险境时我们更多关注的是如何生存而非享受恐惧。但是当我们在安全的环境中尝试这种高唤醒情绪时就能够全身心的去感受这种恐惧带来的纯天然“高潮”。这就是为什么人们在乘坐过山车时能够在瞬息间完成尖叫和大笑的转变。我们的身体其实早已处于愉悦状态了，我们只是在自我催眠，好像自己真的身处险境一样。研究表明，虽然这种这种“恐惧愉悦”现象十分普遍，却仍会因个体的不同体现出些许差异。这种区别体现在激素刺激产生愉悦感的过程中。这就解释了为什么有些人更热衷于去寻求刺激，感受恐惧。另外的一些正常生理现象的区别则解释了为何有些人喜爱转圈带来的眩晕感，却讨厌过山车带来的胃部翻江倒海的感觉；为何有些人在鬼屋中兴奋的尖叫，却不敢到真正的墓园当中。恐惧带来的不仅是兴奋和“高潮”。尝试挑战我们害怕的东西对于树立自尊自信益处颇多。就像很多个人挑战一样，无论是完成了一次跑步比赛，还是读完了一本篇幅很长的书，当坚持到最后时，我们都会很有成就感。这是事实，即便早已知晓我们并非真正身处险境。大脑告诉我们僵尸并不存在，但我们的身体反应却并非如此。恐惧的感受非常真实，因此当我们挑战成功时，那种满足感和成就感同样真实。这是一种强大的进化与适应能力。有些人能够很好的辨别鲁莽和智慧，他们知道何时需要勇往直前，何时需要急流勇退，而他们获得的奖赏则是“生存"，新的食物，新的栖息地。最后，恐惧还能提高人们的凝聚力。情绪是极富感染性的，无论你看到朋友在尖叫或大笑，都会不自觉的想和他做同样的事情。这是因为我们会再创情境，来使自己感受朋友正在经历的情绪。事实上，当我们看到看到朋友正在尖叫时，我们自身对应恐惧和尖叫的大脑部分也会活跃起来。这不仅会加强我们自身的情绪体验，也会拉近我们与身边同伴的距离。恐惧期间产生的亲近感是体内某种激素刺激产生的，而这种激素和我们在搏斗或飞行时产生的是相同的。恐惧是种强烈的情绪体验，任何引发这种强烈反应的刺激，都会在我们的头脑中留下鲜活的记忆。你不会忘记那些会对你造成伤害的事物。所以当你和同伴一起看恐怖电影的记忆十分刺激，并且带给你极大的满足感时，你就会不断的期望再次尝试。

**P346 2016-04-21 The Turing test - Can a computer pass for a human - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=346)

What is consciousness? Can an artificial machine really think? Does the mind just consist of neurons in the brain, or is there some intangible spark at its core? For many, these have been vital considerations for the future of artificial intelligence. But British computer scientist Alan Turing decided to disregard all these questions in favor of a much simpler one: can a computer talk like a human? This question led to an idea for measuring aritificial intelligence that would famously come to be known as the Turing test. In the 1950 paper, "Computing Machinery and Intelligence," Turing proposed the following game. A human judge has a text conversation with unseen players and evaluates their responses. To pass the test, a computer must be able to replace one of the players without substantially changing the results. In other words, a computer would be considered intelligent if its conversation couldn't be easily distinguished from a human's. Turing predicted that by the year 2000, machines with 100 megabytes of memory would be able to easily pass his test. But he may have jumped the gun. Even though today's computers have far more memory than that, few have succeeded, and those that have done well focused more on finding clever ways to fool judges than using overwhelming computing power. Though it was never subjected to a real test, the first program with some claim to success was called ELIZA. With only a fairly short and simple script, it managed to mislead many people by mimicking a psychologist, encouraging them to talk more and reflecting their own questions back at them. Another early script PARRY took the opposite approach by imitating a paranoid schizophrenic who kept steering the conversation back to his own preprogrammed obsessions. Their success in fooling people highlighted one weakness of the test. Humans regularly attribute intelligence to a whole range of things that are not actually intelligent. Nonetheless, annual competitions like the Loebner Prize, have made the test more formal with judges knowing ahead of time that some of their conversation partners are machines. But while the quality has improved, many chatbot programmers have used similar strategies to ELIZA and PARRY. 1997's winner Catherine could carry on amazingly focused and intelligent conversation, but mostly if the judge wanted to talk about Bill Clinton. And the more recent winner Eugene Goostman was given the persona of a 13-year-old Ukrainian boy, so judges interpreted its nonsequiturs and awkward grammar as language and culture barriers. Meanwhile, other programs like Cleverbot have taken a different approach by statistically analyzing huge databases of real conversations to determine the best responses. Some also store memories of previous conversations in order to improve over time. But while Cleverbot's individual responses can sound incredibly human, its lack of a consistent personality and inability to deal with brand new topics are a dead giveaway. Who in Turing's day could have predicted that today's computers would be able to pilot spacecraft, perform delicate surgeries, and solve massive equations, but still struggle with the most basic small talk? Human language turns out to be an amazingly complex phenomenon that can't be captured by even the largest dictionary. Chatbots can be baffled by simple pauses, like "umm..." or questions with no correct answer. And a simple conversational sentence, like, "I took the juice out of the fridge and gave it to him, but forgot to check the date," requires a wealth of underlying knowledge and intuition to parse. It turns out that simulating a human conversation takes more than just increasing memory and processing power, and as we get closer to Turing's goal, we may have to deal with all those big questions about consciousness after all.

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翻译人员: Amy H. Fann 校对人员: Jing Zhou什么是意识？人造的机器真的能思考吗？人类的大脑到底仅仅是 一个神经元的集体还是是一种神秘意志的存在？对很多人来说， 这些都是关于未来人工智能的 一些重要考虑因素。但是对于一位英国电脑科学家， 阿兰-图灵，而言，他关心一个更简单的问题：电脑可以如人类一样地交流吗？这个问题让他有了测量人工智能的想法，之后，这便演变为著名的“图灵测验” 。在1950年，图灵在 “计算机器与智能”的报告里提出了一个游戏：一个判官和看不到的选手用短信交流，然后评价他们的回答。要通过考试， 电脑必须能在没有改变结果的情况下，代替其中一位选手。换句话说，如果无轻易法分辨 一台电脑与一个人的区别，这台电脑就是“聪明”的。图灵预计在2000年，拥有100兆字节内存的机器会 轻易地通过图灵测试。但是图灵预计错了。虽然现代的电脑具备更多的内存，没有几个通过了图灵测试。那些通过图灵测试的电脑并不是用了压倒性的计算能力，而是用了巧妙的手段来迷惑判官。虽然没有经过正式的考试，ELIZA成了历史上第一个有资格成功的程序。仅用了一个十分简短的脚本，ELIZA成功地迷惑了很多人，模仿心理专家， 鼓励他们多说话，同时也发问他们的问题。另一个早期程式脚本，PARRY, 运用相反的方式，模仿了偏执的精神分裂症患者一直将话题转移回他自己预设的困扰。它们玩弄人们的成功 凸显出测试的缺点。人类常常把很多并不聪明的事物归类于“聪明”。尽管如此，年度竞赛 比如洛伯纳奖，使测试变得更规范，让判官们事先知道有些对话选手是机器。虽然总体质量上升了，很多聊天机器人还是局用了 与ELIZA和PARRY类似的技巧。1997年的获胜者，凯瑟琳能够进行惊人般的聪慧会话，但是这是在讨论与 比尔·克林顿 相关的话题。最近的获奖者， 尤金·古斯特曼拥有13岁的乌克兰少年的个性，使判官将 他的别扭语法理解为语言及文化的阻碍。在这同时，其他的程式如 Cleverbot， 采取了另一个方式通过分析与统计巨大的真实对话数据，决定最好的回答方式。有一些还存储先前对话的记忆，以便长期改善。但尽管Cleverbot 自己的答复 听起来非常像人类，对始终如一的个性的缺乏及无法回答崭新的话题则完全暴露了它。在图灵的时代里， 谁可能预料到今日的电脑能够驾驶宇宙飞船，能操控精巧的手术，还能解答大量的方程，可仍与最基本的对话斗争？人类语言是样 如何巧妙及复杂的现象，连最大最广泛的字典都 无法记录。聊天机器人会被简单的停顿， 如“额...”，或被没有正确回答的问题 而弄得团团转。一个简单的对话句子，比如“我从冰箱里拿出了果汁， 然后给了他，但忘了查明日子“，需要丰富的潜在知识 与直觉来解析。事件证明若要模仿人类对话，比单纯地增加记忆力和运算量 更加复杂。在接近图灵的目标的同时，我们也终究需考虑下 与“意识”相关的重大问题。翻译：Amy H. Fann

**P347 2016-04-22 Why do cats act so weird - Tony Buffington**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=347)

Why do cats do that? They're cute, they're lovable, and judging by the 26 billions views of over 2 million YouTube videos of them pouncing, bouncing, climbing, cramming, stalking, clawing, chattering, and purring, one thing is certain: cats are very entertaining. These somewhat strange feline behaviors, both amusing and baffling, leave many of us asking, "Why do cats do that?" Throughout time, cats were simultaneously solitary predators of smaller animals and prey for larger carnivores. As both predator and prey, survival of their species depended on crucial instinctual behaviors which we still observe in wild and domestic cats today. While the feline actions of your house cat Grizmo might seem perplexing, in the wild, these same behaviors, naturally bred into cats for millions of years, would make Grizmo a super cat. Enabled by their unique muscular structure and keen balancing abilities, cats climbed to high vantage points to survey their territory and spot prey in the wild. Grizmo doesn't need these particular skills to find and hunt down dinner in her food bowl today, but instinctually, viewing the living room from the top of the bookcase is exactly what she has evolved to do. As wild predators, cats are opportunistic and hunt whenever prey is available. Since most cat prey are small, cats in the wild needed to eat many times each day, and use a stalk, pounce, kill, eat strategy to stay fed. This is why Grizmo prefers to chase and pounce on little toys and eat small meals over the course of the day and night. Also, small prey tend to hide in tiny spaces in their natural environments, so one explanation for Grizmo's propensity to reach into containers and openings is that she is compelled by the same curiosity that helped ensure the continuation of her species for millions of years before. In the wild, cats needed sharp claws for climbing, hunting, and self-defense. Sharpening their claws on nearby surfaces kept them conditioned and ready, helped stretch their back and leg muscles, and relieve some stress, too. So, it's not that Grizmo hates your couch, chair, ottoman, pillows, curtains, and everything else you put in her environment. She's ripping these things to shreds and keeping her claws in tip-top shape because this is exactly what her ancestors did in order to survive. As animals that were preyed upon, cats evolved to not get caught, and in the wild, the cats that were the best at avoiding predators thrived. So at your house today, Grizmo is an expert at squeezing into small spaces and seeking out and hiding in unconventional spots. It also explains why she prefers a clean and odor-free litter box. That's less likely to give away her location to any predators that may be sniffing around nearby. Considering everything we do know about cats, it seems that one of their most predominate behaviors is still one of the most mysterious. Cats may purr for any number of reasons, such as happiness, stress, and hunger. But curiously, the frequency of their purrs, between 25 and 150 hertz, is within a range that can promote tissue regeneration. So while her purring makes Grizmo an excellent nap companion, it is also possible that her purr is healing her muscles and bones, and maybe even yours, too. They developed through time as both solitary predators that hunted and killed to eat, and stealthy prey that hid and escaped to survive. So cats today retain many of the same instincts that allowed them to thrive in the wild for millions of years. This explains some of their seemingly strange behaviors. To them, our homes are their jungles. But if this is the case, in our own cat's eyes, who are we? Big, dumb, hairless cats competing with them for resources? Terribly stupid predators they're able to outsmart every day? Or maybe they think we're the prey.

**P347 2016-04-22 Why do cats act so weird - Tony Buffington**

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翻译人员: Yuyang Zhao 校对人员: Jenny Yang为什么猫要这么做？它们很可爱，惹人喜欢观众超过260亿人次，YouTube视频200万个，只为了欣赏它们的抓、扑跳跃，攀爬，狼吞虎咽，潜行，抓挠，不停地叫，甚至打呼噜，有件事是确定的：猫非常很有趣。这些猫科动物的奇怪行为，既好玩也让人困惑，让我们不由自主地要问：“猫为什么这样呢？”一直以来，猫科动物既能独立猎食小动物也是大型食肉动物的猎物。同时作为捕食者和猎物，物种的生存取决于决定性的生物本能这些我们今天可以从野生或者家养的猫观察到。你的猫的行为看上去可能让你困惑而在野外，这些行为，经过百万年的自然进化，足以让 Grizmo变成一只超级猫。独一无二的肌肉结构和完美的平衡能力，使猫可以爬到很高的地方侦察领地并且锁定野外的猎物。Grizmo不需要这些特别技巧来发现和捕捉食物为了她今天的饭碗，可是本质上，从书架顶部观察客厅正是它在进化中获得的本能。作为野外猎食者，猫都会时刻准备着捕食猎物。由于猫的猎物很小在野外，猫每天要进食很多次，不停地通过潜行-猛扑-杀死-吃掉的技巧来获得食物。这就是为什么Grisom喜欢追逐和抓扑小玩具并且成天不停地吃东西。而且在野外，小猎物往往隐藏在狭小的空间里，Grizom之所以喜欢躲进容器和小洞中是好奇心所驱使这有助于这个物种几百万年得以延续。在野外，猫需要利爪来爬树，猎食，自我防御。随时随地摩尖爪子不仅帮助它们时刻保持状态，还有助于活动腰部和腿部肌肉，也使压力得到释放。所以，不是Grizmo恨你的沙发，椅子，凳子，枕头，窗帘，以及所有你放在它面前的东西。它抓挠只是为了保持它的爪子锋利因为这正是它的祖先为了生存所做的事情。作为被捕食的猎物，猫进化出躲避追捕的技能，在野外，猫非常善于躲避捕食者。所以直到今天，Grizom仍然是个挤进小空间的专家常常搜寻或躲藏在意想不到的地方。这也解释了为什么它喜欢干净无味的小盒子。那是捕食者不可能发现的地方即使在附近寻觅的猎食者。想一下我们知道的关于猫的一切，然而它们最常见的行为之一仍然是最神秘的一个。猫打呼可能有多种原因引起，比如快乐，压力，甚至饥饿，可是，奇怪的是打呼噜的频率，在25-150赫兹之间，这个范围内能促进组织再生。所以打呼噜使Grizmo成为优秀的陪伴者，也可能还会治疗它的肌肉和骨头，甚至可能也包括你的。它们一直在进化一边孤独地捕食一边不停躲避天敌的追捕时至今日，猫仍然保留了许多本能使他们在野外存活了几百万年的本能。这是一些看来奇怪的行为的解释。对它们来说，我们的家是它们的丛林。如果是这样，在猫的眼里，我们是什么？是和它们争抢资源的没毛傻大个？还是它们能轻松应对的愚蠢捕食者？甚至也许它们认为我们是它们的猎物

**P348 2016-04-28 The threat of invasive species - Jennifer Klos**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=348)

Massive vines that blanket the southern United States, climbing as high as 100 feet as they uproot trees and swallow buildings. A ravenous snake that is capable of devouring an alligator. Rabbit populations that eat themselves into starvation. These aren't horror movie concepts. They're real stories, but how could such situations exist in nature? All three are examples of invasive species, organisms harmful not because of what they are, but where they happen to be. The kudzu vine, for example, had grown quality in its native east Asia, eaten by various insects and dying off during the cold winters. But its fortunes changed when it was imported into the southeastern United States for porch decoration and cattle feed. Its planting was even subsidized by the government to fight soil erosion. With sunny fields, a mild climate, and no natural predators in its new home, the vine grew uncontrollably until it became known as the plant that ate the South. Meanwhile in Florida's Everglades, Burmese pythons, thought to have been released by pet owners, are the cause of decreasing populations of organisms. They're successfully outcompeting top predators, such as the alligator and panther, causing a significant reduction in their food sources. They're not a problem in their native Asia because diseases, parasites, and predators help to control their population size. And in Australia, European rabbits eat so many plants that they wipe out the food supply for themselves and other herbivores. They're a pretty recent addition, intentionally introduced to the continent because one man enjoyed hunting them. Like the Burmese pythons, various factors in their native habitat keep their numbers in control. But in Australia, the lack of predators and a climate perfect for year-long reproduction allows their populations to skyrocket. So why does this keep happening? Most of the world's ecosystems are the result of millennia of coevolution by organisms, adapting to their environment and each other until a stable balance is reached. Healthy ecosystems maintain this balance via limiting factors, environmental conditions that restrict the size or range of a species. These include things like natural geography and climate, food availability, and the presence or absence of predators. For example, plant growth depends on levels of sunlight and soil nutrients. The amount of edible plants affects the population of herbivores, which in turn impacts the carnivores that feed on them. And a healthy predator population keeps the herbivores from becoming too numerous and devouring all the plants. But even minor changes in one factor can upset this balance, and the sudden introduction of non-native organisms can be a pretty major change. A species that is evolved in a separate habitat will be susceptible to different limiting factors, different predators, different energy sources, and different climates. If the new habitat's limiting factors fail to restrict the species growth, it will continue to multiply, out-competing native organisms for resources and disrupting the entire ecosystem. Species are sometimes introduced into new habitats through natural factors, like storms, ocean currents, or climate shifts. The majority of invasive species, though, are introduced by humans. Often this happens unintentionally, as when the zebra mussel was accidentally brought to Lake Erie by cargo ships. But as people migrate around the world, we have also deliberately brought our plants and animals along, rarely considering the consequences. But now that we're learning more about the effects of invasive species on ecosystems, many governments closely monitor the transport of plants and animals, and ban the imports of certain organisms. But could the species with the most drastic environmental impact be a group of primates who emerged from Africa to cover most of the world? Are we an invasive species?

**P348 2016-04-28 The threat of invasive species - Jennifer Klos**

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翻译人员: Zhenning YANG 校对人员: Amy H. Fann覆盖美国南部的巨大藤蔓爬上近百英尺高，并将树木连根拔起，吞没房屋贪食的蛇可以吞掉鳄鱼兔群能将周围的食物吃光这不是恐怖电影的情节这是真实的故事但是这类的情况是如何存在于自然界的呢接下来举三个物种入侵的实例生物的有害性并不在取决于它们是什么而取决于它们在哪比如葛藤在它的故乡原产地东亚会被各种昆虫食用而且在寒冬枯萎但是它时来运转了当它成为门廊装饰和家畜饲料， 并被出口到美国东南部时政府为了对抗水土流失甚至鼓励人们种植葛藤由于阳光充足、气候温而且没有天敌在它的新家，葛藤的长势失去控制直到它被称为“吞食南方的植物”与此类似，佛罗里达州的大沼泽地，作为宠物的缅甸巨蟒由于被其主人释放到野外导致了该地生物数量的减少他们成功地战胜了其他顶级捕食者比如鳄鱼和黑豹导致了它们食物资源的减少他们原产地亚洲并不存在这种问题因为疾病、寄生虫和天敌控制了他们的种群规模在澳大利亚，欧洲野兔食用了大量的植物它们吃光了自己和其他本地动物的食物他们在最近才开始增加而他们被人引入这块大陆只是因 有一个人喜欢猎杀它们像缅甸蟒，原产地的多种因素制约了他们的数量但是在澳大利亚，天敌的缺失和适宜全年繁殖的气候使得它们的数量飞涨那么，为什么这样的事情经常发生呢？世界上的大多数生态系统是由生物经过上千年的共同进化不断的适应彼此和周围环境最终形成的一个稳定的平衡健康的生态系统通过限制因素维持这一平衡环境条件限制了物种的大小和范围这些条件包括了自然地理、气候食物供应以及是否存在天敌比如，植物的生长依赖于阳光和土壤营养程度可食用植物的规模影响食草动物数量这又影响到以它们为食的食肉动物一个正常的捕食者数量能够避免食草动物不会过多而吃光所有植物但是，即便某个因素上一个微小的改变都能破坏这一平衡并且，突然引进的非本地物种可是一个相当大的改变一个在相对隔绝的栖息地进化的物种对不同的限制因素不同的捕食者不同的能量来源以及不同的气候都是比较敏感的如果新栖息地的限制因素不能够限制住物种数量那么它将持续增长与本土生物竞争资源并且扰乱整个生态系统物种偶尔会由于自然因素而将物种引入新栖息地比如，风暴洋流或者气候变迁大部分入侵物种由人类引入通常这是无意间发生的就像斑马贻贝被货船意外地带进伊利湖一样但是由于人们在世界范围内迁移我们通常特意的带上我们的植物或动物一起极少考虑后果但是现在，我们知道了更多生物入侵对生态环境的影响许多政府对动植物运输严密监管并且禁止某些物种入境但是，是否当初一群某种灵长类动物 由强烈的环境变化从非洲出发而几乎占领全球呢？我们人类到底是不是入侵物种呢？

**P349 2016-04-29 Can plants talk to each other - Richard Karban**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=349)

Can plants talk to each other? It certainly doesn't seem that way. Plants don't have complex sensory or nervous systems like animals do, and they look pretty passive, basking in the sun, and responding instinctively to inputs like light and water. But odd as it sounds, plants can communicate with each other. Just like animals, plants produce all kinds of chemical signals in response to their environments, and they can share those signals with each other, especially when they're under attack. These signals take two routes: through the air, and through the soil. When plant leaves get damaged, whether by hungry insects or an invading lawn mower, they release plumes of volatile chemicals. They're what's responsible for the smell of freshly cut grass. Certain kinds of plants, like sagebrush and lima beans, are able to pick up on those airborne messages and adjust their own internal chemistry accordingly. In one experiment, sagebrush leaves were deliberately damaged by insects or scissor-wielding scientists. Throughout the summer, other branches on the same sagebrush plant got eaten less by insects wandering through, and so did branches on neighboring bushes, suggesting that they had beefed up their anti-insect defenses. Even moving the air from above a clipped plant to another one made the second plant more insect-resistant. These airborne cues increase the likelihood of seedling survival, and made adult plants produce more new branches and flowers. But why would a plant warn its neighbors of danger, especially if they're competing for resources? Well, it might be an accidental consequence of a self-defense mechanism. Plants can't move information through their bodies as easily as we can, especially if water is scarce. So plants may rely on those airborne chemicals to get messages from one part of a plant to another. Nearby plants can eavesdrop on those signals, like overhearing your neighbor sneeze and stocking up on cold medicine. Different plants convey those warnings using different chemical languages. Individual sagebrush plants in the same meadow release slightly different sets of alarm chemicals. The makeup of that cocktail influences the effectiveness of communication. The more similar two plants' chemical fingerprints are, the more fluently they can communicate. A plant will be most sensitive to the cues emitted by its own leaves. But because these chemicals seem to be inherited, like human blood types, sagebrush plants communicate more effectively with relatives than with strangers. But sometimes, even other species can benefit. Tomato and tobacco plants can both decipher sagebrush warning signals. Plants don't have to rely solely on those airborne broadcasts. Signals can travel below the soil surface, too. Most plants have a symbiotic relationship with fungi, which colonize the plants' roots and help them absorb water and nutrients. These fungal filaments form extensive networks that can connect separate plants, creating an underground super highway for chemical messages. When a tomato plant responds to blight by acitvating disease-fighting genes and enzymes, signaling molecules produced by its immune system can travel to a healthy plant and prompt it to turn on its immune system, too. These advance warnings increase the plants chance of survival. Bean plants also eavesdrop on each other's health through these fungal conduits. An aphid investation in one plant triggers its neighbor to ramp up production of compounds that repel aphids and attract aphid-eating wasps. If you think of communication as an exchange of information, then plants seem to be active communicators. They're sending, receiving, and responding to signals without making a sound, and without brains, noses, dictionaries, or the Internet. And if we can learn to speak to them on their terms, we may gain a powerful new tool to protect crops and other valuable species. It all makes you wonder what else are we missing?

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翻译人员: Mingyu Cui 校对人员: 臻瑢 邵植物能互相交流吗？看起来当然不能。植物不像动物一样有着复杂的感触神经系统，他们看起来被动得多，晒晒太阳，本能地吸收阳光和水分。尽管听起来很玄乎，但是植物确实能相互交流。像动物一样，植物也会针对周围环境，产生各种化学信号，而且，它们还会相互分享这些化学信号，尤其是当它们处于受到侵犯时。这些化学信号有两种传播途径：一个是通过空气，一个是通过土壤。当植物叶子受到损伤，如被饥饿的虫子吃或者被除草机割时，它们会释放一缕缕挥发性的化学气体。这就是割新鲜草时我们闻到的气味。一些特定的植物，例如灌木蒿和利马豆，能够检测到这些空气信息因子，然后相应地调节它们内部自身的化学状态。在一次实验中，科学家用剪刀或让虫子故意破坏灌木蒿的叶子，在整个夏天里，在这株灌木蒿上的其他枝桠被到处飞舞的昆虫吃的相对较少。周围植株的叶子也同样被昆虫吃得少，这表明它们的抗虫性得到的增强。甚至将剪除了叶子的植物周围的空气移给另外一株植物也能增强这株植物的抗虫性。这些通过空气传播的因子有利于幼苗的存活，而且还能使成熟植株生长出更多的枝桠和花朵。但为什么植物会给它的邻居提示危险呢，它们明明在竞争资源啊？或许这只是个自我防御机制的偶然结果——植物不能像我们一样随意通过身体传播信息，尤其是当水资源缺乏时，植物也许能依赖于这些空气信息因子，从植株的这一部分传到信息到另一部分。附近的植株能探测到这些信号，就像偷听到你邻居在打喷嚏，然后你就开始囤积感冒药。不同的植物用不同的化学语言传递这些警示信息，同一牧场中的单体灌木蒿，释放稍有不同的预警化学物质。不同化学物质的相互补充影响着交流的效率，两种植物释放的化学物质的特征越相近，它们之间的交流就越顺利。一种植物对由它自身叶子释放的化学物质最为敏感，但是这些化学物质就像是被遗传的，像人类的血型，灌木蒿和亲属之间的交流较陌生属来说更为有效。但有时候，其他种类的植物也能从中获益，西红柿和烟草植物都能解析灌木蒿释放的化学信号，植物没必要仅仅依赖于这些空气“广播”，这些信号还能在土壤下传播。很多植物和真菌有共生关系，这些真菌寄生在植物的根上，并帮助它们的吸收水分和营养。这些真菌丝形成广泛的网络，能在不同植物之间建立起联系，为化学信号传递建立一个地下超高速公路。当西红柿通过激活抗病基因和酶对抗枯萎病时，免疫系统产生的信号分子，会传递到其他健康的植物上，并刺激它也开启免疫系统。这些高级预警机制能提升植物的存活机会，豆类植物也能”偷听“各自的健康状态信息。通过这些真菌渠道，一株植物上蚜虫的入侵能激活它的邻居产生大量的抗蚜虫化学物质，将吃蚜虫的黄蜂吸引过来。如果认为交流就是相互交换信息，那么植物就是活跃的联络员，它们收发信号以及作出相应的反应，静悄悄地，没有声音，没有大脑、鼻子、词典和互联网。如果我们能学会用它们的语言和它们沟通，我们就掌握了一个强有力工具去保护庄稼和其他重要物种。这些让你想起作为人类的我们缺失什么了吗？

**P350 2016-05-04 How do we separate the seemingly inseparable - Iddo Magen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=350)

Your cell phone is mainly made of plastics and metals. It's easy to appreciate the inventive process by which those elements are made to add up to something so useful and entertaining. But there's another story we don't hear about as much. How did we get our raw ingredients in the first place from the chaotic tangle of materials that is nature? The answer is a group of clever hacks known as separation techniques. They work by taking advantage of the fundamental properties of things to disentangle them from each other. Simple separation techniques apply to many physical scenarios, like separating cream from milk, extracting water from soil, or even sifting out flecks of gold from river sand. But not all mixtures are so easy to unravel. In some of those cases, we can exploit the differences between physical properties within a mixture, like particle size, density, or boiling point to extract what's required. Take petroleum, a mixture of different types of hydrocarbons. Some of these are valuable as fuels, and others make good raw materials for generating electric power. To separate them, experts rely on one important feature: different hydrocarbons boil at different temperatures. During the boiling process, each type vaporizes at a precise point, then gets separately funneled into a container and collected as a liquid as it cools. Separation techniques also take us to the sea. In some drought-stricken countries, the ocean is the only available water source. But of course, humans can't drink salt water. One way to get around this problem is to remove salt from sea water with reverse osmosis, a process that separates water's ingredients by size. A membrane with pores bigger than water particles, but smaller than salt particles, only lets fresh water pass through, transforming what was once undrinkable into a life saver. Meanwhile in the medical world, blood tests are a vital tool for evaluating a person's health, but doctors typically can't examine blood samples until they've separated the solid blood cells from the liquid plasma they're dissolved in. To do that, a powerful rotational force is exerted on the test tube, causing heavier substances with higher density, like blood cells, to move away from the rotational axis. Meanwhile, lighter substances with lower density, like plasma, move to its center. The tube's contents divide clearly, and the blood cells and liquid plasma can be tested independently. But sometimes, unlike oil, seawater, and blood, the parts of mixtures that we want to separate share the same physical properties. In these cases, the only way to isolate ingredients is by chemical separation, a complex process that relies on unique interactions between components within a mixture and another material. One of these methods is chromatography, a tool forensic scientists use to examine crime scenes. They dissolve gathered evidence in a gas, and can monitor and analyze the ingredients as they separate and move at varying speeds due to their unique chemical properties. That information then tells scientists precisely what was present at the scene, often helping to identify the culprit. Separation techniques are not just about industry, infrastructure, medicine, and justice. One of the most technically ambitious projects in human history is a separation technique aimed at answering the fundamental question, "What is the Universe made of?" By accelerating particles to extremely high speeds and smashing them into each other, we can break them into their constituent parts ever so briefly. And if we succeed at that, what's next? Is there a most elementary particle? And if so, what's it made of?

**P350 2016-05-04 How do we separate the seemingly inseparable - Iddo Magen**

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翻译人员: Brife Zhang 校对人员: Sophie Anderson你的手机主要由塑料和金属制成。我们很容易理解那些把各种元素加工成为有用又有趣的东西的发明过程但是有件事我们没怎么听过。那就是，如何从自然中的混沌杂质第一时间得到我们想要的原材料呢？答案就在被称为分离技术的一组聪明的手段中。它们通过利用物质的基本属性从而把物质相互分离。在很多物理情况中会应用到简单的分离技术，例如从牛奶中分离出奶油，从泥土中提取水分，甚至从河砂中筛出黄金微粒。但并不是所有的混合物都是这么简单就被分离开的。在某些情况下，我们可以利用混合物物质性上的差异，例如颗粒尺寸，密度，或者沸点去分离出我们想要的元素。拿石油为例，它是由不同类的碳氢化合物混合而成。其中有的碳氢化合物可作为宝贵的燃料，其他的，则可以作为产生电能的原材料。为了分离它们，专家们利用一个重要的特性：不同碳氢化合物的沸点也有所差别。在沸腾过程中，每一种成分都在一个比较精确的沸点蒸发，然后分别汇集在各自的容器中冷却后以液体的形式储存。我们也将分离技术运用在海洋中。在一些遭受旱灾困扰的国家里，海洋是仅有的可用水源。当然了，人类是不能饮用盐水的。解决这个问题的办法就是用反渗透方法将盐从海水中移除，这也是按大小分离水分子的过程。一个比水质点大但却比盐分子小的有孔隙的薄膜，只允许淡水通过，将原来不能喝的水 变为可饮用的生命之源。同时在医学领域，血液测试是评估个人健康的重要手段，但是医生一般不能检查血液样本除非他将固态的血细胞从液体血浆中分离出来。为此，对试管施加强有劲的旋转力，让高密度的比较重的物质例如血细胞，远离旋转轴。同时，低密度的较轻物质，例如血浆，就会留在中心。试管内的物质被分得一清二楚，这样血细胞和血浆就可以分别被检测了。但有些时候，不像石油，海水和血液，我们想要分离的混合物成分有着相同的物理属性。在这种情况中，分离原料的唯一方法就是化学分离，一个基于混合物成分和其他物质之间独特相互作用的复杂的过程。方法之一是色层分析法，这也是法医学家用来检测犯罪现场的一种手段。他们把收集到的证据溶解在一种气体中，就可以检测并分析其成分由于每一种成分都有其特殊的化学性质所以它们会以不同的速度分离。科学家们能从这些信息中精确得知现场留下什么，利于识别出罪犯。分离技术不光运用于工业，基础设施，医学，和法律。在人类历史中有一个"野心技术工程"旨在以一种分离手法回答一个最基本的问题“宇宙是由什么组成的？”通过将粒子加速到极速再让它们互相碰撞，能够在极短时间内将它们分成各自的组成部分。如果我们成功了，那么接下来会是什么？会有最基本的粒子存在吗？如果有，那它又是由什么构成的呢？

**P351 2016-05-04 Who IS Sherlock Holmes - Neil McCaw**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=351)

More than a century after first emerging into the fog-bound, gas-lit streets of Victorian London, Sherlock Holmes is universally recognizable. Even his wardrobe and accessories are iconic: the Inverness cape, deerstalker hat, and calabash pipe, and figures such as his best friend and housemate Doctor Watson, arch-nemesis Moriarty, and housekeeper Mrs. Hudson have become part of the popular consciousness, as have his extraordinary, infallible powers of deduction utilized in the name of the law, his notorious drug use, and his popular catchphrase, "Elementary, my dear Watson." And yet many of these most recognizable features of Holmes don't appear in Arthur Conan Doyle's original stories. Doyle's great detective solves crimes in all sorts of ways, not just using deduction. He speculates, and at times even guesses, and regularly makes false assumptions. Furthermore, Mrs. Hudson is barely mentioned, no one says, "Elementary, my dear Watson," and the detective and his sidekick live apart for much of the time. Moriarty, the grand villain, only appears in two stories, the detective's drug use is infrequent after the first two novels, and Holmes is rarely enthralled to the English legal system; He much prefers enacting his own form of natural justice to sticking to the letter of the law. Finally, many of the most iconic elements of the Holmesian legend aren't Doyle's either. The deerstalker cap and cape were first imagined by Sidney Paget, the story's initial illustrator. the curved pipe was chosen by American actor William Gillette so that audiences could more clearly see his face on stage, and the phrase, "Elementary, my dear Watson," was coined by author and humorist P.G. Wodehouse. So who exactly is Sherlock Holmes? Who's the real great detective, and where do we find him? Purists might answer that the original Sherlock inspired by Arthur Conan Doyle's university mentor Dr. Joseph Bell is the real one. But the fact remains that that version of Sherlock has been largely eclipsed by the sheer volume of interpretation, leaving Doyle's detective largely unrecognizable. So there's another, more complex, but perhaps more satisfying answer to the question, but to get there, we must first consider the vast body of interpretations of the great detective. Since Conan Doyle's first story in 1887, there have been thousands of adaptations of Holmes, making him perhaps the most adapted fictional character in the world. That process began with Victorian stage adaptations, and accelerated with the emergence of film. There were more than 100 film adaptations of Holmes in the first two decades of the 20th century alone. And since then, there have many thousands more in print, and on film, television, stage, and radio. Holmes has been reinterpreted by people everywhere, in remarkably different, and often contradictory ways. These adaptations demonstrate both Holmes's popularity and his malleability. For instance, he featured in a number of allied anti-Nazi propaganda films during World War II. And both Winston Churchill and Franklin Delano Roosevelt were avid enthusiasts, the latter even joining the Baker Street Irregulars, a Holmesian appreciation society, and nicknaming one secret service hideout Baker Street. And yet, at the very same time, Holmes also appeared in various German-language film adaptations, some of which were said to have been much-loved favorites of Adolf Hitler. So let's return to our question. Would the real Sherlock Holmes please stand up? The truth is that this world of adaptation has made him into a palimpsest. Sherlock is a cultural text, repeatedly altered over time as each new interpretation becomes superimposed over those that proceed it. This means that Sherlock continually evolves, embodying ideas and values often far removed from those found in Conan Doyle. And after each particular story ends, Sherlock rises again, a little changed, perhaps, with a new face and fresh mannerisms or turns of phrase, but still essentially Sherlock, our Sherlock.

**P351 2016-05-04 Who IS Sherlock Holmes - Neil McCaw**

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翻译人员: Zhimin Lin 校对人员: Cissy Yun在他第一次在维多利亚时期那亮着煤气灯、迷雾重重的伦敦街头现身一个多世纪之后，夏洛克·福尔摩斯如今在世界上家喻户晓。甚至连他的服饰也成了他的标志：带护肩的斗篷、猎鹿帽和葫芦式烟斗，而且诸如他最好的朋友和室友华生、死敌莫里亚蒂和房东哈德森太太也都为公众所熟知就像他那用于伸张法律的非凡可靠的推理能力、他那恶名昭著的吸毒行为以及他那著名的口头禅：“这很简单，我亲爱的华生。”然而福尔摩斯这些鲜明特点的相当一部分并未在阿瑟·柯南·道尔的原版小说中出现。道尔笔下的伟大侦探使用各种途径侦破案件，而并非只通过推理。他会怀疑，有时甚至靠猜测， 且时常作出错误的假设。不仅如此，哈德孙太太很少被提及，没人说过“这很简单，我亲爱的华生”，这位神探和他的朋友 大多数时候也不住在一起。大反派莫里亚蒂只在两个故事中出现过，在前两部小说后这位神探也不再频繁吸毒，他更很少为英国的法律系统所吸引；相比于坚守法律条文，他更倾向于以自己的形式伸张正义。最后，福尔摩斯式传奇中的大量标志性元素也不出自道尔。猎鹿帽和斗篷源于故事最初的插画家Sidney Paget的想象。弯曲的烟斗则是美国演员William Gillette用它来使这样观众能更清楚地看到他的面部。至于“这很简单，我亲爱的华生”这句话则是作家和幽默家P.G.Wodehouse的创造。那么福尔摩斯到底是个怎样的人？真正的伟大神探是谁，我们又该到哪去寻找他呢？正统主义者会回答说 柯南·道尔从他的大学导师Joseph Bell博士那得到灵感所创作的夏洛克是最真实的。但事实是大量不同的诠释很大程度上掩盖了这个版本的福尔摩斯，导致道尔笔下的侦探形象模糊不清。因此有另一个更加复杂但或许更令人满意的答案，但是，我们必须 首先考虑对于这位侦探的海量的不同诠释。在柯南·道尔1887年发表第一个故事后，出现了成千上万个改编版的福尔摩斯，使得他几乎成为世界上 被改编次数最多的虚构人物。这一过程自维多利亚时期的戏剧改编开始，并在电影最初萌生阶段迅速增加仅在20世纪前20年就出现了超过100种电影改编版的福尔摩斯。从那以后，更多的版本成千上万地在书籍、电影、电视、舞台和广播中出现。福尔摩斯被各地的人们塑造成不同，甚至相反的形象这些改编同时展现了福尔摩斯的普及性以及可塑性。比如，在二战时期，他出现在了同盟国的许多反纳粹宣传片中。温斯顿·丘吉尔和富兰克林·迪兰诺·罗斯福都是爱好者，后者甚至加入了贝克街小分队，一个福尔摩斯鉴赏协会，并将一处特工据点命名为贝克街。然而，与此同时，福尔摩斯也出现在各种德语影片中，其中一些据说是阿道夫·希特勒的至爱。让我们回到刚才的问题。真正的夏洛克·福尔摩斯请现身！事实是，这些各式各样的改编 已经使他成为一个多义词，夏洛克是一种文化的代名词，它随着每一种诠释的叠加不断地变化这意味着夏洛克在不断地进化，其拥有的思维和价值观都与柯南·道尔的原版相去甚远随着每个单一的故事的结束， 夏洛克又会再次出现。他或许带着一点小小的变化，也许是拥有一张新的面孔，或是一句新的口头禅但本质上，他仍是夏洛克，我们的夏洛克。

**P352 2016-05-05 Why is the US Constitution so hard to amend - Peter Paccone**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=352)

When it was ratified in 1789, the U.S. Constitution didn't just institute a government by the people. It provided a way for the people to alter the constitution itself. And yet, of the nearly 11,000 amendments proposed in the centuries since, only 27 have succeeded as of 2016. So what is it that makes the Constitution so hard to change? In short, its creators. The founders of the United States were trying to create a unified country from thirteen different colonies, which needed assurance that their agreements couldn't be easily undone. So here's what they decided. For an amendment to even be proposed, it must receive a two-thirds vote of approval in both houses of Congress, or a request from two-thirds of state legislatures to call a national convention, and that's just the first step. To actually change the Constitution, the amendment must be ratified by three-quarters of all states. To do this, each state can either have its legislature vote on the amendment, or it can hold a separate ratification convention with delegates elected by voters. The result of such high thresholds is that, today, the American Constitution is quite static. Most other democracies pass amendments every couple of years. The U.S., on the other hand, hasn't passed one since 1992. At this point, you may wonder how any amendments managed to pass at all. The first ten, known as the Bill of Rights, includes some of America's most well-known freedoms, such as the freedom of speech, and the right to a fair trial. These were passed all at once to resolve some conflicts from the original Constitutional Convention. Years later, the Thirteenth Amendment, which abolished slavery, as well as the Fourteenth and Fifteenth Amendments, only passed after a bloody civil war. Ratifying amendments has also become harder as the country has grown larger and more diverse. The first ever proposed amendment, a formula to assign congressional representatives, was on the verge of ratification in the 1790s. However, as more and more states joined the union, the number needed to reach the three-quarter mark increased as well, leaving it unratified to this day. Today, there are many suggested amendments, including outlawing the burning of the flag, limiting congressional terms, or even repealing the Second Amendment. While many enjoy strong support, their likelihood of passing is slim. Americans today are the most politically polarized since the Civil War, making it nearly impossible to reach a broad consensus. In fact, the late Supreme Court Justice Antonin Scalia once calculated that due to America's representative system of government, it could take as little as 2% of the total population to block an amendment. Of course, the simplest solution would be to make the Constitution easier to amend by lowering the thresholds required for proposal and ratification. That, however, would require its own amendment. Instead, historical progress has mainly come from the U.S. Supreme Court, which has expanded its interpretation of existing constitutional laws to keep up with the times. Considering that Supreme Court justices are unelected and serve for life once appointed, this is far from the most democratic option. Interestingly, the founders themselves may have foreseen this problem early on. In a letter to James Madison, Thomas Jefferson wrote that laws should expire every 19 years rather than having to be changed or repealed since every political process is full of obstacles that distort the will of the people. Although he believed that the basic principles of the Constitution would endure, he stressed that the Earth belongs to the living, and not to the dead.

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翻译人员: Cissy Yun 校对人员: Yvonne Tian当美国宪法在1789年被通过时它不仅成立了一个被人民选出的政府它还保证了人民拥有修改宪法的办法但是，从建国到2016年的这几个世纪里， 11,000条修订草案中只有27条被成功录用所以，为什么宪法如此难以改变呢？简单来说：宪法的创建者美利坚的国父们要将十三个殖民地联合成一个合众国为此，他们需要确认他们的决定不会被轻易更改这些是他们决定的一个修正草案想要被提议它在众议院和参议院中必须得到三分之二的投票或是赢得全国三分之二的州提议从而促成一个全国会议这只是第一步要到改变宪法这一步修正案必须被四分之三的州同意每个州可以让它的制法人员来对修正法案进行投票也可以召集由投票者选出的众议院议员举行多个会议来通过正因为有了如此高的门槛今天的美国宪法十分的稳定世界上大多民主国家每几年就会通过一项修正案但在就美国来说，1992年以来就没有这样的记录说到这里，你可能开始好奇到底有多少条修正草案被通过前十条，被熟知为《权力法案》囊括了美国几条最有名的“自由”权力比如说言论自由以及受到公平审判权这些都是一起通过的为的是解决制宪会议出现的一些分歧很多年以后，第十三修正案废除了奴隶制第十四和第十五条相继在残酷的内战后被通过修改修正案随着国家的扩大以及多样性变得愈加困难第一个被提议的修正草案是关于任命国会众议员的方法在1790时就开始讨论是否要通过但是随着越来越多的州加入合众国需要数量达到三分之二的基数也变大导致其到今日还未被通过如今，有很多被建议的修正草案包括将焚烧国旗变得非法执政者的期时减少或是废除第二修正案（持枪权）虽然很多人支持这些提议 但是通过的可能性非常小如今的美国，是自内战以来， 政治观点最两级分化的这使得国家很难达成一致的看法其实，前一任最高法院法官Antonin Scalia曾计算过 在美国现有的政府代表系统下只要百分之二的人口就可以阻止一条修正法案的通过当然，解决这个问题的最好方法是将宪法变得容易更改些将限制更改或是提议的条款减少但是这又需要立一个新的修正草案其实，历史性的改变与进步大多归功于美国的最高法院它的势力已扩大到可以介入美国已有的宪法使其紧随时代的变迁但是，最高法院的法官并非是选举出的并且是终身任命制这又与所谓的民主，相差甚远有趣的是，美国的国父自己也许也遇见到了这个问题在一封写给James Madison的信中Thomas Jefferson写到法律应该每19年就更换不要使法律需要人们去改变和废除它因为每一个政治过程都会遇到很多对立于人民的意愿的阻碍虽然他相信宪法的基本条款会将永存他更强调了世界是属于当代的人们并非逝者

**P353 2016-05-06 How computer memory works - Kanawat Senanan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=353)

In many ways, our memories make us who we are, helping us remember our past, learn and retain skills, and plan for the future. And for the computers that often act as extensions of ourselves, memory plays much the same role, whether it's a two-hour movie, a two-word text file, or the instructions for opening either, everything in a computer's memory takes the form of basic units called bits, or binary digits. Each of these is stored in a memory cell that can switch between two states for two possible values, 0 and 1. Files and programs consist of millions of these bits, all processed in the central processing unit, or CPU, that acts as the computer's brain. And as the number of bits needing to be processed grows exponentially, computer designers face a constant struggle between size, cost, and speed. Like us, computers have short-term memory for immediate tasks, and long-term memory for more permanent storage. When you run a program, your operating system allocates area within the short-term memory for performing those instructions. For example, when you press a key in a word processor, the CPU will access one of these locations to retrieve bits of data. It could also modify them, or create new ones. The time this takes is known as the memory's latency. And because program instructions must be processed quickly and continuously, all locations within the short-term memory can be accessed in any order, hence the name random access memory. The most common type of RAM is dynamic RAM, or DRAM. There, each memory cell consists of a tiny transistor and a capacitor that store electrical charges, a 0 when there's no charge, or a 1 when charged. Such memory is called dynamic because it only holds charges briefly before they leak away, requiring periodic recharging to retain data. But even its low latency of 100 nanoseconds is too long for modern CPUs, so there's also a small, high-speed internal memory cache made from static RAM. That's usually made up of six interlocked transistors which don't need refreshing. SRAM is the fastest memory in a computer system, but also the most expensive, and takes up three times more space than DRAM. But RAM and cache can only hold data as long as they're powered. For data to remain once the device is turned off, it must be transferred into a long-term storage device, which comes in three major types. In magnetic storage, which is the cheapest, data is stored as a magnetic pattern on a spinning disc coated with magnetic film. But because the disc must rotate to where the data is located in order to be read, the latency for such drives is 100,000 times slower than that of DRAM. On the other hand, optical-based storage like DVD and Blu-ray also uses spinning discs, but with a reflective coating. Bits are encoded as light and dark spots using a dye that can be read by a laser. While optical storage media are cheap and removable, they have even slower latencies than magnetic storage and lower capacity as well. Finally, the newest and fastest types of long-term storage are solid-state drives, like flash sticks. These have no moving parts, instead using floating gate transistors that store bits by trapping or removing electrical charges within their specially designed internal structures. So how reliable are these billions of bits? We tend to think of computer memory as stable and permanent, but it actually degrades fairly quickly. The heat generated from a device and its environment will eventually demagnetize hard drives, degrade the dye in optical media, and cause charge leakage in floating gates. Solid-state drives also have an additional weakness. Repeatedly writing to floating gate transistors corrodes them, eventually rendering them useless. With data on most current storage media having less than a ten-year life expectancy, scientists are working to exploit the physical properties of materials down to the quantum level in the hopes of making memory devices faster, smaller, and more durable. For now, immortality remains out of reach, for humans and computers alike.

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翻译人员: Sophie Anderson 校对人员: Wu Di在许多方面来说，记忆决定了我们是什么样的人让我们不忘往事学习并记住新本领以及为未来做规划像计算机常常扮演人的延伸这一角色内存也起着同样的作用不论是一部两个小时的电影写着两个单词的文本或是执行把两者都打开的指令所有在计算机内存里的东西 都采以基本单位“比特”的这一形式出现我们也称之为二进制数字每个二进制数被存放于存储元件中在两种可能值间自如转换0和1由数百万计的二进制数组成的程序和文件在中央处理器中统一处理也就是CPU它担任计算机大脑一职并且，随着要处理的二进制数成倍增长电脑设计师不断面临着有关数据大小、成本费用和处理速度三方面的难题和我们一样，电脑对于即时任务 有着短期记忆也有更为长久的固定储存器来保留长期记忆当你运行某个程序时操作系统位于短期记忆的区域内以便践行指令打比方说，当你在文字处理软件中 按下一个键中央处理器会访问其中一个位置 来检索这些数据它也可以进行修改 或是产生新的数据这个过程所花费的时间被称为延时由于程序指令必须处理迅速并且不断进行短期记忆区的所有定位点以任意顺序被访问因此又名随机访问存储器最常见的随机储存器是动态随机存储器 或者说DRAM在动态储存器中 每个储存单元由微小的晶体管和电容器组成用以贮存电荷0代表没有电 有电则是1我们称之为动态记忆的原因是它仅是在电荷耗散前 短暂保留它们需要定期充电来保留这些数据但即使是100纳秒的低延迟对于现代CPU来说都算是高延迟了因此“内部快取记忆体”应运而生也就是静态随机存取存储器它通常以六个联结晶状体所构成不需要去更新静态随机存取储存器是计算机系统中最快的存储器但也是最贵的也占用了比动态随机存取储存器多三倍的空间但是RAM和高速缓冲存储器只有充电后才能保存数据为了保留数据 设备一旦关机后必须将之转移到长期储存设备中这样的储存设备主要有三种类型在磁存储器，也就是三者中最便宜的储存设备中数据以磁性模式 储存于磁膜编码的旋转盘上但正因圆盘必须转到数据所位于的地方才能让它们被读取所以磁储存器的延时比DRAM慢上100,000倍另一方面，像DVD和蓝牙这样的光储存设备同样也使用旋转盘只不过多了一层反射涂层二进制数字被编译成空白点和黑点 加以涂料方便被激光识别读取尽管光储存媒体价钱便宜并可摘除它们甚至比磁存储器有着更低的延时同样也有着更小的容量末了，固态硬盘 是最新也是最快捷的长期存储器比如闪存存储器它没有可运转的部件而是使用浮栅晶体管在他人专门设计的内部构件中以捕获和排除电荷存储二进制数字那么，这数十亿的二进制数字可靠性到底如何我们总认为 计算机存储器具有稳定性和永久性但实际上它降解得相当快由装置和周身环境所产生的热会使硬盘去磁降解光学媒体内的染料并造成浮置栅极里的电荷流失固态硬盘也有额外的缺陷在不断重复存盘到浮栅中的过程中 晶体管会腐蚀固态硬盘使之毫无用处当今大多存储媒体内的数据寿命预测也不超过10年科学家们正在尝试开拓材料的物理性能将它们下至量子水平希望能因此制造出更快更小以及更耐久的设备眼下，不朽仍无法实现 不论对于人类还是电脑而言

**P354 2016-05-10 The psychology behind irrational decisions - Sara Garofalo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=354)

Let's say you're on a game show. You've already earned $1000 in the first round when you land on the bonus space. Now, you have a choice. You can either take a $500 bonus guaranteed or you can flip a coin. If it's heads, you win $1000 bonus. If it's tails, you get no bonus at all. In the second round, you've earned $2000 when you land on the penalty space. Now you have another choice. You can either take a $500 loss, or try your luck at the coin flip. If it's heads, you lose nothing, but if it's tails, you lose $1000 instead. If you're like most people, you probably chose to take the guaranteed bonus in the first round and flip the coin in the second round. But if you think about it, this makes no sense. The odds and outcomes in both rounds are exactly the same. So why does the second round seem much scarier? The answer lies in a phenomenon known as loss aversion. Under rational economic theory, our decisions should follow a simple mathematical equation that weighs the level of risk against the amount at stake. But studies have found that for many people, the negative psychological impact we feel from losing something is about twice as strong as the positive impact of gaining the same thing. Loss aversion is one cognitive bias that arises from heuristics, problem-solving approaches based on previous experience and intuition rather than careful analysis. And these mental shortcuts can lead to irrational decisions, not like falling in love or bungee jumping off a cliff, but logical fallacies that can easily be proven wrong. Situations involving probability are notoriously bad for applying heuristics. For instance, say you were to roll a die with four green faces and two red faces twenty times. You can choose one of the following sequences of rolls, and if it shows up, you'll win $25. Which would you pick? In one study, 65% of the participants who were all college students chose sequence B even though A is shorter and contained within B, in other words, more likely. This is what's called a conjunction fallacy. Here, we expect to see more green rolls, so our brains can trick us into picking the less likely option. Heuristics are also terrible at dealing with numbers in general. In one example, students were split into two groups. The first group was asked whether Mahatma Gandhi died before or after age 9, while the second was asked whether he died before or after age 140. Both numbers were obviously way off, but when the students were then asked to guess the actual age at which he died, the first group's answers averaged to 50 while the second group's averaged to 67. Even though the clearly wrong information in the initial questions should have been irrelevant, it still affected the students' estimates. This is an example of the anchoring effect, and it's often used in marketing and negotiations to raise the prices that people are willing to pay. So, if heuristics lead to all these wrong decisions, why do we even have them? Well, because they can be quite effective. For most of human history, survival depended on making quick decisions with limited information. When there's no time to logically analyze all the possibilities, heuristics can sometimes save our lives. But today's environment requires far more complex decision-making, and these decisions are more biased by unconscious factors than we think, affecting everything from health and education to finance and criminal justice. We can't just shut off our brain's heuristics, but we can learn to be aware of them. When you come to a situation involving numbers, probability, or multiple details, pause for a second and consider that the intuitive answer might not be the right one after all.

**P354 2016-05-10 The psychology behind irrational decisions - Sara Garofalo**

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翻译人员: xiao gu 校对人员: Vivi Dai假设你在玩博彩游戏第一轮，你已经赚了1000美元当指针停留在奖励区域现在，你有个选择再给你500美元奖金(1000+500=1500美元)或者再投币一次如果正面，再得到1000美元奖金（1000+1000=2000美元）如果反面，什么也得不到（1000美元）第二轮游戏，你已经赚了2000美元,当指针停留在惩罚区域现在你有另一个选择或者损失500美元（2000-500=1500美元）或者再投币一次如果是正面，不亏不赚（2000美元）如果是反面，损失1000美元（2000-1000=1000美元）如果你和大部分人一样你可能会选择第一轮再拿500美元（1500美元）第二轮选择投币（2000<i>50%+1000</i>50%=1500美元）但是，仔细想想，完全没有道理2次的赔率和结果是完全一样的为什么第二轮的选择让你害怕答案是我们称为“损失厌恶”的现象在理性经济学理论中我们用一个简单的数学等式来做决定“风险程度”除以“赌注数量”但研究发现，绝大部分人害怕损失的负面心理影响两倍于获得收益的正面心理影响“损失厌恶”是一种来自于大脑快速判断的认知失调我们解决问题的方式来源于从前的经验和直觉而不是仔细的分析脑力捷径（快速思维）导致不合理的决定不同于热恋或悬崖上的蹦极逻辑谬误很容易被证伪当存在概率时，大脑更容易做出错误决定比如： 投掷一个4面绿色2面红色的骰子20次你可以在下面的结果中做出选择如果正确，赢25美元如何选择？一项研究显示65%的大学生参与者选择B明显的A比B更短，并且包含在B中就是说，A更可能这被称为“链接谬误”我们期待能看见更多的绿色大脑玩弄我们，让我们选择更不可能的答案“快速思考”在处理数字时也特别糟糕在一个实验中，学生被分成2组第一组被问到：甘地死于9岁前还是后？第二组被问到：甘地死于140岁前还是后？这两组问题显然都是错误的当学生被要求猜测甘地什么时候去世？第一组学生平均答案是：50岁第二组：67岁当然最早给出的信息都是错误的应该不相关仍然影响学生的判断这是“锚定影响”的例子被用于营销和谈判用来增加人们愿意支付的价格如果快速思考导致上述的错误为什么会这样？原因是他们相当有效大部分人类历史当信息有限时，生存依赖于快速决定当我们没有时间逻辑分析所有可能性快速决定有时能让我们活下来但今天的环境需要做出更复杂决定这些决定比我们想象的还要容易存在偏见影响健康，教育经济和司法公正的方方面面我们不能关闭大脑的直觉思考但是我们应该学会了解他们当处理数字问题概率或者复杂决定时候等一等直觉给出的答案也许根本就是错误的

**P355 2016-05-16 The microbial jungles all over the place (and you) - Scott Chimileski**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=355)

As we walk through our daily environments, we're surrounded by exotic creatures that are too small to see with the naked eye. We usually imagine these microscopic organisms, or microbes, as asocial cells that float around by themselves. But in reality, microbes gather by the millions to form vast communities known as biofilms. Natural biofilms are like miniature jungles filled with many kinds of microbes from across the web of life. Bacteria and archaea mingle with other microbes like algae, fungi, and protozoa, forming dense, organized structures that grow on almost any surface. When you pad across a river bottom, touch the rind of an aged cheese, tend your garden soil, or brush your teeth, you're coming into contact with these invisible ecosystems. To see how biofilms come about, let's watch one as it develops on a submerged river rock. This type of biofilm might begin with a few bacteria swimming through their liquid environment. The cells use rotating flagella to propel towards the surface of the rock, which they attach to with the help of sticky appendages. Then, they start producing an extracellular matrix that holds them together as they divide and reproduce. Before long, microcolonies arise, clusters of cells sheathed in this slimy, glue-like material. Microcolonies grow to become towers, while water channels flow around them, functioning like a basic circulatory system. But why do microbes build such complex communities when they could live alone? For one thing, microbes living in a biofilm are rooted in a relatively stable microenvironment where they may have access to a nutrient source. There's also safety in numbers. Out in the deep, dark wilderness of the microbial world, isolated microbes face serious risks. Predators want to eat them, immune systems seek to destroy them, and there are physical dangers, too, like running out of water and drying up. However, in a biofilm, the extracellular matrix shields microbes from external threats. Biofilms also enable interactions between individual cells. When microbes are packed against each other in close proximity, they can communicate, exchange genetic information, and engage in cooperative and competitive social behaviors. Take the soil in your garden, home to thousands of bacterial species. As one species colonizes a plant root, its individual cells might differentiate into various subpopulations, each carrying out a specific task. Matrix producers pump out the extracellular goo, swimmers assemble flagella and are free to move about or migrate, and spore-formers produce dormant, tough endospores that survive starvation, temperature extremes, and harmful radiation. This phenomenon is called division of labor. Ultimately, it gives rise to a sophisticated system of cooperation that's somewhat like a multicellular organism in itself. But because biofilms often contain many different microbes that aren't closely related to each other, interactions can also be competitive. Bacteria launch vicious attacks on their competitors by secreting chemicals into the environment, or by deploying molecular spears to inject nearby cells with toxins that literally blow them up. In the end, competition is all about resources. If one species eliminates another, it keeps more space and food for itself. Although this dramatic life cycle occurs beyond the limits of our vision, microbial communities provide humans and other species with tangible, and sometimes even delicious, benefits. Microbes make up a major fraction of the biomass on Earth and play a critical role within the global ecosystem that supports all larger organisms, including us. They produce much of the oxygen we breath, and are recruited to clean up environmental pollution, like oil spills, or to treat our waste water. Not to mention, biofilms are normal and flavor enhancing parts of many of the foods we enjoy, including cheese, salami, and kombucha. So the next time you brush your teeth, bite into that cheese rind, sift through garden soil, or skip a river stone, look as close as you can. Imagine the microbial jungles all around you waiting to be discovered and explored.

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翻译人员: Lynn Wang 校对人员: Cissy Yun日常生活中我们被许多奇异的生物所环绕它们小到我们用肉眼无法看到我们通常把这些微型有机物 或者说微生物想象成独自四处漂流、不合群的细胞体但实际上，微生物以数百万计地聚集形成一种叫做生物膜的巨大组织天然的生物膜就像微缩丛林充满了来自生命之网的各种微生物水澡，真菌，原生动物等微生物与细菌、古生菌混合形成紧密、有序的 能在几乎所有表面上生长的结构当你踏过河底时触摸陈年的奶酪表皮时料理花园里的土壤时或者刷牙时你都在与这些看不见的生态系统发生接触为了了解生物膜如何产生我们以一个生长在河石上的生物膜为例这种生物膜最初由少数细菌组成这些细菌在周围的液体环境中穿梭细胞利用旋转的鞭毛游向石头的表面然后利用富有粘性的附属物 附着于石头上其后，细胞开始制造细胞外基质细胞分裂、繁殖时 细胞外基质能够保持细胞的完整不久后小菌落形成了成群的细胞在这种黏滑、胶状的小菌落里生活小菌落渐渐长成塔状水分子通过水通道进入细胞功能相当于一个基本的循环系统微生物能够独立生存那么为什么它们还要建立起如此复杂的群落呢一方面，对于微生物而言生物膜形成的微观环境相对稳定在此微生物拥有营养来源另一方面，集体生活也更加安全微生物世界黑暗而原始单独行动非常危险它们可能会被掠食者捕杀被免疫系统毁灭另外还有很多肉体风险比如失水干涸而死但是，如果生活在生物膜中细胞外基质能够为微生物提供保护微生物在生物膜中还可以 与其他微生物互动当微生物紧密聚集在一起时它们就能够沟通交换遗传信息并产生社会性行为 与同类合作或竞争你从花园里带走的一小块泥土就是上千种细菌的居所当一种细菌殖居于一株植物的根部时其个别细胞可能分化成不同的次级种群每一种群执行各自的特定任务基质制造者能够分泌细胞外粘性物质鞭毛可以自由活动和迁移芽孢菌生产休眠、坚硬的孢子内壁孢子内壁能够在饥饿极端温度以及有害射线下生存这种现象称之为分工最终形成一个复杂、精致的合作系统有些类似于多细胞生物但是，生物膜常常包含不同种类的微生物它们之间关联并不紧密有时会互相竞争细菌会对竞争者发起猛烈攻击在周围环境中分泌化学物质或利用分子茅刺将毒素注射到临近细胞将它们涨破归根结底，竞争是为了资源如果一种细菌消灭了另一种细菌那么它就将拥有更多的空间和食物虽然这种奇妙的生命系统 超出我们的目力所及但微生物群落为人类和其他物种 提供了有形的益处有时这种益处甚至非常美味微生物是地球生物量的 一个主要的组成部分并且它们在全球生态系统中 扮演着重要角色供养所有大型生物也包括人类它们制造了大量我们呼吸的空气还能用来应对石油泄漏等环境污染问题或者用来处理污水更不用说，我们享用的许多美食也需要生物膜的参与包括奶酪意大利香肠以及红茶菌所以，下次你刷牙咬破乳酪外皮踏上花园的土壤或者打水漂时尽可能地仔细看看想象一下围绕着你的微生物丛林正等待被发现和探索

**P356 2016-05-17 Making sense of irrational numbers - Ganesh Pai**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=356)

Like many heroes of Greek myths, the philosopher Hippasus was rumored to have been mortally punished by the gods. But what was his crime? Did he murder guests, or disrupt a sacred ritual? No, Hippasus's transgression was a mathematical proof: the discovery of irrational numbers. Hippasus belonged to a group called the Pythagorean mathematicians who had a religious reverence for numbers. Their dictum of, "All is number," suggested that numbers were the building blocks of the Universe and part of this belief was that everything from cosmology and metaphysics to music and morals followed eternal rules describable as ratios of numbers. Thus, any number could be written as such a ratio. 5 as 5/1, 0.5 as 1/2 and so on. Even an infinitely extending decimal like this could be expressed exactly as 34/45. All of these are what we now call rational numbers. But Hippasus found one number that violated this harmonious rule, one that was not supposed to exist. The problem began with a simple shape, a square with each side measuring one unit. According to Pythagoras Theorem, the diagonal length would be square root of two, but try as he might, Hippasus could not express this as a ratio of two integers. And instead of giving up, he decided to prove it couldn't be done. Hippasus began by assuming that the Pythagorean worldview was true, that root 2 could be expressed as a ratio of two integers. He labeled these hypothetical integers p and q. Assuming the ratio was reduced to its simplest form, p and q could not have any common factors. To prove that root 2 was not rational, Hippasus just had to prove that p/q cannot exist. So he multiplied both sides of the equation by q and squared both sides. which gave him this equation. Multiplying any number by 2 results in an even number, so p^2 had to be even. That couldn't be true if p was odd because an odd number times itself is always odd, so p was even as well. Thus, p could be expressed as 2a, where a is an integer. Substituting this into the equation and simplifying gave q^2 = 2a^2 Once again, two times any number produces an even number, so q^2 must have been even, and q must have been even as well, making both p and q even. But if that was true, then they had a common factor of two, which contradicted the initial statement, and that's how Hippasus concluded that no such ratio exists. That's called a proof by contradiction, and according to the legend, the gods did not appreciate being contradicted. Interestingly, even though we can't express irrational numbers as ratios of integers, it is possible to precisely plot some of them on the number line. Take root 2. All we need to do is form a right triangle with two sides each measuring one unit. The hypotenuse has a length of root 2, which can be extended along the line. We can then form another right triangle with a base of that length and a one unit height, and its hypotenuse would equal root three, which can be extended along the line, as well. The key here is that decimals and ratios are only ways to express numbers. Root 2 simply is the hypotenuse of a right triangle with sides of a length one. Similarly, the famous irrational number pi is always equal to exactly what it represents, the ratio of a circle's circumference to its diameter. Approximations like 22/7, or 355/113 will never precisely equal pi. We'll never know what really happened to Hippasus, but what we do know is that his discovery revolutionized mathematics. So whatever the myths may say, don't be afraid to explore the impossible.

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翻译人员: Nancy JIANG 校对人员: Runyu Hu正如希腊神话中许多英雄一样哲学家希帕索斯被传说要接受神的惩罚但他错在哪儿了呢是他杀人了还是他破坏了神圣的仪式都不是 希帕索斯的罪源于一个数学证明无理数的发现希帕索是毕达哥拉斯学派中的一员他们对于数字有着宗教般的崇敬他们的格言“万物皆数”暗示着他们认为数字是宇宙建立的基石而且他们也相信任何事物 从宇宙研究到音乐发展从形而上学到道德观念归根到底都是数字比例的问题因此，任何数字都可以被写成一个比例（分数）5就是5/10.5就是1/2等等甚至一个可以被无限延伸的十进制数字 也可以被准确表示成34/45这些数字都被称为有理数而希帕索斯却发现了一个背离这种和谐规律的数字一个本不该存在的数字这个问题起源于一个非常简单的图形一个四边长度均为单位1的正方形根据毕达哥拉斯的理论这个正方形的对角线长度应该为根号二但是无论希帕索斯如何尝试 都不能将根号二变为两个整数的比例形式他并没有选择放弃 而是决定证明这个数字确实无法被比例表示出来希帕索斯首先假设毕达哥拉斯的“万物皆数”的观点是正确的根号二是可以被表示成两个整数的比例他假设这两个整数分别为p和q假定这个比例已经被最简化因此，p和q应该没有相同约数要证明根号二并不是有理数希帕索斯只需要证明p/q并不存在即可他将等号两侧均乘以q然后两侧均计算平方得到了这样一个等式任何数字乘以2的结果都是偶数所以p的平方是偶数如果p是奇数，则p的平方不可能为偶数因为奇数乘以本身，得到的还是奇数所以p也应该是一个偶数因此，p可以表示为2a 其中a也是一个整数把这个等式带入原来的方程，并简化得到：q^2 = 2a^2再一次，任何数字乘以2得到的结果为偶数所以q的平方一定是偶数那么q也一定是偶数这就得到p和q都是偶数的结果但如果这是正确的话 p和q就有一个共同的因子2和最初的题设矛盾至此，希帕索斯得以证明这样的比例是不存在的这被称为矛盾证明法而根据传说上帝并不喜欢矛盾的存在有趣的是，即便我们无法将无理数表示称为整数的比例我们却可以将它准确表现在图形之中以根号二为例我们需要做的就是准确的画出一个 两条直角边均为单位一的三角形他的的斜边的长度就是单位根号二 这同时也可以被延伸下去我们可以继续画另外一个直角三角形其中一条边以刚才的斜边为基础，另一条边长度为单位一这个三角形的斜边程度就是单位根号三它同时还可以继续被延展下去关键问题是 小数和分数都只是表现数字的方法之一根号二只是一个边长为单位一的直角三角形的斜边长度罢了相似的，著名的无理数pi也是与它描述的图形关系一样代表者圆周长和半径的比例近似值 22/7 或者 355/133是永远无法准确的表达出pi值的我们永远也无法知道在希帕索斯身上到底发生过什么但是我们知道他的发现带动了整个数学界的革命所以无论神话里面怎么说 永远不要害怕去探索不可能

**P357 2016-05-19 The otherworldly creatures in the ocean's deepest depths - Lidia Lins**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=357)

It's easy to forget how vast and deep the ocean really is. About 60% of it is actually a cold and dark region known as the deep ocean. And it reaches down to 11,000 meters. Yet, this remote zone is also one of the greatest habitats on Earth, harboring a huge diversity of life, from giant squids and goblin sharks to minuscule animals smaller than a millimeter. How do so many species thrive in this underwater world? Over the decades, intrepid scientists have ventured there to find out. Traveling down through the water column, pressure increases and light begins to wane. At 200 meters, photosynthesis stops and temperature decreases from surface temperatures by up to 20 degrees Celsius. By 1000 meters, normal sunlight has disappeared altogether. Without light, life as we know it seems impossible. That's why in 1844, the naturalist Edward Forbes wrote his Azoic Theory, Azoic, meaning without animals. Forbes was sure that nothing could survive below 600 meters on account of the lack of light. Of course, the discovery of deep-sea species proved him wrong. What Forbes failed to take into account is something called marine snow, which sounds much nicer than it is. Marine snow is basically organic matter, things like particles of dead algae, plants, and animals, drifting down into the depths and acting as food for deep-sea animals. Largely thanks to that, abundant life forms exist in the darkness, adapting to a harsh reality where only the weird and wonderful can survive. Fish with cavernous mouths, spiky teeth jutting from their jaws, and lamp-like structures protruding from their heads, like the anglerfish which entices prey with its misleading glow. Several sea creatures have perfected this lightning technique known as bioluminescence, using it to lure prey, distract predators, or attract mates. Some creatures use it for camoflauge. In parts of the water column where only faint blue light filters through, animals bioluminesce to match the glow. Predators or prey looking up from below are deceived by this camoflauge, unable to see the creatures silhouette. Such otherworldly adaptations also arise from the need to locate and snatch up food before it drifts away. Some sea animals, like jellyfish, comb jellies and salps can migrate between depths partially because their 90% water consistency allows them to withstand immense pressure. But they're the exception. Most deep-sea creatures are confined to a narrow range in the water column where nutrients are scarce since the food drifting downwards from the surface rapidly sinks to the sea floor. Plunging all the way down, we find more exotic creatures. Some take on dwarfism, a trait that transforms them into miniature versions of animals we see closer to the surface. It's thought that reduced food availability causes the shrinkage. Only a tiny fraction of the food produced at the surface reaches the sea floor, so being small gives animals a low energy requirement and an adaptive advantage. And yet, the sea is also the land of giants. Here, gargantuan squids can reach 18 meters long. Isopods scuttle around the sea floor like enormous wood lice. There are long-limbed Japanese spider crabs, and oarfish, whose bodies stretch to 15 meters. This trait is known as gigantism, and it's something of a mystery. It's thought that high oxygen levels may drive extreme growth in some species, while the colder temperatures promote longer life spans, giving animals the opportunity to grow massive. Many of these exotic sea beasts will never experience sunlight. Some will venture up through the water column to feed, and a few will actually break the waves, reminding us at the surface about the incredible survival skills of the ocean's deepest inhabitants. Humans still have an astounding 95% of the ocean left to explore. So those depths remain a great mystery. What other untold wonders lie far below, and which ones will we discover next?

**P357 2016-05-19 The otherworldly creatures in the ocean's deepest depths - Lidia Lins**

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翻译人员: Bingjie Yu 校对人员: William Lee我们很容易忘记海洋到底有多广阔，有多深海洋的大约60%是冰冷黑暗的也被称为深海它深达11,000 米然而，这一偏远的地带却是地球上最大的栖息地之一容纳了丰富的生命多样性从巨型鱿鱼和妖精鲨鱼到小于一毫米的微型动物这么多种生物是如何在这个水下世界繁盛起来的呢？在过去几十年里勇敢的科学家们曾冒险进入这片区域去寻找答案穿越过整个水层随着深度增加水压逐渐增大，光线开始变得微弱到达200米时，光合作用停止温度比起水面温度可以降低20摄氏度到1000米时，日光完全消失没有了光线，我们所知的生命似乎无法存在这也是为什么在1844年，自然学家爱德华－福布斯在他的著作无生学说中写道无生，意味着没有动物福布斯认定没有生物可以在600米以下的海洋存活由于没有光的缘故当然，深海生物的发现证实了他是错的福布斯没有考虑到的是一种叫海雪的东西这种东西的名字听起来比它实质要美妙很多海雪是一种有机物质像死去的海藻或动植物的粒子沉入到深海中并称为深海动物的食物得益于此，丰富的生命形式得以在黑暗中存在在如此严酷的环境中，只有最怪异的和最美妙的生命形式得以留存有着洞穴一般巨嘴的鱼类尖刺状的牙齿从下巴中突出来还有头顶上突出的台灯状结构还有如通过令人迷惑的亮光吸引猎物的琵琶鱼有些海洋生物完善了这项发光的技能我们称之为生物光来诱捕猎物分散捕食者注意或吸引伴侣有些生物通过它来伪装自己有些水域只有蓝光能被过滤通过动物们用生物光来配合光线捕食者或猎物从下往上看会被这种伪装欺骗无法看到它们的轮廓这种适应性的形成也来自于定位的需求在猎物遁走前抓住它有些海洋动物，比如水母，栉水母，还有樽海鞘可以在不同深度水域中移动部分原因是它们身体有90%的组成是水使它们能够忍受巨大的压力但它们属于特例大部分深海生物被限制于一个狭窄的水层区域那里营养稀缺因为食物从水面下沉很快沉入海底越是往下，我们发现越多奇异的生物它们有些是侏儒状态一种将它们转化成迷你版本生物的特征当我们更近的观察表面减少的食物来源被认为是造成这种体积缩减的原因仅有一小部分水面的食物最终到达海底所以动物的小型体积能够降低能量消耗和更好的适应性的优势然而，海洋也是巨人的家园在这里，巨型鱿鱼体长可达18米等足目生物在海床表面像木虱一样遁走也有长足日本蜘蛛蟹还有身子可以拉长至15米的桨鱼这一特性被称为巨人症，并仍然是个谜高氧浓度被认为也许促进了一些物种的极端生长而冰冷的水温延缓了寿命使得动物们能够长至巨型的身材这些异国海兽中的许多将终生不见光亮有些会冒险去到其他水层觅食还有极少的一部分能够真正的突破海浪到达海面，提醒着我们这些深海居民惊人的生存能力人类仍然还有难以置信的95%的海洋不曾探索过因此这些深水区域仍然充满谜团在这下面还有什么未知的奇迹？而我们发现的下一个奇迹又会是什么？

**P358 2016-05-25 Can you solve the control room riddle - Dennis Shasha**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=358)

As your country's top spy, you must infiltrate the headquarters of the evil syndicate, find the secret control panel, and deactivate their death ray. But all you have to go on is the following information picked up by your surveillance team. The headquarters is a massive pyramid with a single room at the top level, two rooms on the next, and so on. The control panel is hidden behind a painting on the highest floor that can satisfy the following conditions: Each room has exactly three doors to other rooms on that floor, except the control panel room, which connects to only one, there are no hallways, and you can ignore stairs. Unfortunately, you don't have a floor plan, and you'll only have enough time to search a single floor before the alarm system reactivates. Can you figure out which floor the control room is on? Pause now to solve the riddle yourself. Answer in: 3 Answer in: 2 Answer in: 1 To solve this problem, we need to visualize it. For starters, we know that on the correct floor there's one room, let's call it room A, with one door to the control panel room, plus one door to room B, and one to C. So there must be at least four rooms, which we can represent as circles, drawing lines between them for the doorways. But once we connect rooms B and C, there are no other connections possible, so the fourth floor down from the top is out. We know the control panel has to be as high up as possible, so let's make our way down the pyramid. The fifth highest floor doesn't work either. We can figure that out by drawing it, but to be sure we haven't missed any possibilities, here's another way. Every door corresponds to a line in our graph that makes two rooms into neighbors. So in the end, there have to be an even number of neighbors no matter how many connections we make. On the fifth highest floor, to fulfill our starting conditions, we'd need four rooms with three neighbors each, plus the control panel room with one neighbor, which makes 13 total neighbors. Since that's an odd number, it's not possible, and, in fact, this also rules out every floor that has an odd number of rooms. So let's go one more floor down. When we draw out the rooms, low and behold, we can find an arrangement that works like this. Incidentally, the study of such visual models that show the connections and relationships between different objects is known as graph theory. In a basic graph, the circles representing the objects are known as nodes, while the connecting lines are called edges. Researchers studying such graphs ask questions like, "How far is this node from that one?" "How many edges does the most popular node have?" "Is there a route between these two nodes, and if so, how long is it?" Graphs like this are often used to map communication networks, but they can represent almost any kind of network, from transport connections within a city and social relationships among people, to chemical interactions between proteins or the spread of an epidemic through different locations. So, armed with these techniques, back to the pyramid. You avoid the guards and security cameras, infiltrate the sixth floor from the top, find the hidden panel, pull some conspicuous levers, and send the death ray crashing into the ocean. Now, time to solve the mystery of why your surveillance team always gives you cryptic information. Hi everybody. If you liked this riddle, try solving these two.

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翻译人员: Cissy Yun 校对人员: Mingyu Cui作为国家的顶级间谍，你必须潜入邪恶组织的总部，找到隐蔽的控制板，并且关闭死亡射线。但是你拥有的信息只是你的监督团队所收集的。如下：这个总部是一个巨大的金字塔 在顶层有一个的房间，下面一层有两间房间，以此类推。控制板被藏在一幅画的后面这幅画在满足下面的这些条件的最高层：在每一层，每一个房间恰好有三张门通往其他房间，除了控制室只连接一个房间。没有走廊，忽略楼梯。不幸的是，你没有楼层平面图，而且你仅有足够时间在警报系统恢复正常之前完整搜寻某一层。你能想出控制室在哪一层吗？现在暂停，尝试解决这个谜题。答案在3秒后答案在2秒后答案在1秒后为了解决这个问题，我们需要把它形象化。最开始，我们知道在每一个楼层都至少有一个房间，我们把它叫做房间A，有一个门通往控制室另一个门通往房间B，还有一个通往房间C。所以这至少有4个房间，我们可以把它们绘成圆形，在它们的门之间连线。但是一旦我们连接B和C，就没有其他可能的连接了，所以第4层楼不满足条件。我们知道控制室必须尽可能的高，所以我们继续下金字塔。第5层也不满足条件。我们可以通过画图得出这个结论，但是为了确保我们没有错失任何的可能，还有另外一种方法。在我们的图中，每一个门对应一条线使两个房间相邻。所以最后必须是有偶数倍的相邻房间，无论我们连了多少线。到了第5层，为了满足我们刚开始的条件，我们需要4个房间，每个房间都有3个相邻的房间，加上控制室有1个相邻的房间，总共就有13个相邻的房间了。因为这是一个奇数，这是不可能出现的，实际上，这样就排除了有奇数个房间的所有层。所以让我们再往下一层。当我们画出房间的时候，看，我们可以找到这样一种可行的安排。顺便说一句，这种可视化模型的表明不同物体间的联系和关系的研究叫做图论。在一个基本的图中，每一个表示物体的圆叫一个节点，而相连的线被称为边。研究人员研究这样的图时会这样问，“这个节点和另外一个之间有多远？”“一个节点最多有多少边与它相连？”“这两个节点之间有没有一条路线，如果有，有多长？”这样的图表经常被用作绘制通讯网，但是它们几乎可以呈现任何种类的网，从一个城市的交通网，人与人的社交关系网，到蛋白质之间的化学作用或者是通过不同地区的传染病的传播。所以，有了这些技术，回到金字塔上。你躲开了侍卫个安保的摄像机，从顶层潜入第六层，找到了隐蔽的控制板，拉了几个杠杆，把死亡射线偏折到了大海里。现在，到了解开这个谜的时候了：为什么你的监督团队总是给你一些加了密的信息呢？嗨！如果你喜欢这个谜语，也尝试解开这两个吧。

**P359 2016-05-25 Why do people have seasonal allergies - Eleanor Nelsen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=359)

Ah, spring. Grass growing, flowers blooming, trees growing new leaves, but if you get allergies, this explosion of new life probably inspires more dread than joy. Step outside, and within minutes, you're sneezing and congested. Your nose is running, your eyes are swollen and watery, your throat is itchy. For you and millions of others, it's seasonal allergy time. So what's behind this onslaught of mucus? The answer lies within you. It's your immune system. Seasonal allergies, also called hay fever, or allergic rhinitis, are a hypersensitive immune response to something that's not actually harmful. Pollen from trees and grass, and mold spores from tiny fungi find their way into your mucous membranes and your body attacks these innocuous travelers the same way it would infectious bacteria. The immune system has a memory. When a foreign substance gets tagged as threatening, white blood cells produce customized antibodies that will recognize the offender the next time around. They then promptly recruit the body's defense team. But sometimes, the immune system accidentally discriminates against harmless substances, like pollen. When it wafts in again, antibodies on the surface of white blood cells recognize it and latch on. This triggers the cell to release inflammatory chemicals, like histamine, which stimulate nerve cells, and cause blood vessels in the mucous membranes to swell and leak fluid. In other words, itchiness, sneezing, congestion, and a runny nose. Allergies usually, but not always, show up for the first time during childhood. But why do some people get allergies and others don't? Allergies tend to run in families, so genetics may be one culprit. In fact, errors in a gene that helps regulate the immune system are associated with higher rates of allergies. The environment you grow up in matters, too. Being exposed to an allergen as a baby makes you less likely to actually develop an allergy to it. People who grow up on farms, in big families, and in the developing world also tend to have fewer allergies, although there are plenty of exceptions, partly thanks to genetics. One theory is that as children, they encounter more of the microbes and parasites that co-evolved with traditional hunter-gatherer societies. Called the hygiene hypothesis, the idea is that when the immune system isn't exposed to the familiar cast of microbes, it'll keep itself busy mounting defenses against harmless substances, like pollen. Another theory is that an immune system toughened up by a barrage of pathogens is less likely to overreact to allergens. Pollen is a common offender, just because we encounter so much of it, but there's a long list of substances: dust, animal dander, insect venom, medications, certain foods, that can send your immune system into overdrive. Some of these reactions can be scary. An allergy can develop into full-blown anaphylaxis, which typically brings on severe swelling, shortness of breath, and very low blood pressure. It can be deadly. The body can even have an allergic reaction to itself causing auto-immune disorders, like multiple sclerosis, lupus, and type 1 diabetes. But even non-life threatening allergy symptoms can make you miserable, so what can you do about it? Medications can help reduce the symptoms. The most common ones keep histamines from binding to your cells. These antihistamines stop the inflammation response. Steroids can help dial down the immune system. Another more permanent option is immunotherapy. Deliberate, controlled exposure to gradually increasing amounts of an allergen can teach the immune system that it isn't dangerous after all. And if you're really adventurous, there's a less traditional option: intestinal parasites. When hookworms sink their teeth into the intestinal wall, they secrete chemicals that blunt the immune system. Some studies suggest that hookworms can treat allergies, which may be another reason allergies are more common in industrialized countries where hookworms are few and far between. Of course, you can always just wait your seasonal allergies out. The spring pollen onslaught dwindles by mid-summer, just in time for ragweed season.

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翻译人员: Zhibo Wang 校对人员: WEI ZHENG啊，春天青草生长，百花绽放，树木萌发出新叶但如果你有过敏探索这片生机或许就意味着悲大于喜走出室外，不出几分钟，你就会打喷嚏并感到呼吸困难你会流鼻涕你的眼睛会肿胀并流泪你感到喉咙发痒对于你和与你相似的几百万人来说，这就是季节性过敏的征兆所以隐藏在这一系列粘液侵袭背后的是什么呢？答案就在你身上是你的免疫系统季节性过敏，也被称为花粉病、过敏性鼻炎是免疫系统对于并没有危害的物质的过激反应来自树上和草地上的花粉和来自真菌的霉菌孢子都能够进入你的黏膜而你的身体就会像对待感染性细菌一样攻击这些无辜的来访者免疫系统是有记忆性的当外来物质被标记为有威胁的时候白细胞就会分泌出相应的抗体在下一次识别出入侵者它们到时就会启动身体的防御系统但有时候，免疫系统会不小心排斥无害物质，例如花粉当它再次出现，白细胞表面的抗体就会立刻识别出来并将其锁定这就会导致细胞分泌炎症性化学物质例如组胺它可以刺激神经细胞使得黏膜内的血管肿胀并分泌液体换句话说，就是发痒，打喷嚏，呼吸困难，流鼻涕过敏通常第一次出现在童年时期，但不是所有人都是如此但为什么一些人会过敏而另一些人没有？过敏倾向于在家族中出现，所以基因是罪魁祸首之一事实上，调控免疫系统的基因发生错误与高过敏率息息相关你成长的环境也是有关联的在婴儿时期接触到过敏原使得你更小几率对其产生过敏那些成长在农场里尤其是在大家族和发展中国家的人过敏的更少虽然一部分是由于基因引起的，但还是会有很多的例外一个理论是作为儿童他们会接触到更多从传统狩猎采集社会就开始演化的微生物以及寄生虫这被称为卫生假说这个观点是当免疫系统不能接触到一些常见的微生物时它们就会一直增加对于无害物质的防御措施比如花粉另一个理论是如果免疫系统经受过大量病菌的洗礼就不会对过敏原产生过激反应花粉是常见的入侵者，是因为我们经常能够遇到但还有很多其他类似的物质如灰尘动物皮屑昆虫毒液药物特定食物它们会使得你的免疫系统过度工作其中的一些反应可以是很可怕的某些过敏能够发展为完全性过敏从而导致严重的肿胀呼吸急促以及低血压这可能致命人体甚至可能对自身产生过敏造成自身免疫性疾病像各种硬化症，狼疮，I型糖尿病但即使是不致命的过敏症也能让你苦不堪言所以我们能对它们做些什么呢？药物能够帮助减轻症状最常见的能够防止组胺与细胞结合这些抗组胺剂能够防止炎症反应类固醇能够帮助平稳免疫系统另外更长久的做法是免疫疗法在科学控制下，特定地暴露于数量逐渐增加的过敏原可以让免疫系统知道这些物质并不危险如果你敢于冒险，还有一种不太传统的做法肠道寄生虫当十二指肠虫将牙齿嵌到肠壁它们会分泌化学物质使得免疫系统迟钝一些研究认为十二指肠虫能够治疗过敏这也解释了为什么过敏在工业化的国家更常见那儿的十二指肠虫相对较少当然，你也可以等着季节性过敏过去春季花粉侵袭在仲夏就会减少正好赶上豚草的季节

**P360 2016-05-28 The pleasure of poetic pattern - David Silverstein**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=360)

Just for a moment, focus on your breath. In slowly. Out slowly. In slowly. Out. The same pattern repeats within every one of us and consider your pulse. The beat is built into the very fabric of our being. Simply put, we're creatures of rhythm and repetition. It's central to our experience, rhythm and repetition, rhythm and repetition. On, and in, and on, and out. And we delight in those aspects everyday, in the rhythm of a song, the beat of the drum, the nod of your head, or in the repetition of soup cans, the rows of an orchard, the artistry of petals. Pattern can be pleasure. In language, rhythm and repetition are often used as the building blocks for poetry. There's the rhythm of language, created by syllables and their emphasis, such as, "So long as men can breathe or eyes can see." And there's the repetition of language at multiple levels: the repetition of letters, "So long lives this and this gives life to thee," of sounds, "breathe," "see," "thee," and of words. With so many uses, repetition is one of the poet's most malleable and reliable tools. It can lift or lull the listener, amplify or diminish the line, unify or diversify ideas. In fact, even rhythm itself, a repeated pattern of stressed syllables, is a form of repetition. Yet for all its varied uses, too much repetition can backfire. Imagine writing the same sentence on the blackboard twenty times, again, and again, and again, and again, or imagine a young child clamoring for her mother's attention, "Mom, mom, mommy, mom, mom." Not exactly what we might call poetry. So what is poetic repetition, and why does it work? Possibly most familiar is rhyme, the repetition of like sounds in word endings. As with Shakespeare's example, we often encounter rhyme at the ends of lines. Repetition in this way creates an expectation. We begin to listen for the repetition of those similar sounds. When we hear them, the found pattern is pleasurable. Like finding Waldo in the visual chaos, we hear the echo in the oral chatter. Yet, rhyme need not surface solely at a line's end. Notice the strong "i" sound in, "So long lives this and this gives life to thee." This repetition of vowel sounds is called assonance and can also be heard in Eminem's "Lose Yourself." Notice how the "e" and "o" sounds repeat both within in and at the end of each line: "Oh, there goes gravity, Oh, there goes rabbit, he choked, he so mad but he won't give up that easy, no, he won't have it, he knows his whole back's to these ropes." The alternating assonance creates its own rhythm, and invites us to try our own voices in echoing it. Similarly, consonance is the repetition of like consonant sounds, such as the "l" and "th" in, "So long lives this and this gives life to thee." In fact, this type of specific consonance, which occurs at the beginning of words may be familiar to you already. It's called alliteration, or front rhyme. Great examples include tongue twisters. Betty bought some butter but the butter was bitter so Betty bought some better butter to make the bitter butter better. Here, the pleasure in pattern is apparent as we trip over the consonance both within words and at their start. Yet tongue twisters also reflect the need for variation in poetic repetition. While challenging to say, they're seen by some as lesser imitations of poetry, or gimmicky because they hammer so heavily on the same sounds, closer to that blackboard-style of repetition. Ultimately, this is the poet's balancing act, learning when to repeat and when to riff, when to satisfy expectations, and when to thwart them, and in that balance, it may be enough to remember we all live in a world of wild variation and carry with us our own breath and beat, our own repetition wherever we go.

**P360 2016-05-28 The pleasure of poetic pattern - David Silverstein**

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翻译人员: Vivi Dai 校对人员: Rongpei Yang只要一小会儿请凝神于你的呼吸慢慢吸气慢慢呼气慢慢吸气慢慢呼气每个人都在重复同样的模式想想你的脉搏这个跳动深植于我们的生命结构之中简单来说，我们是节奏和重复的产物这是我们活动的中心节奏和重复节奏和重复吸气呼气我们每天都从这些节奏和重复中获得快乐比如一首歌的节奏鼓点点头或者是重复 的汤罐头果园里一排排果树花瓣的艺术性模式是让人愉悦的在语言中，节奏和重复常常被用来作为诗歌的构建模块这是语言的节奏由音节和重音构成比如，“So long as men can breathe or eyes can see”。语言的重复有多个层次：字母的重复“So long lives this and this gives life to thee”音节的重复“breathe”、“see”、“thee”以及单词的重复重复的用途极为广泛是诗人们最具可塑性和最可靠的工具之一它可以让听者的情绪跌宕起伏可以强化或削弱句子可以统一或分散观点事实上，节奏本身就是重音节的重复模式节奏是重复的一种形式虽然用途多样但太多重复会带来负面效果想想看，在黑板上写20遍同一个句子一遍，一遍，一遍，一遍或者孩子大声吵闹要引起母亲的注意“妈妈，妈妈，妈咪，妈妈，妈妈”这可不是我们心目中的诗歌那么，诗歌中的重复到底是什么？为什么它们具有艺术性？最常见的重复也许是韵脚单词结尾的音节重复以莎士比亚为例我们经常在句子结尾读到韵脚这种重复制造了一种期待我们开始仔细聆听这些相似音节的重复当我们听见音节、发现模式时，会感到愉悦就像在视觉混乱的画幅中找到沃尔多我们在纷繁对话中听见了重复不过韵脚不必只出现在句末请注意有力的“i”音"So long lives this and this gives life to thee."元音的重复发音被称为元韵埃米纳姆的《迷失你自己》中也能听到元韵注意在每句中间和结尾“e”和‘o’音是如何重复的“Oh, there goes gravity,Oh, there goes rabbit, he choked,he so mad but he won't give up that easy,no, he won't have it,he knows his whole back's to these ropes."交替的元韵创造了自身的节奏让我们试图用自己的声音去重复它类似的，和音是类辅音的重复比如“I”和“th”音"So long lives this and this gives life to thee."实际上，这类特殊的和音出现在单词的开头你们可能都听过它叫做头韵或前押韵最好的例子就是绕口令Betty bought some butter but the butter was bitterso Betty bought some better butter to make the bitter butter better.当我们读到和音时，不管是出现在单词中间或开头模式带来的愉悦感很明显。虽然绕口令也反映出对诗歌重复的多样性的需求但不得不说，在有些人看来绕口令是对诗歌的低级模仿，或只是噱头因为它们在相同音节上的重复如此强烈近似于在黑板上抄写相同句子的重复从根本上说，只有诗人才能找到平衡学习何时重复何时即兴重复何时满足人们的期待以及何时打破期待在这种平衡中，也许只需要记住我们都生活在一个极度多样化的世界中我们都有自己的呼吸和心跳不管身在何方，我们都有自己的重复节奏

**P361 2016-06-01 How transistors work - Gokul J. Krishnan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=361)

Modern computers are revolutionizing our lives, performing tasks unimaginable only decades ago. This was made possible by a long series of innovations, but there's one foundational invention that almost everything else relies upon: the transistor. So what is that, and how does such a device enable all the amazing things computers can do? Well, at their core, all computers are just what the name implies, machines that perform mathematical operations. The earliest computers were manual counting devices, like the abacus, while later ones used mechanical parts. What made them computers was having a way to represent numbers and a system for manipulating them. Electronic computers work the same way, but instead of physical arrangements, the numbers are represented by electric voltages. Most such computers use a type of math called Boolean logic that has only two possible values, the logical conditions true and false, denoted by binary digits one and zero. They are represented by high and low voltages. Equations are implemented via logic gate circuits that produce an output of one or zero based on whether the inputs satisfy a certain logical statement. These circuits perform three fundamental logical operations, conjunction, disjunction, and negation. The way conjunction works is an "and gate" provides a high-voltage output only if it receives two high-voltage inputs, and the other gates work by similar principles. Circuits can be combined to perform complex operations, like addition and subtraction. And computer programs consist of instructions for electronically performing these operations. This kind of system needs a reliable and accurate method for controlling electric current. Early electronic computers, like the ENIAC, used a device called the vacuum tube. Its early form, the diode, consisted of two electrodes in an evacuated glass container. Applying a voltage to the cathode makes it heat up and release electrons. If the anode is at a slightly higher positive potential, the electrons are attracted to it, completing the circuit. This unidirectional current flow could be controlled by varying the voltage to the cathode, which makes it release more or less electrons. The next stage was the triode, which uses a third electrode called the grid. This is a wire screen between the cathode and anode through which electrons could pass. Varying its voltage makes it either repel or attract the electrons emitted by the cathode, thus, enabling fast current-switching. The ability to amplify signals also made the triode crucial for radio and long distance communication. But despite these advancements, vacuum tubes were unreliable and bulky. With 18,000 triodes, ENIAC was nearly the size of a tennis court and weighed 30 tons. Tubes failed every other day, and in one hour, it consumed the amount of electricity used by 15 homes in a day. The solution was the transistor. Instead of electrodes, it uses a semiconductor, like silicon treated with different elements to create an electron-emitting N-type, and an electron absorbing P-type. These are arranged in three alternating layers with a terminal at each. The emitter, the base, and the collector. In this typical NPN transistor, due to certain phenomena at the P-N interface, a special region called a P-N junction forms between the emitter and base. It only conducts electricity when a voltage exceeding a certain threshold is applied. Otherwise, it remains switched off. In this way, small variations in the input voltage can be used to quickly switch between high and low-output currents. The advantage of the transistor lies in its efficiency and compactness. Because they don't require heating, they're more durable and use less power. ENIAC's functionality can now be surpassed by a single fingernail-sized microchip containing billions of transistors. At trillions of calculations per second, today's computers may seem like they're performing miracles, but underneath it all, each individual operation is still as simple as the flick of a switch.

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翻译人员: Jin Wu 校对人员: Kelly Qi现代计算机正在改变着我们的生活，处理着几十年前人们无法想象的事情一连串的创新实现了那些人们在十几年前无法完成的事情但几乎所有的技术都取决于一个划时代性的发明晶体管所以，什么是晶体管这是一个什么样的东西可以让计算机完成那么多神奇的事情顾名思义，计算机就是一个进行数学运算的机械最初的计算机是人手动运行计算的比如算盘后来计算机里增加了机械部件计算机的特点便是用特定方式表示数字并运用系统处理数字电子计算机使用同机械计算机相同的运算方式但电子计算机不使用物理排列数字而被电压代替大部分的计算机使用布尔数学体系它只有两种可能的值那就是正确和错误的逻辑条件并用二进制数值1和0表示它们被高和低电压表述着程式通过逻辑门电路来执行并输出1或0基于输入值是否符合某一个逻辑陈述这些电路处理三种基本的逻辑运算接合，分离与取反接合类似于“且”运算，并产生高电压输出当它接受到两个高电压输入时其他两种逻辑运算工作原理相似电路可以通过结合来处理复杂的运算比如加法和减法电脑通过电子方式运行程序包括指令这种系统需要一个可靠且精准的算法来控制电流早期电子计算机，比如电子数值积分计算机使用了一种叫真空管的设备真空管是二极管的前身在一个真空玻璃管内放置两个电极通过给阴极电压并使温度上升来释放电子如果阳极处在一个高一点的正电位电子就会被吸引过去联通电路这种单方向电流是可控的通过对阴极使用不同的电压可以使阴极释放不同数量的电子下一个是三极管使用了第三个电极叫做栅极这是一种在阴极与阳极之间的网格状的线路并可以使电子通过不同的电压可以使它排斥或者吸引阴极发出的电子从而，得以实现快速电流开关三极管可以放大信号的性能使它成为收音机的关键部位还有长距通信虽然真空管有这些优点，它不稳定且体型笨重电子数值积分计算机使用了18000个真空管这使它的体积近似于一个网球场并重达30吨几乎每天都有真空管出现故障而且使用它1小时的电量等同于15个家庭的日用电量问题的解决办法是晶体管它使用了半导体来替代电极比如用其它元素处理过的硅来制造一个电子发射N型和一个电子接收P型这些被排列在三个交替层并在每一层有一个终端发射极，基极和接收极在典型的NPN晶体管由于有些出现在在P－N接口的现象一个在发射极和基极之间的特别的区域叫做P－N结当电压超过某一阀值时它才会导电不然，它会处于关闭状态以这种方式，输入电压里的小变化可以激发高低输出电流之间的转换晶体管的优点在于它的高效和小体积因为晶体管不需要加热，它们更加的耐用与低耗电子数值积分计算机的性能已被今天指甲盖大小携带者几十亿个晶体管的指甲盖大小的微芯片所超越有着每秒万亿次计算的当代计算机看上去是在展现着一个奇迹但是在它背后每一个运算仍然只是一个简单的开关动作

**P362 2016-06-03 How interpreters juggle two languages at once - Ewandro Magalhaes**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=362)

In 1956, during a diplomatic reception in Moscow, Soviet leader Nikita Khrushchev told Western Bloc ambassadors, "My vas pokhoronim!" His interpreter rendered that into English as, "We will bury you!" This statement sent shockwaves through the Western world, heightening the tension between the Soviet Union and the US who were in the thick of the Cold War. Some believe this incident alone set East/West relations back a decade. As it turns out, Khrushchev's remark was translated a bit too literally. Given the context, his words should have been rendered as, "We will live to see you buried," meaning that Communism would outlast Capitalism, a less threatening comment. Though the intended meaning was eventually clarified, the initial impact of Khrushchev's apparent words put the world on a path that could have led to nuclear armageddon. So now, given the complexities of language and cultural exchange, how does this sort of thing not happen all the time? Much of the answer lies with the skill and training of interpreters to overcome language barriers. For most of history, interpretation was mainly done consecutively, with speakers and interpreters making pauses to allow each other to speak. But after the advent of radio technology, a new simultaneous interpretations system was developed in the wake of World War II. In the simultaneous mode interpreters instantaneously translate a speaker's words into a microphone while he speaks. Without pauses, those in the audience can choose the language in which they want to follow. On the surface, it all looks seamless, but behind the scenes, human interpreters work incessantly to ensure every idea gets across as intended. And that is no easy task. It takes about two years of training for already fluent bilingual professionals to expand their vocabulary and master the skills necessary to become a conference interpreter. To get used to the unnatural task of speaking while they listen, students shadow speakers and repeat their every word exactly as heard in the same language. In time, they begin to paraphrase what is said, making stylistic adjustments as they go. At some point, a second language is introduced. Practicing in this way creates new neural pathways in the interpreter's brain, and the constant effort of reformulation gradually becomes second nature. Over time and through much hard work, the interpreter masters a vast array of tricks to keep up with speed, deal with challenging terminology, and handle a multitude of foreign accents. They may resort to acronyms to shorten long names, choose generic terms over specific, or refer to slides and other visual aides. They can even leave a term in the original language, while they search for the most accurate equivalent. Interpreters are also skilled at keeping aplomb in the face of chaos. Remember, they have no control over who is going to say what, or how articulate the speaker will sound. A curveball can be thrown at any time. Also, they often perform to thousands of people and in very intimidating settings, like the UN General Assembly. To keep their emotions in check, they carefully prepare for an assignment, building glossaries in advance, reading voraciously about the subject matter, and reviewing previous talks on the topic. Finally, interpreters work in pairs. While one colleague is busy translating incoming speeches in real time, the other gives support by locating documents, looking up words, and tracking down pertinent information. Because simultaneous interpretation requires intense concentration, every 30 minutes, the pair switches roles. Success is heavily dependent on skillful collaboration. Language is complex, and when abstract or nuanced concepts get lost in translation, the consequences may be catastrophic. As Margaret Atwood famously noted, "War is what happens when language fails." Conference interpreters of all people are aware of that and work diligently behind the scenes to make sure it never does.

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翻译人员: Yancy Ye 校对人员: Jiawei Ni1956年，在墨西哥的外交招待会上苏联领导人尼基塔·谢尔盖耶维奇·赫鲁晓夫告诉西方集团大使“不管你们喜不喜欢，历史都在我们这一边，我们会为你们掘土”他的翻译把他的话翻译成“我们要埋葬你们”这句话震惊了西方国家使在冷战期间的苏联与美国关系进一步降到了冰点有一些人认为就这一事故会使东西关系倒退十年最终证明发现，对于赫鲁晓夫的言辞翻译的有些太夸张了鉴于上下文， 他的话应该渲染为：“我们会活着看你自掘坟墓”意味着共产主义会超过资本主义变成了一个威胁性更小的评论虽然赫鲁晓夫预期的意思最终被澄清了但如果这句话走上了世界的道路，可能就会引发核战争所以现在，当我们考虑到语言与文化交流的复杂性怎样才能避免这样的事情反复发生？大部分答案说是取决于翻译官的技能与培训去克服语言障碍在翻译历史上，口译主要是按顺序做的说话者和翻译员会停顿允许对方说话但是在无线电技术问世后一种新的同声传声系统在二战后发展起来在同步模式下翻译者可以在瞬间为说话者翻译并将翻译内容在说话者说话时传入麦克风没有停顿，观众可以选择自己可听懂的语言表面上看起来是无缝的但是在幕后人工翻译人员在不间断的工作着保证每一个观点都被正确翻译这可不是一个简单的任务即使是双语流利的人员也要经过两年的训练去扩大他们的词汇量并且掌握主要的技能最终成为一名会议翻译人员听和说在同一时刻，去顺应不自然的工作任务这些翻译学员是说话者的影子，并重复他们的每一个字，就像是在同一语言中听到的一样随着时间的推移，他们开始释义根据实际情况进行风格调整再某些特殊点上，运用第二种语言进行介绍翻译人员运用这种方法练习来建立新的大脑思维方式再加上不断的努力，逐渐形成为第二天性随着时间的推移和努力的工作翻译官在掌握大量的技巧后，逐渐提高速度处理具有挑战性的术语并处理大量外语口音他们会运用缩写来缩短较长的名字选择特定术语或参考幻灯片和其他视觉助手当他们在寻找最准确的同义词时他们甚至可以在原先的语言中留下一个术语翻译官们在面对混乱的场面时善于保持沉着冷静要记住的是，他们没法控制谁会说什么或者发言人的发音是否清晰意外随时都会发生此外，他们经常在有成千上万人的会议上执行任务和一些非常威严的地点比如说联合国大会去控制自己的情绪他们会仔细认真的准备一项任务提前建立词汇表大量阅读会议有关题材并回顾以前谈论的话题最终，在会议上翻译官配对进行翻译当其中一个同事正在进项忙碌的实时翻译另一名通过定位文件进行支持查词汇并寻找相关信息因为同声传译需要精神极度集中每三十分钟，同伴交换角色成功很大程度上是依赖于熟练的合作语言十分复杂当翻译一些抽象或微妙的概念时容易失去方向后果或许是充满灾难性的正如玛格丽特·阿特伍德所说 “战争是当语言失败时发生的事情”所有会议的口译人员都意识到这一点在幕后努力工作以确保这样的事情不会发生

**P363 2016-06-06 Why do our bodies age - Monica Menesini**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=363)

In 1997, a French woman named Jeanne Calment passed away after 122 years and 164 days on this Earth, making her the oldest known person in history. Her age was so astounding that a millionaire pledged $1 million to anyone who could break her record. But in reality, living to this age or beyond is a feat that very few, maybe even no humans, are likely to accomplish. Human bodies just aren't built for extreme aging. Our capacity is set at about 90 years. But what does aging really mean and how does it counteract the body's efforts to stay alive? We know intuitively what it means to age. For some, it means growing up, while for others, it's growing old. Yet finding a strict scientific definition of aging is a challenge. What we can say is that aging occurs when intrinsic processes and interactions with the environment, like sunlight, and toxins in the air, water, and our diets, cause changes in the structure and function of the body's molecules and cells. Those changes in turn drive their decline, and subsequently, the failure of the whole organism. The exact mechanisms of aging are poorly understood. But recently, scientists have identified nine physiological traits, ranging from genetic changes to alterations in a cell's regenerative ability that play a central role. Firstly, as the years pass, our bodies accumulate genetic damage in the form of DNA lesions. These occur naturally when the body's DNA replicates, but also in non-dividing cells. Organelles called mitochondria are especially prone to this damage. Mitochondria produce adenosine triphosphate, or ATP, the main energy source for all cellular processes, plus mitochondria regulate many different cell activities and play an important role in programmed cell death. If mitochondrial function declines, then cells and, later on, whole organs, deteriorate, too. Other changes are known to occur in the expression patterns of genes, also known as epigenetic alterations, that affect the body's tissues and cells. Genes silenced or expressed only at low levels in newborns become prominent in older people, leading to the development of degenerative diseases, like Alzheimer's, which accelerate aging. Even if we could avoid all these harmful genetic alterations, not even our own cells could save us. The fact remains that cellular regeneration, the very stuff of life, declines as we age. The DNA in our cells is packaged within chromosomes, each of which has two protective regions at the extremities called telomeres. Those shorten every time cells replicate. When telomeres become too short, cells stop replicating and die, slowing the body's ability to renew itself. With age, cells increasingly grow senescent, too, a process that halts the cell cycle in times of risk, like when cancer cells are proliferating. But the response also kicks in more as we age, halting cell growth and cutting short their ability to replicate. Aging also involves stem cells that reside in many tissues and have the property of dividing without limits to replenish other cells. As we get older, stem cells decrease in number and tend to lose their regenerative potential, affecting tissue renewal and maintenance of our organs original functions. Other changes revolve around cells' ability to function properly. As they age, they stop being able to do quality control on proteins, causing the accumulation of damaged and potentially toxic nutrients, leading to excessive metabolic activity that could be fatal for them. Intercellular communication also slows, ultimately undermining the body's functional ability. There's a lot we don't yet understand about aging. Ultimately, does longer life as we know it come down to diet, exercise, medicine, or something else? Will future technologies, like cell-repairing nanobots, or gene therapy, artificially extend our years? And do we want to live longer than we already do? Starting with 122 years as inspiration, there's no telling where our curiosity might take us.

**P363 2016-06-06 Why do our bodies age - Monica Menesini**

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翻译人员: YU WANG 校对人员: Chen Zou1997年， 一位叫珍妮·卡尔芒的法国女士在活了122年164天后于世长辞这使她成为历史记载 上最长寿的人由于她的年龄如此令人震惊甚至有一位百万富翁愿意付出一百万美元 给任何可以打破她长寿记录的人但事实上 能活到这个年纪或以上是个十分罕见的盛宴 非常少，甚至没人可以完成这个目标人类的身体不是为 极端的年龄而建造的我们的年龄范围大概是90年但是年老真正意味着什么?它又是怎样对抗我们 身体存活所付出努力的呢?我们直觉上知道年龄意味着什么对于某些人来说 年老是成长对于另一些人来说 意味着变老然而 寻找严格科学意义上的 年老的定义是一个挑战我们可以说的是 年老发生在一个内在性的过程以及我们与环境的接触 比如说阳光和在空气 ，水和 我们食物里的毒素引起结构上的变化以及人体的分子和细胞功能的变化这些变化造成它们数量的减少最终导致 整个有机体的凋零人们对人体老化的确切机理 知之甚少但是在近年，科学家鉴定出 九个生理学的特征从基因的变化到一个细胞再生能力的变更这个能力起着一个核心的角色首先，随着时间的流失 我们的身体体累计了很多基因的伤害以DNA损伤的形式表现出来当身体的DNA复制时 这些就自然发生了但这些也在非分裂的细胞里发生这个被称为线粒体的细胞器 特别容易出现这种损伤线粒体产生三磷酸腺苷或者ATP是所有的细胞过程的主要能量来源加上线粒体会调节 许多不同的细胞活动并在程序性细胞死亡中 起到重要作用如果线粒体功能减弱细胞， 以及再后来的 整个器官也会衰亡其它已知变化以 基因模式的表达发生这也被称为表观遗传的改变这个改变会影响机体的组织和细胞一般不表达 或仅在新生儿中部分表达的基因在老年人中变得常见这会导致退化性疾病比如会加速衰老的阿茨海默症即使我们能够避免所有这些 有害的基因变异甚至我们自己的细胞都不能拯救我们事实是 细胞再生功能生命重要的东西随着我们年龄的增长而减弱在我们细胞中的DNA 被包含在染色体内每个染色体都具有在末端的两个保护区域 叫做端粒每次细胞复制时 端粒会缩短当端粒变得太短时细胞会停止复制并且凋亡减缓机体的自我更新能力随着年龄的增长 细胞也会日益衰老这个过程终止在 危机的时候细胞的循环就像当癌细胞增殖但这个反应也因为 我们的年龄而减弱阻止细胞的生长和 减弱它们的繁殖能力衰老还涉及了驻留在 许多组织中的干细胞那些具有无限分裂 以补充其他细胞的细胞当我们变老的时候 干细胞的数量会减少并且往往会失去 其再生的潜能影响组织更新和维修 我们的器官原有的功能其它的变化包含了 细胞正常工作的能力随着它们年龄的增长 它们停止了对蛋白质的质量控制这会造成损伤的和 具有潜在毒性的营养物质的积累并且导致过多的代谢活性 它们可能是致命的细胞间的信息通讯也缓慢下来最终破坏了 人体机能的作用关于老化 还有很多我们不知道的最终，更长的寿命 是不是像我们知道的归因于饮食运动医疗条件或许还有其它的元素？未来的科技的发展， 会像进行细胞修复的纳米机器人或者基因疗法人为地延长我们的寿命？而且我们真的想 比我们现在活得长久？以122年为激励的起点我们不知道我们的好奇心会带着我们去向何处

**P364 2016-06-07 The evolution of the book - Julie Dreyfuss**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=364)

What makes a book a book? Is it just anything that stores and communicates information? Or does it have to do with paper, binding, font, ink, its weight in your hands, the smell of the pages? Is this a book? Probably not. But is this? To answer these questions, we need to go back to the start of the book as we know it and understand how these elements came together to make something more than the sum of their parts. The earliest object that we think of as a book is the codex, a stack of pages bound along one edge. But the real turning point in book history was Johannes Gutenberg's printing press in the mid-15th century. The concept of moveable type had been invented much earlier in Eastern culture, but the introduction of Gutenberg's press had a profound effect. Suddenly, an elite class of monks and the ruling class no longer controlled the production of texts. Messages could spread more easily, and copies could constantly be produced, so printing houses popped up all over Europe. The product of this bibliographic boom is familiar to us in some respects, but markedly different in others. The skeleton of the book is paper, type, and cover. More than 2000 years ago, China invented paper as a writing surface, which was itself predated by Egyptian papyrus. However, until the 16th century, Europeans mainly wrote on thin sheets of wood and durable parchment made of stretched animal skins. Eventually, the popularity of paper spread throughout Europe, replacing parchment for most printings because it was less expensive in bulk. Inks had been made by combining organic plant and animal dyes with water or wine, but since water doesn't stick to metal type, use of the printing press required a change to oil-based ink. Printers used black ink made of a mixture of lamp soot, turpentine, and walnut oil. And what about font size and type? The earliest movable type pieces consisted of reversed letters cast in relief on the ends of lead alloy stocks. They were handmade and expensive, and the designs were as different as the people who carved their molds. Standardization was not really possible until mass manufacturing and the creation of an accessible word processing system. As for style, we can thank Nicolas Jenson for developing two types of Roman font that led to thousands of others, including the familiar Times Roman. Something had to hold all this together, and until the late 15th century, covers consisted of either wood, or sheets of paper pasted together. These would eventually be replaced by rope fiber millboard, originally intended for high quality bindings in the late 17th century, but later as a less expensive option. And while today's mass produced cover illustrations are marketing tools, the cover designs of early books were made to order. Even spines have a history. Initially, they were not considered aesthetically important, and the earliest ones were flat, rather than rounded. The flat form made the books easier to read by allowing the book to rest easily on a table. But those spines were damaged easily from the stresses of normal use. A rounded form solved that issue, although new problems arose, like having the book close in on itself. But flexibility was more important, especially for the on-the-go reader. As the book evolves and we replace bound texts with flat screens and electronic ink, are these objects and files really books? Does the feel of the cover or the smell of the paper add something crucial to the experience? Or does the magic live only within the words, no matter what their presentation?

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翻译人员: Alison Choi 校对人员: Yuan Ma到底什么才叫书呢？书是任何可以储存 和传递信息的东西吗？还是它必须与跟纸、装订、字体、墨水、拿在手中的重量和书页的气味有关？这是书吗？大概不是。那这个呢？为了回答这些问题，我们需要回溯到已知的书的起源，去了解不同的的元素如何一起去整合为一件有着丰富意义的物件。我们已知的最早期的书是抄本，一叠单边装订的纸页。但是在书的历史中真正的转折点，是Johannes Gutenberg 在十五世纪中期发明的印刷机。虽然东方在更早时就发明了活字印刷术，但Gutenberg的印刷机却 带来了巨大的影响。突然间，诸如僧人和 统治阶级之类的精英阶层无法再控制文本的生产。消息可以更简单地传播，文本可以不停地复制，因此全欧洲涌现了许多印刷厂。在书本蓬勃发展的时代的产品 在很多方面是我们所熟悉的，但也在一些方面存在显著不同。书的骨架是纸、字和封面。在两千多年以前， 中国发明了纸作为书写平台，而之前的书写平台是 埃及的纸莎草。然而直到十六世纪，欧洲人主要把字写在薄木片或者用动物皮延展制成的耐用羊皮纸上。最终，纸在欧洲也得到了广泛的使用，在大多数印刷中取代了羊皮纸， 因为散装购买更便宜。墨水之前都是利用有机的植物与动物染料， 加上水或酒一起合成，但由于金属活字不能沾水，印刷机的使用需要一种油基墨水。印刷机用的黑色墨水是由 灯烟灰、松节油和胡桃油混合制成。那字的大小和字体呢？最早的活字是在铅铝坯料的一端 铸造凸出的反字，这些活字都是手工制成，价格昂贵，字样的设计因雕刻字模的工匠不同而异。在大规模制造和易用的文字处理系统产生之前， 标准化实际上根本不可能。我们应该感谢Nicolas Jenson发明了 两种罗马字体，那之后产生了上千种其他字形，这其中包含了我们熟悉的Times Roman。这一切要怎么组合在一起呢？直到十五世纪晚期，书的封面都是由木头或纸张粘贴在一起而成，这些最后被绳纤维做成的纸板代替，这在十七世纪晚期本来是作为较高级的装订方式，而后来变成了一种经济的选择。虽然封面插图在现在大规模生产的今天 是一种营销手段，早期书的封面设计是定制的。连书脊都有一段历史。一开始它们被认为对美观并不重要，最早期的书脊都是直边而不是圆的，直的书脊让书可以平稳地放在桌子上 以便读书。但是这种书脊因为每天的日常使用容易被损坏，圆形的书脊解决了这个问题。可是新的问题又出现了，比如书会自己合起来。但尤其对于忙碌的读者来说， 灵活性还是更重要。当书继续进化，我们开始用平板屏幕和电子墨水代替固定文本，这些物品和文件真的是书吗？封面的触感和纸张的气味会增强阅读的体验吗？还是说阅读的魔力只在于文字的内容，与呈现的形式无关呢？

**P365 2016-06-08 Why wasn’t the Bill of Rights originally in the US Constitution - Jam**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=365)

Take a moment to think about the US Constitution. What's the first thing that comes to mind? Freedom of speech? Protection from illegal searches? The right to keep and bear arms? These passages are cited so often that we can hardly imagine the document without them, but that's exactly what the writers of the Constitution did. The list of individual freedoms known as the Bill of Rights was not in the original text and wasn't added for another three years. So does this mean the founders didn't consider them? The answer goes back to the very origins of the Constitution itself. Even prior to the first shots of the American Revolution, the Thirteen Colonies worked together through a provisional government called the Continental Congress. During the war in 1781, the Articles of Confederation were ratified as the first truly national government. But establishing a new nation would prove easier than running it. Congress had no power to make the states comply with their laws. When the national government proved unable to raise funds, enforce foreign treaties, or suppress rebellions, it was clear reform was needed. So in May 1787, all the states but Rhode Island sent delegates to Philidelphia for a constitutional convention. A majority of these delegates favored introducing a new national constitution to create a stronger federal government. Thanks to compromises on issues like state representation, taxation power, and how to elect the president, their proposal gradually gained support. But the final text drafted in September still had to be approved by conventions held in the states. So over the next few months, ratification would be debated across the young nation. Among those who championed the new document were leading statesmen Alexander Hamilton, James Madison, and John Jay. Together, they laid out eloquent philosophical arguments for their positions in a series of 85 essays now known as the Federalist Papers. But others felt the Constitution was overreaching and that more centralized authority would return the states to the sort of tyranny they had just escaped. These Anti-Federalists were especially worried by the text's apparent lack of protections for individual liberties. As the conventions proceeded, many of these critics shifted from opposing the Constitution entirely to insisting on adding an explicit declaration of rights. So what was the Federalists problem with this idea? While their opponents accused them of despotism, wanting to maintain absolute power in the central government, their real motives were mostly practical. Changing the constitution when it had already been ratified by some states could complicate the entire process. More importantly, Madison felt that people's rights were already guaranteed through the democratic process, while adding extra provisions risked misinterpretation. And some feared that creating an explicit list of things the government can't do would imply that it can do everything else. After the first five states ratified the Constitution quickly, the debate grew more intense. Massachusetts and several other states would only ratify if they could propose their own amendments for consideration. Leading Federalists recognized the need to compromise and promised to give them due regard. Once ratification by nine states finally brought the Constitution into legal force, they made good on their promise. During a meeting of the first United States Congress, representative James Madison stood on the House floor to propose the very amendments he had previously believed to be unnecessary. After much debate and revision, first in the Congress, and then in the states, ten amendments were ratified on December 15, 1791, over three years after the US Constitution had become law. Today, every sentence, word, and punctuation mark in the Bill of RIghts is still considered fundamental to the freedoms Americans enjoy, even though the original framers left them out.

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翻译人员: Diana Li 校对人员: Qiyun Xing花点时间思考一下美国宪法。最先想到的是什么？言论自由？保护人们免于非法搜查？拥有和携带武器的权利？我们对这些文段耳熟能详，以至于没有办法想象 没有这些条款的文件会是什么样，但是这正是当时那些宪法撰写人 所面临的情况。列出来的这些个人权利 就是众所周知的《权利法案》，并不在最初版本之中，并且直到三年之后才被添加进去。所以，这意味着法案的撰写人 根本就没有考虑它们吗？问题的答案要回溯到 宪法制定初期。早在美国独立战争开始之前，十三个殖民地通过名为“大陆议会”的临时政府合作。在1781年战争期间，《邦联条例》通过批准成为第一个真正意义上的国家管理体系。但是，事实证明建立一个新的国家 比管理一个国家要简单得多。国会没有任何权力使 各个州遵从法律。当国家政府没有办法 筹集到足够的资金、执行外交条约、或者是镇压叛乱时，显而易见，改革势在必行。所以，在1787年五月， 除罗德岛之外的所有州都指派代表前往费城 参加制宪会议。大多数代表倾向于 通过编写新的国家宪法来建立更有影响的联邦政府。因为折衷解决了许多问题， 比如每个州的代表权、征税权、以及如何选举总统，他们的提议渐渐开始受到支持。但是九月份起草的文件最终版仍旧需要由州内保守派批准通过。所以在接下来的几个月里，批准与否在这个年轻的国家里 广为争议。在那些力挺新文件的人中间，带头的政治家有亚历山大·汉密尔顿、詹姆斯·麦迪逊、和约翰·杰伊。他们利用85篇文章阐述立场，陈述了他们具有说服力的哲学争论，这85篇文章就是现在的《联邦论》。但是其他人觉得 这份宪法要求过高，同时中央集权会使各个州退回到他们 最初逃离的暴政。这些反联邦主义者 尤其担心这一文本明显缺乏对 人身自由保护的现实。随着宪法的推进，许多批评家从完全反对宪法转为了强烈要求增加 一条对权利的申明。那么联邦制拥护者关于 这个看法的疑虑是什么呢？在反对派指责他们想要在中央政府获得绝对权力 这种专制统治思想的同时，拥护者们真正的目的大多都是 很有实践意义的。在一些州已经通过这份宪法 之后做出改动会使整个系统变得复杂。更重要的是，麦迪逊认为票选程序已经保证了人权，增加其他条款只会增大曲解的可能。也有些人人担心阐明 政府不能做的事情会会暗示它可以做其他任何事。在最初五个州很快通过宪法之后，国内的争论愈演愈烈。只有同意他们根据情况提出修正案，马萨诸塞州和其他几个州才会批准。带头的联邦制拥护者们 意识到了妥协的必要性，并承诺会给予应有注意。当九个州的批准使得 这份文件有法律效力之后，他们兑现了诺言。在美国第一届国会的一次会议中，詹姆斯·麦迪逊代表在联邦厅宣布了这个他最初认为没有必要的修正案。经过许多争论与修订先是在国会之内，接下来是在各个州中间1791年12月15日， 在宪法正式成为法律三年之后，批准通过了十份宪法修正案。现在，《权利法案》中的每一句话、 每一个词、乃至每一个标点符号都被认为是美国人享受的基本自由，虽然最初的创作者们 并没有把它们考虑在内。

**P366 2016-06-14 How the food you eat affects your brain - Mia Nacamulli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=366)

Your Brain on Food If you sucked all of the moisture out of your brain and broke it down to its constituent nutritional content, what would it look like? Most of the weight of your dehydrated brain would come from fats, also known as lipids. In the remaining brain matter, you would find proteins and amino acids, traces of micronutrients, and glucose. The brain is, of course, more than just the sum of its nutritional parts, but each component does have a distinct impact on functioning, development, mood, and energy. So that post-lunch apathy, or late-night alertness you might be feeling, well, that could simply be the effects of food on your brain. Of the fats in your brain, the superstars are omegas 3 and 6. These essential fatty acids, which have been linked to preventing degenerative brain conditions, must come from our diets. So eating omega-rich foods, like nuts, seeds, and fatty fish, is crucial to the creation and maintenance of cell membranes. And while omegas are good fats for your brain, long-term consumption of other fats, like trans and saturated fats, may compromise brain health. Meanwhile, proteins and amino acids, the building block nutrients of growth and development, manipulate how we feel and behave. Amino acids contain the precursors to neurotransmitters, the chemical messengers that carry signals between neurons, affecting things like mood, sleep, attentiveness, and weight. They're one of the reasons we might feel calm after eating a large plate of pasta, or more alert after a protein-rich meal. The complex combinations of compounds in food can stimulate brain cells to release mood-altering norepinephrine, dopamine, and serotonin. But getting to your brain cells is tricky, and amino acids have to compete for limited access. A diet with a range of foods helps maintain a balanced combination of brain messengers, and keeps your mood from getting skewed in one direction or the other. Like the other organs in our bodies, our brains also benefit from a steady supply of micronutrients. Antioxidants in fruits and vegetables strengthen the brain to fight off free radicals that destroy brain cells, enabling your brain to work well for a longer period of time. And without powerful micronutrients, like the vitamins B6, B12, and folic acid, our brains would be susceptible to brain disease and mental decline. Trace amounts of the minerals iron, copper, zinc, and sodium are also fundamental to brain health and early cognitive development. In order for the brain to efficiently transform and synthesize these valuable nutrients, it needs fuel, and lots of it. While the human brain only makes up about 2% of our body weight, it uses up to 20% of our energy resources. Most of this energy comes from carbohydrates that our body digests into glucose, or blood sugar. The frontal lobes are so sensitive to drops in glucose, in fact, that a change in mental function is one of the primary signals of nutrient deficiency. Assuming that we are getting glucose regularly, how does the specific type of carbohydrates we eat affect our brains? Carbs come in three forms: starch, sugar, and fiber. While on most nutrition labels, they are all lumped into one total carb count, the ratio of the sugar and fiber subgroups to the whole amount affect how the body and brain respond. A high glycemic food, like white bread, causes a rapid release of glucose into the blood, and then comes the dip. Blood sugar shoots down, and with it, our attention span and mood. On the other hand, oats, grains, and legumes have slower glucose release, enabling a steadier level of attentiveness. For sustained brain power, opting for a varied diet of nutrient-rich foods is critical. When it comes to what you bite, chew, and swallow, your choices have a direct and long-lasting effect on the most powerful organ in your body.

**P366 2016-06-14 How the food you eat affects your brain - Mia Nacamulli**

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翻译人员: YINGHUA XU 校对人员: Menglu Zhang食物对大脑的影响如果将你的大脑里所有的水分都吸干然后按不同的营养成分进行分类会是怎样呢？脱水后，大脑的重量主要来自于脂肪也被认为是脂质（Lipids）在剩余的物质中，你会发现蛋白质和氨基酸微量营养素以及葡萄糖当然，大脑不仅仅是这些营养物质的简单加总这些营养物质确实各有分工， 影响着身体运作机能发展情绪变化及能量消耗我们可能都有过，午饭后乏力易困或是夜幕已深我们仍难以入眠，这些体验都可能是食物对大脑产生的影响大脑里的脂质中，Omegas-3和 6是其中的明星成员这些人体必需的脂肪酸被认为能防止脑功能的退化它们必须通过食物才能摄取所以，食用富含Omega脂肪酸的食物比如坚果食物种子脂质含量较高的鱼类对细胞膜生成和维护是非常关键的Omega这类脂质对大脑来说是有益脂肪但长期食用其他脂质，比如反式脂肪和饱和脂肪却可能会危害脑部健康此外，蛋白质和氨基酸也是身体机能增长和发展的基础营养要素操纵着人类的感受与行为氨基酸含有构成神经递质的前体蛋白神经递质就是在神经元之间传递信号的化学物质会影响人类的情绪睡眠注意力及体重这是人们在吃了一大份意大利面后会变得镇定的原因之一也是为什么人们吃了一顿富含蛋白质的晚餐后会很精神食物中复合物的的复杂组合会刺激大脑细胞释放影响情绪 的降肾上腺素多巴胺和血清素但它们想要进入脑部细胞并非易事氨基酸还需抢占有限的通道以进入脑细胞饮食结构多样化 能帮助脑部传输元素数量平衡相互协作以保证你的情绪不会有偏向的波动像我们身体中的其他器官一样稳定供给微量营养元素也会有益大脑水果和蔬菜中的抗氧化剂能加强脑部抗击的自由基的能力，防止脑细胞受损从而使大脑能良好运作更长的时间如果没有这些强大的微量营养元素如维他命B6B12及叶酸我们会易出现脑部疾病和智力下降的病症微量的矿物铁铜锌钠也是大脑健康和早期认知发展所需的基本元素为了使大脑能更有效地转化和合成这些重要的营养物质大脑需要的能量，大量的能量尽管人类大脑只占到体重的2%但它却消耗了超过20%的能量大多数的能量来自于碳水化合物我们的身体将这些碳水化合物消化成葡萄糖或者血糖大脑前庭对葡萄糖供给下降十分敏感实际上，心智功能产生的变化就是营养不足的一个重要信号假设我们能不断获取葡萄糖那么我们食用特定种类的碳水化合物是如何影响我们的大脑的呢？碳水化合物有三种形式淀粉糖类和纤维素尽管在大多数营养成分表中它们都计入在碳水化合物的含量中糖类和纤维素各自在总量中所占的比例会影响我们身体和大脑的反应高血糖食物，如白面包会迅速释放大量葡萄糖进入血液中之后血糖含量又迅速下降当血糖含量降低时， 我们的注意力和情绪也随之下降另一方面，燕麦、谷物和豆类 释放葡萄糖较为缓慢能使注意力保持得更稳定为了让脑力可持续使用选择饮食多样化是至关重要的涉及到你要吃，要咀嚼的，要吞咽的食物时你的选择会直接并长久地影响到你身体中最强大的器官

**P367 2016-06-15 What does it mean to be a refugee - Benedetta Berti and Evelien Borgm**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=367)

Around the globe, there are approximately 60 million people who have been forced to leave their homes to escape war, violence, and persecution. The majority of them have become internally displaced persons, which means they have fled their homes but are still within their own countries. Others have crossed a border and sought shelter outside of their own countries. They are commonly referred to as refugees. But what exactly does that term mean? The world has known refugees for millennia, but the modern definition was drafted in the UN's 1951 Convention relating to the status of refugees in response to mass persecutions and displacements of the Second World War. It defines a refugee as someone who is outside their country of nationality, and is unable to return to their home country because of well-founded fears of being persecuted. That persecution may be due to their race, religion, nationality, membership in a particular social group, or political opinion, and is often related to war and violence. Today, roughly half the world's refugees are children, some of them unaccompanied by an adult, a situation that makes them especially vulnerable to child labor or sexual exploitation. Each refugee's story is different, and many must undergo dangerous journeys with uncertain outcomes. But before we get to what their journeys involve, let's clear one thing up. There's a lot of confusion regarding the difference between the terms "migrant" and "refugee." "Migrants" usually refers to people who leave their country for reasons not related to persecution, such as searching for better economic opportunities or leaving drought-stricken areas in search of better circumstances. There are many people around the world who have been displaced because of natural disasters, food insecurities, and other hardships, but international law, rightly or wrongly, only recognizes those fleeing conflict and violence as refugees. So what happens when someone flees their country? Most refugee journeys are long and perilous with limited access to shelter, water, or food. Since the departure can be sudden and unexpected, belongings might be left behind, and people who are evading conflict often do not have the required documents, like visas, to board airplanes and legally enter other countries. Financial and political factors can also prevent them from traveling by standard routes. This means they can usually only travel by land or sea, and may need to entrust their lives to smugglers to help them cross borders. Whereas some people seek safety with their families, others attempt passage alone and leave their loved ones behind with the hopes of being reunited later. This separation can be traumatic and unbearably long. While more than half the world's refugees are in cities, sometimes the first stop for a person fleeing conflict is a refugee camp, usually run by the United Nations Refugee Agency or local governments. Refugee camps are intended to be temporary structures, offering short-term shelter until inhabitants can safely return home, be integrated to the host country, or resettle in another country. But resettlement and long-term integration options are often limited. So many refugees are left with no choice but to remain in camps for years and sometimes even decades. Once in a new country, the first legal step for a displaced person is to apply for asylum. At this point, they are an asylum seeker and not officially recognized as a refugee until the application has been accepted. While countries by and large agree on one definition of refugee, every host country is responsible for examining all requests for asylum and deciding whether applicants can be granted the status of refugee. Different countries guidelines can vary substantially. Host countries have several duties towards people they have recognized as refugees, like the guarantee of a minimum standard of treatment and non-discrimination. The most basic obligation towards refugees is non-refoulement, a principle preventing a nation from sending an individual to a country where their life and freedom are threatened. In reality, however, refugees are frequently the victims of inconsistent and discriminatory treatment. They're increasingly obliged to rebuild their lives in the face of xenophobia and racism. And all too often, they aren't permitted to enter the work force and are fully dependent on humanitarian aid. In addition, far too many refugee children are out of school due to lack of funding for education programs. If you go back in your own family history, chances are you will discover that at a certain point, your ancestors were forced from their homes, either escaping a war or fleeing discrimination and persecution. It would be good of us to remember their stories when we hear of refugees currently displaced, searching for a new home.

**P367 2016-06-15 What does it mean to be a refugee - Benedetta Berti and Evelien Borgm**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=367)

翻译人员: Jackie Zheng 校对人员: Guo Shenjia全世界约有6千万人被迫离开他们的家园为了躲避战争、暴力和迫害他们中的大多数人都在本国内流离失所也就是说他们虽然逃离了自己的家乡，但仍然在自己的国家里而其他人则跨越了国境，去往别的国家避难这些人通常被称为难民但是难民这个词究竟意味着什么？难民已经存在千年之久1951年的联合国大会根据难民的不同情况对其起草了新的定义以应对第二次世界大战后大量受到迫害和流离失所的人新的定义认为难民是由于害怕受到迫害离开了自己国籍所在地并且再也回不去的那些人迫害可能源自他们的种族、宗教信仰、国籍在特定社会团体的身份或者政治意见并且通常和战争及暴力相关如今，世界上半数的难民是儿童很多都没有成人陪伴因此他们极有可能沦为童工或者是未成年性奴每个难民都有自己的故事很多人都历经了难以想象的艰险，且不知未来如何在尝试了解他们的经历之前必须说明一件事很多人会混淆“移民”和“难民”这两个词“移民”是指那些并非出于迫害而离开自己国家的人如为了寻求更好的经济机遇或者选择离开让自己感觉压抑和受限的环境以寻求更好的境遇世界上有很多人离开自己的家园出于自然灾害缺乏食物保障以及其它的一些困苦但是按照国际法，不论对错与否只承认那些因冲突和暴力流离失所的人为难民那么当一个人逃离自己的国家时会发生什么大多数难民的流亡之路是漫长且艰险的缺乏保障的避难住所、水和食物他们离开时往往十分突然无法随身带够所需的物品而那些急于躲避冲突的人往往来不及带上他们所需的文件如用于登机和进入他国的签证经济状况和政治因素也可能使他们无法通过一般的途径离开自己的国家因此他们通常只能走陆路和水路将自己的性命交付给走私犯以穿越国境有些人带着家人一起寻求安全有些人则只身离去，怀着将来能重聚的憧憬留下所爱的人分离总是十分痛苦且漫长地无法忍受世界上一半的难民会流亡到城市里逃离冲突的难民有时会进入难民营作为他们的第一站这些难民营一般由联合国难民署或者当地政府负责运营并且通常是临时设施为难民提供短期避难所用，直到他们可以安全回国融入难民接收国家或是在另外的国家安身然而在他国安身或是通过较长的时间融入他国的机会十分有限大量的难民没有选择，最终只能年复一年住在难民营里有的甚至住上几十年难民进入新的国家，依照法律首先需要申请避难此时，他们是寻求避难者并非官方认可的难民，直到他们的申请通过尽管大多数国家对于难民的定义都是一致的但每个接收国都需要自己负责审查避难申请并且决定是否给予申请人难民身份不同国家之间的参照标准大相径庭作为接收国对于被他们认可的难民有应尽的义务如最低标准的待遇和无歧视保障对待难民的最基本原则是不遣返防止国家将个人送至他们生命和自由无法得到保证的国土现实中，难民常常沦为缺乏持续保障及备受歧视的受害者他们被迫在种族歧视和排外仇恨中重建他们的生活同时，难民也常常被工作机会拒之门外只能完全依赖人道主义援助不仅如此，大量的难民孩子都没法上学因为缺乏教育类资金援助如果你们回去查找家族历史很有可能会发现你们的祖先曾经被迫离开自己的家乡为了躲避战乱、歧视或者迫害请记住这些故事因为它们能让我们更好地看待那些流离失所、正在寻找新家的难民们

**P368 2016-06-17 What makes something 'Kafkaesque' - Noah Tavlin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=368)

"Someone must have been telling lies about Josef K. He knew he had done nothing wrong, but one morning, he was arrested." Thus begins "The Trial," one of author Franz Kafka's most well-known novels. K, the protagonist, is arrested out of nowhere and made to go through a bewildering process where neither the cause of his arrest, nor the nature of the judicial proceedings are made clear to him. This sort of scenario is considered so characteristic of Kafka's work that scholars came up with a new word for it. Kafkaesque has entered the vernacular to describe unnecessarily complicated and frustrating experiences, like being forced to navigate labyrinths of bureaucracy. But does standing in a long line to fill out confusing paperwork really capture the richness of Kafka's vision? Beyond the word's casual use, what makes something Kafkaesque? Franz Kafka's stories do indeed deal with many mundane and absurd aspects of modern bureaucracy, drawn in part from his experience of working as an insurance clerk in early 20th century Prague. Many of his protagonists are office workers compelled to struggle through a web of obstacles in order to achieve their goals, and often the whole ordeal turns out to be so disorienting and illogical that success becomes pointless in the first place. For example, in the short story, "Poseidon," the Ancient Greek god is an executive so swamped with paperwork that he's never had time to explore his underwater domain. The joke here is that not even a god can handle the amount of paperwork demanded by the modern workplace. But the reason why is telling. He's unwilling to delegate any of the work because he deems everyone else unworthy of the task. Kafka's Poseidon is a prisoner of his own ego. This simple story contains all of the elements that make for a truly Kafkaesque scenario. It's not the absurdity of bureaucracy alone, but the irony of the character's circular reasoning in reaction to it that is emblematic of Kafka's writing. His tragicomic stories act as a form of mythology for the modern industrial age, employing dream logic to explore the relationships between systems of arbitrary power and the individuals caught up in them. Take, for example, Kafka's most famous story, "Metamorphosis." When Gregor Samsa awaken's one morning to find himself transformed into a giant insect, his greatest worry is that he gets to work on time. Of course, this proves impossible. It was not only the authoritarian realm of the workplace that inspired Kafka. Some of his protagonists' struggles come from within. The short story, "A Hunger Artist," describes a circus performer whose act consists of extended fasts. He's upset that the circus master limits these to 40 days, believing this prevents him from achieving greatness in his art. But when his act loses popularity, he is left free to starve himself to death. The twist comes when he lays dying in anonymity, regretfully admitting that his art has always been a fraud. He fasted not through strength of will, but simply because he never found a food he liked. Even in "The Trial," which seems to focus directly on bureaucracy, the vague laws and bewildering procedures point to something far more sinister: the terrible momentum of the legal system proves unstoppable, even by supposedly powerful officials. This is a system that doesn't serve justice, but whose sole function is to perpetuate itself. What political theorist Hannah Arendt, writing years after Kafka's death, would call "tyranny without a tyrant." Yet accompanying the bleakness of Kafka's stories, there's a great deal of humor rooted in the nonsensical logic of the situations described. So on the one hand, it's easy to recognize the Kafkaesque in today's world. We rely on increasingly convoluted systems of administration that have real consequences on every aspect of our lives. And we find our every word judged by people we can't see according to rules we don't know. On the other hand, by fine-tuning our attention to the absurd, Kafka also reflects our shortcomings back at ourselves. In doing so, he reminds us that the world we live in is one we create, and have the power to change for the better.

**P368 2016-06-17 What makes something 'Kafkaesque' - Noah Tavlin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=368)

翻译人员: Steven's coco(可可) 校对人员: Chen Zou“关于约瑟夫·K的事有人说了谎他肯定自己没有做错事， 却在一天早上被捕了“于是“审判”开始了这是弗兰茨 卡夫卡 最著名的一部小说主角 K 被凭空逮捕了并且经历一段 令人困扰的过程不论是他被逮捕的原因还是任何的司法依据都没有对他清楚交待过这种情节被认为 典型的卡夫卡作品于是学者们发明了一个新词卡夫卡式成为不必要的繁琐和令人沮丧的经历的术语比如被迫应对 繁沉的官僚机构但是站在长队里 填写一堆令人困惑的文件真的能抓住卡夫卡视野的 丰富内涵吗？除了对这个词的随意使用外 什么造就了卡夫卡式？弗兰茨 卡夫卡的故事确实描写了许多当代官僚主义的 单调和荒谬部分原因是他曾在 20世纪初的布拉格担任一名保险办事员很多他的主要角色 都是在办公室工作的白领他们不得不通过在 在充满障碍的网络中挣扎来达到他们的目标常常这整个考验 变得迷惘而且不合逻辑致使成功在一开始 就毫无意义比如，在短篇小说 《波塞冬》中古希腊神明变成 埋首于文书工作的主管以至于他没有时间去 探索他的深层主体笑点在于 即使是上帝也无法应对现代职场所要求的文书工作量但是原因很清楚他不愿意将任何一项工作委派给他人因为他确信其他人 不值得这样的工作卡夫卡的波塞冬是 “自负”的囚犯这个简单的故事包含了所有使经典的卡夫卡式状况 形成的要素不是官僚主义本身的荒谬而是角色在对官僚主义反应上的 围绕式推理的讽刺成为了卡夫卡作品的典型他的悲喜剧就像一种 现代工业时代的神话故事运用梦幻的逻辑 去探索关于专制力量和挣扎在其中的个体 之间的系统间的关系举例，卡夫卡 最有名的故事，“变形计”当格里高 萨姆沙有一天早上醒来 发现自己突变成为一个巨大的昆虫他最大的担心的 是如何准时上班当然， 这是不可能的不只是专制的工作环境 启迪了卡夫卡一些他的经典角色的挣扎 来自于内部短篇小说，“一个饥饿的艺术家”描述了一个马戏团表演者的任务是由 延期的禁食组成的他苦恼于马戏团主 把禁食限制为４０天因为他相信这会阻碍他 达成他伟大的表演但当他的表演缺乏人气时他被置之不理 以至于饥饿至死扭曲的地方在于当他在 默默死去的临终前后悔地承认他的艺术 一直是一个骗局他的禁食不是通过意志的力量而仅仅是因为他从没有找到 他喜欢的食物即使是在“审讯”里似乎是直接 专注在官僚主义上模糊的法律和扑朔迷离的程序 指出了更为罪恶的东西：法律系统的恐怖 势不可挡甚至是那些很有权势的官员 都无法阻挡这个系统不是为 正义服务的而是将渗透自己 作为唯一的功能政治理论家汉娜·阿伦特在卡夫卡死去后一直书写的叫做“没有暴君的暴政“然而，在伴随着 卡夫卡故事的荒凉里有不少的幽默扎根在那些描述的事件 里的荒谬逻辑中所以，一方面很容易识别在 当今世界中的“卡夫卡式”我们依靠越来越扭曲和困惑的 管理系统这个管理系统在我们生活的各个方面 已经有了真实的效应我们发现我们的每一个单词 都在被我们看不到的人下判断根据我们不知道的规则另一方面,通过修饰我们 对荒谬的注意力卡夫卡也反省了 我们自己身上的缺点通过做这些，他提醒我们，这个我们居住的 世界是一个我们创造的因此我们有力量使它 变得更美好

**P369 2016-06-20 Is there a disease that makes us love cats - Jaap de Roode**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=369)

Is there a disease that makes us love cats, and do you have it? Maybe, and it's more likely than you'd think. We're talking about toxoplasmosis, a disease caused by toxoplasma gondii. Like all parasites, toxoplasma lives at the expense of its host, and needs its host to produce offspring. To do that, toxo orchestrates a brain manipulation scheme involving cats, their rodent prey, and virtually all other birds and mammals, including humans. Documented human infections go as far back as ancient Egypt. We found samples in mummies. Today, about a third of the world's population is infected, and most of them never even know it. In healthy people, symptoms often don't show up at all. When they do, they're mild and flu-like. But those are just the physical symptoms. Toxoplasma also nestles into our brains and meddles with our behavior behind the scenes. To understand why, let's take a look at the parasite's life cycle. While the parasite can multiply in practically any host, it can only reproduce sexually in the intestines of cats. The offspring, called oocysts, are shed in the cat's feces. A single cat can shed up to a hundred million oocysts. If another animal, like a mouse, accidentally ingests them, they'll invade the mouse's tissues and mature to form tissue cysts. If the mouse gets eaten by a cat, the tissue cysts become active and release offspring that mate to form new oocysts, completing the cycle. But there's a problem. A mouse's natural desire to avoid a cat makes it tough to close this loop. Toxoplasma has a solution for that. The parasites invade white blood cells to hitch a ride to the brain where they seem to override the innate fear of predators. Infected rodents are more reckless and have slower reaction times. Strangest of all, they're actually attracted to feline urine, which probably makes them more likely to cross paths with a cat and help the parasite complete its life cycle. How does the parasite pull this off? Although the exact mechanism isn't known, toxo appears to increase dopamine, a brain neurotransmitter that is involved in novelty-seeking behavior. Thus, one idea is that toxo tinkers with neurotransmitters, the chemical signals that modulate emotions. The result? Fatal attraction. But mice aren't the only animals that end up with these parasites, and that's where humans, and all of toxo's other hosts, come in. We can accidentally ingest oocysts in contaminated water, or unwashed produce, or from playing in sandboxes, or cleaning out litter boxes. This is behind the common recommendation that pregnant women not change cat litter. Toxo can cause serious birth defects. We can also get toxo from eating undercooked meat from other animals that picked up some oocysts. And it turns out that toxo can mess with our brains, too. Studies have found connections between toxo and schizophrenia, biopolar disorder, obsessive compulsive disorder, and aggression. It also slows reactions and decreases concentration, which may be why one study found that people involved in traffic accidents were almost three times more likely to have toxoplasma. So is toxo manipulating our brains as an evolutionary strategy to get predatory cats to eat us? Or are our brains just similar enough to a rodent's that the same neurological tricks that lure them in catch us in the net, too? And is toxo the reason so many people love cats and keep them as pets? Well, the jury's still out on that one. Some recent studies even contradict the idea. Regardless, toxoplasma has definitely benefited from humans to become one of the world's most successful parasites. It's not just our willingness to let cats on our dining room tables or in our beds. Raising livestock and building cities which attract rodents has provided billions of new hosts, and you and your cat may be two of them.

**P369 2016-06-20 Is there a disease that makes us love cats - Jaap de Roode**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=369)

翻译人员: Diana Li 校对人员: 晓铮 张我们对猫的着迷是不是一种疾病？你是不是患者之一？或许，而且比你想象的可能性要大。我们讨论的是弓形体病，一种由刚地弓形虫引起的疾病。像其他寄生虫一样，刚地弓形虫的生长以牺牲寄主为代价，同时需要借助寄主繁衍生息。为了达到这样的目的，刚地弓形虫精心策划了一种大脑控制策略，包括猫、它们的啮齿目猎物，几乎是全部的鸟类和哺乳动物，以及人类。有史料记载的人类对猫的喜爱最远可以追溯到古代埃及，我们在木乃伊中找到了样本。现在，大约世界上三分之一的人口感染有这种寄生虫，而且大多数人对此毫不知情。在健康人中间，症状一般难以察觉，展示出来也很温和，与流感类似。但这些只是物理症状。刚地弓形虫还会在我们的大脑中安家落户，并且会在背地里干涉我们的一举一动。要想知道为何会这样，我们要看一下寄生虫的生命周期。虽然寄生虫可以在几乎任何寄主体内繁殖，它们只能够在猫的肠内进行有性繁殖，产生名为卵囊的后代分散在猫砂中。仅仅一只猫就可以产生多达一亿个卵囊。如果被另外一个动物，比如老鼠，意外吞食，它们就会入侵老鼠的组织，发展成熟为组织囊肿。如果这只老鼠被猫捕食，组织囊肿就会活跃起来，并且产生可以交配繁殖新的卵囊的后代，完成整个周期。但是其中有一个问题，老鼠怕猫的天性使得完成这个周期变得困难。刚地弓形虫对此早有对策。寄生虫入侵白细胞到达大脑，在那里它们推翻了老鼠与生俱来的恐惧。被感染的啮齿动物更加鲁莽且反应减慢。最奇怪的是，它们实际上被猫尿吸引，因此增大了遇到猫类的几率，更有可能帮助寄生虫完成它们的生命周期。刚地弓形虫是怎样达成目的呢？虽然途径还不明确，但是这些寄生虫增加了多巴胺，一种参与形成由好奇带来的行为的神经传递素。因此，一种看法是刚地弓形虫影响了神经传递素，也就是影响情感的化学信号，带来的影响就是致命的吸引。但是鼠类并不是唯一感染这种寄生虫的动物，还有人类等其他的寄主。我们可能会无意中吞食卵囊通过污染的水、没有清洗的农产品、在沙坑中玩耍、或者是清理猫砂盆。这也是为什么一般不建议怀孕中的女性打扫猫粪便，因为刚地弓形虫可能带来严重的出生缺陷。我们同样可能通过食用没有做熟的、且含有卵囊的动物的肉类得病。事实证明，刚地弓形虫同样可以干涉我们的行为。研究发现，刚地弓形虫和精神分裂症、双向型障碍、强迫症和脾气暴躁之间有紧密联系，这种寄生虫还使我们反应速度降低并且注意力不集中，这可能或许可以解释为什么一项研究发现感染寄生虫的人有三倍的可能涉及到交通事故中。这么说来，刚地弓形虫对我们大脑的操控是一种进化策略吗？是为了让食肉的猫类吃掉我们吗？还是说仅仅因为我们的大脑与啮齿目动物有共同之处，因此吸引它们的神经学把戏对我们也有效果？刚地弓形虫能否可以解释为什么那么多人喜欢猫并把它们当作宠物吗？这些问题仍然是众说纷纭，莫衷一是。最近的一些研究甚至与这一结论矛盾。不管怎么说，人类在使刚地弓形虫成为世界上最成功的寄生虫这个事实上功不可没不仅仅在于我们乐意让猫呆在餐桌上或者床上，饲养牲畜和建造城市吸引了难以计量的啮齿目动物，提供了几十亿寄主，你和你的猫或许就是其中两个。

**P370 2016-06-23 Can you solve the prisoner boxes riddle - Yossi Elran**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=370)

Your favorite band is great at playing music, but not so great at being organized. They keep misplacing their instruments on tour, and it's driving their manager mad. On the day of the big concert, the band wakes up to find themselves tied up in a windowless, soundproof practice room. Their manager explains what's happening. Outside, there are ten large boxes. Each contains one of your instruments, but don't be fooled by the pictures - they've been randomly placed. I'm going to let you out one at a time. While you're outside, you can look inside any five boxes before security takes you back to the tour bus. You can't touch the instruments or in any way communicate what you find to the others. No marking the boxes, shouting, nothing. If each one of you can find your own instrument, then you can play tonight. Otherwise, the label is dropping you. You have three minutes to think about it before we start. The band is in despair. After all, each musician only has a 50% chance of finding their instrument by picking five random boxes. And the chances that all ten will succeed are even lower - just 1 in 1024. But suddenly, the drummer comes up with a valid strategy that has a better than 35% chance of working. Can you figure out what it was? Pause the video on the next screen if you want to figure it out for yourself! Answer in: 3 Answer in: 2 Answer in: 1 Here's what the drummer said: Everyone first open the box with the picture of your instrument. If your instrument is inside, you're done. Otherwise, look at whatever's in there, and then open the box with that picture on it. Keep going that way until you find your instrument. The bandmates are skeptical, but amazingly enough, they all find what they need. And a few hours later, they're playing to thousands of adoring fans. So why did the drummer's strategy work? Each musician follows a linked sequence that starts with the box whose outside matches their instrument and ends with the box actually containing it. Note that if they kept going, that would lead them back to the start, so this is a loop. For example, if the boxes are arranged like so, the singer would open the first box to find the drums, go to the eighth box to find the bass, and find her microphone in the third box, which would point back to the first. This works much better than random guessing because by starting with the box with the picture of their instrument, each musician restricts their search to the loop that contains their instrument, and there are decent odds, about 35%, that all of the loops will be of length five or less. How do we calculate those odds? For the sake of simplicity, we'll demonstrate with a simplified case, four instruments and no more than two guesses allowed for each musician. Let's start by finding the odds of failure, the chance that someone will need to open three or four boxes before they find their instrument. There are six distinct four-box loops. One fun way to count them is to make a square, put an instrument at each corner, and draw the diagonals. See how many unique loops you can find, and keep in mind that these two are considered the same, they just start at different points. These two, however, are different. We can visualize the eight distinct three-box loops using triangles. You'll find four possible triangles depending on which instrument you leave out, and two distinct paths on each. So of the 24 possible combinations of boxes, there are 14 that lead to faliure, and ten that result in success. That computational strategy works for any even number of musicians, but if you want a shortcut, it generalizes to a handy equation. Plug in ten musicians, and we get odds of about 35%. What if there were 1,000 musicians? 1,000,000? As n increases, the odds approach about 30%. Not a guarantee, but with a bit of musician's luck, it's far from hopeless. Hi everybody, if you liked this riddle, try solving these two.

**P370 2016-06-23 Can you solve the prisoner boxes riddle - Yossi Elran**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=370)

翻译人员: Chen Zou 校对人员: Xu Junqing你最喜欢的乐队很擅长玩音乐，但是在组织整理方面 不那么尽人意。他们在巡回演出时 不断出现放错乐器的情况，这使他们的经理很恼火。在一个音乐会的当天，乐队成员醒来发现： 他们被绑在了一个没有窗户 隔音的练习室，经理向他们解释了现状：在外面，有十个大箱子。每一个箱子里有一个你们的乐器，但是不要被箱子外面的图片所迷惑， 这些乐器是随意摆放在箱子里的。我将要每次让你们出去一个，当你们在外面的时候 可以打开看任意的五个箱子，然后保安会将 你们带回巡回演出大巴。你们不可以触摸乐器，或者以任何形式和其他成员沟通 箱子里的内容，禁止在箱子上作记号，大声喧哗，禁止任何行动。如果你们每一个人 都可以找到你们自己的乐器，那么你们今晚就可以演出，否则，你们将被禁止出产唱片。在我们开始之前 你们有3分钟思考时间。这个乐队很绝望。毕竟，每一个音乐家只有百分之五十 的机会通过随意挑出五个箱子 找到他们的乐器。而且他们十个全部成功的 几率更低——仅有1024分之1。但是突然间，鼓手想出了一个 有效的策略，这个策略有超过百分之35 有效的几率，你能想出是什么吗？如果你能自己想出 请暂停下一个屏幕的录像。答案即将揭晓：3答案即将揭晓：2答案即将揭晓：1以下是鼓手的主意：每个人首先打开标 有你们使用的乐器的盒子，如果你的乐器是在这个盒子里面 那么你们就完成任务了，否则，看看盒子里是什么乐器。然后打开有那个乐器 图标的盒子。照这样一直进行下去 直到你找到你的乐器。乐队成员对此起先是一阵质疑，但是使人惊讶的是 他们都顺利找到了各自的乐器。几个小时后，他们在成百上千 惹人喜爱的乐迷面前演出。那么，为什么鼓手的策略有效？试想，每个音乐家处在一条直线的程序上。程序开始于盒子外面的标签 和他们使用的乐器相符结束于找到那个真正装有他们乐器的盒子注意，如果他们一直这样做下去的话 那将导致他们回到起点，所以，这是一个回路。比如，假如盒子被 这样安排，歌手会打开第一个盒子 发现鼓乐器在里面，然后走到第八个盒子发现贝斯在里面，然后在第三个盒子里 找到她的麦克风，这将会导致他回到第一个盒子。这个方案比随意猜测 来的有效得多。因为通过开始于标有属于他们 乐器的盒子，每一个音乐家将他们的寻找范围 限制在含有他们乐器的回路中，那么这将大大提高找到乐器的几率。大约有35%的几率使得此回路 保持在5个回合以内。那么这个概率又是如何计算得到的呢？为了使事情简单化 我们将用一个简单的例子来解释：对于每个音乐家来说 有4个乐器和不超过2次的猜测几率。让我们从找到失败的机率开始，也就是在找到他们的乐器之前 他们将会需要打开3个或者4个盒子的机会。这里有6个明显的每4个盒子一组的回路，通过一个有趣的方法去数它们 是将它们摆成方形，在每一个角落里摆上一个乐器，然后画对角线，看你可以找到多少个特殊的回路，而且记住这两个 被认为是一样的，它们仅仅是在不同的点开始，然而，这两个，是不同的。我们可以用三角形来 使8个明显的由3个盒子组成的回路明显化，你将会找到4个可能的三角形，根据哪个乐器你不包括在里面，2个明显的道路在每一个回路上。所以，在有24种 盒子组成的可能性中14种是会失败的，10种是会成功的，这个计算策略对任何 偶数个音乐家都有效。但是如果你想要一个捷径，它会导致出一个很方便的等式如果我们将10放到这个等式中 我们得到的几率是35%，如果我们有1000个音乐家呢？1百万个呢？随着个数的增加 机率接近到大约30%。这并不能绝对的保证成功，但是如果 音乐家运气还算不错的话，还是很有希望的。大家注意了，如果你喜欢这个谜语 尝试解决这两个。

**P371 2016-06-23 How North America got its shape - Peter J. Haproff**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=371)

The geography of our planet is in flux. Each continent has ricocheted around the globe on one or more tectonic plates, changing quite dramatically with time. Today, we'll focus on North America and how its familiar landscape and features emerged over hundreds of millions of years. Our story begins about 750 million years ago. As the super continent Rodinia becomes unstable, it rifts along what's now the west coast of North America to create the Panthalassa Ocean. You're seeing an ancestral continent called Laurentia, which grows over the next few hundred million years as island chains collide with it and add land mass. We're now at 400 million years ago. Off today's east coast, the massive African plate inches westward, closing the ancient Iapetus Ocean. It finally collides with Laurentia at 250 million years to form another supercontinent Pangea. The immense pressure causes faulting and folding, stacking up rock to form the Appalachian Mountains. Let's fast forward a bit. About 100 million years later, Pangea breaks apart, opening the Southern Atlantic Ocean between the new North American Plate and the African Plate. We forge ahead, and now the eastward-moving Farallon Plate converges with the present-day west coast. The Farallon Plate's greater density makes it sink beneath North America. This is called subduction, and it diffuses water into the magma-filled mantle. That lowers the magma's melting point and makes it rise into the overlying North American plate. From a subterranean chamber, the magma travels upwards and erupts along a chain of volcanos. Magma still deep underground slowly cools, crystallizing to form solid rock, including the granite now found in Yosemite National Park and the Sierra Nevada Mountains. We'll come back to that later. Now, it's 85 million years ago. The Farallon Plate becomes less steep, causing volcanism to stretch eastward and eventually cease. As the Farallon Plate subducts, it compresses North America, thrusting up mountain ranges like the Rockies, which extend over 3,000 miles. Soon after, the Eurasian Plate rifts from North America, opening the North Atlantic Ocean. We'll fast forward again. The Colorado Plateau now uplifts, likely due to a combination of upward mantle flow and a thickened North American Plate. In future millennia, the Colorado River will eventually sculpt the plateau into the epic Grand Canyon. 30 million years ago, the majority of the Farallon Plate sinks into the mantle, leaving behind only small corners still subducting. The Pacific and North American plates converge and a new boundary called the San Andreas Fault forms. Here, North America moves to the south, sliding against the Pacific Plate, which shifts to the north. This plate boundary still exists today, and moves about 30 millimeters per year capable of causing devastating earthquakes. The San Andreas also pulls apart western North America across a wide rift zone. This extensional region is called the Basin and Range Province, and through uplift and erosion, is responsible for exposing the once deep granite of Yosemite and the Sierra Nevada. Another 15 million years off the clock, and magma from the mantle burns a giant hole into western North America, periodically erupting onto the surface. Today, this hotspot feeds an active supervolcano beneath Yellowstone National Park. It hasn't erupted in the last 174,000 years, but if it did, its sheer force could blanket most of the continent with ash that would blacken the skies and threaten humanity. The Yellowstone supervolcano is just one reminder that the Earth continues to seethe below our feet. Its mobile plates put the planet in a state of constant flux. In another few hundred million years, who knows how the landscape of North America will have changed. As the continent slowly morphs into something unfamiliar, only geological time will tell.

**P371 2016-06-23 How North America got its shape - Peter J. Haproff**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=371)

翻译人员: Marini Qian 校对人员: Gabriella Hu地球的地理在变动。每一个大洲在地球上的不同板块上移动，随着时间有很大的变化。今天，我们来讲讲北美州现在的风景是如何通过亿万年形成的。我们的故事开始在7.5亿年之前。超级大陆罗迪尼亚变得越来越不稳定，它沿着北美的西海岸裂缝，形成了泛大洋海洋。这是劳伦大陆。岛链与它碰撞，在接下来的几亿年里一直增加它的面积。4亿年前，在今天北美的东岸，非洲板块向西移动，把古老的巨神海关起来了。2.5亿年前，它终于与劳伦碰撞，形成了另一个超级大陆，盘古。巨大的压力导致断层和折叠，让石头形成了阿巴拉契亚山脉。让我们跳到一亿年前。盘古裂开时在新的北美盘和非洲盘之间开通了南大西洋。再往前，向东移动的法拉龙板块与今天的西海岸融合。法拉龙板块更稠密，并且沉到北美底下。这叫俯冲。俯冲把水扩散到充满岩浆的地幔，降低了岩浆的熔点，导致板块升到顶上的北美板块。岩浆从一个地下室往上移动，从一串火山中爆发。还在地下的岩浆慢慢冷却，结晶成岩石，比如说优胜美地和内华达山脉的花岗岩。我们等会儿再来谈这个。8500万年前，法拉龙板块变得没有那么陡，导致火山向东伸展，逐渐停下来。法拉龙板块在俯冲的同时在压缩北美造成山脉，比如落基山脉，延伸大于3000英里。不久之后，欧亚板块跟北美裂开了，打开北大西洋。我们再往后看。科罗拉多高原隆起，多半是由于向上的地幔流与更厚的北美板块。在未来的一千年中，科罗拉多河会将高原塑造成大峡谷。3千万年前，大部分法拉龙板块沉进地幔，只剩下小角落在俯冲。太平洋板块与北美板块汇集，形成新的边界，圣安德烈亚斯断层。在这里，北美州向南移动，滑在太平洋板块旁边。太平洋板块向北移动。这个板块边界今天仍然存在，每年移动30毫米，能够引起强烈的地震。圣安地列斯也在很宽的裂谷带拉开北美州。这种外延区域叫做盆地和山脉省。通过隆起和侵蚀，暴漏了以前埋在优胜美地和内华达深处的花岗岩。1500万年后，地幔的岩浆在西边的北美州烧一个大洞，定期喷发到表面。现在，这个热点养着一个超级活火山，就在黄石公园地下。它174,000年都没有爆发了，但是如果它真爆发了，它的力量可以把大部分北美州覆盖在灰尘里，把天色变黑，并且对人类有很大的危险。黄石的超级火山是在提醒我们地球在我们脚底下一直在沸腾。地球的板块导致它不断变化。数亿年后，谁也不知道北美州的景观会有什么变化。只有时间可以透露以后的北美州会什么样。

**P372 2016-06-23 What is obesity - Mia Nacamulli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=372)

The most basic function of bodily fat is self-storage of food reserves. In prehistoric times, natural selection favored genotypes that could endure harsh conditions by stocking the most fat. With chronic malnutrition being the norm for most of human history, genetics evolved to favor fat storage. So when did body fat become problematic? The negative impacts of being overweight were not even noted in medical literature until as late as the 18th century. Then, technological advances coupled with public health measures resulted in the betterment of the quantity, quality, and variety of food. Sustained abundance of good food enabled a healthier population to boom economically. Output increased, and with it, leisure time and waistlines. By the mid 19th century, being excessively overweight, or obese, was recognized as a cause of ill health, and another century later, declared deadly. What is the distinction between being overweight and being obese? A calculation called the BMI breaks it down for us. For example, if someone weighs 65 kilgorams and is 1.5 meters tall, they have a BMI of about 29. Obesity is a condition of excess body fat that occurs when a person's BMI is above 30, just over the overweight range of 25 to 29.9. While BMI can be a helpful estimate of healthy weight, actual body fat percentage can only really be determined by also considering information like waist circumference and muscle mass. Athletes, for instance, have a naturally higher BMI. So how does a person become obese? At its most basic, obesity is caused by energy imbalance. If the energy input from calories is greater than the energy output from physical activity, the body stores the extra calories as fat. In most cases, this imbalance comes from a combination of circumstances and choices. Adults should be getting at least 2.5 hours of exercise each week, and children a whole hour per day. But globally, one in four adults and eight out of ten adolescents aren't active enough. Calorie-dense processed foods and growing portion sizes coupled with pervasive marketing lead to passive overeating. And scarce resources, and a lack of access to healthy, affordable foods creates an even greater risk in disadvantaged communities. Yet, our genetic makeup also plays a part. Studies on families and on separated twins have shown a clear causal hereditary relationship to weight gain. Recent studies have also found a link between obesity and variations in the bacteria species that live in our digestive systems. No matter the cause, obesity is an escalating global epidemic. It substantially raises the probability of diseases, like diabetes, heart disease, stroke, high blood pressure, and cancer. It affects virtually all ages, genders, and socioeconomic groups in both developed and developing countries. With a 60% rise in child obesity globally over just two decades, the problem is too significant to ignore. Once a person is obese, the climb to recovery becomes progressively steeper. Hormonal and metabolic changes reduce the body's response to overeating. After losing weight, a formerly overweight person burns less calories doing the same exercises as a person who is naturally the same weight, making it much more difficult to shed the excess fat. And as people gain weight, damage to signaling pathways makes it increasingly difficult for the brain to measure food intake and fat storage. There is, however, some evidence that well-monitored, long-term changes in behavior can lead to improvements in obesity-related health issues. And weight loss from sustained lifestyle changes, or invasive treatments like bariatric surgery, can improve insulin resistance and decrease inflammation. What was once an advantage for survival is now working against us. As the world's population continues to slow down and get bigger, moving and consciously eating our way towards a healthier weight is essential to our overall well-being. And with the epidemic affecting every country in the world for different socioeconomic reasons, obesity cannot be seen as an isolated issue. More global measures for prevention are essential to manage the weight of the world.

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翻译人员: 晓铮 张 校对人员: Ke Ding食物储备的自我存储是脂肪最基本的功能。在史前时期，以保存大量的脂肪 来忍耐恶劣坏境的基因型在自然选择中胜出。同时，因为慢性的营养不良普遍 存在于大多数的人类历史中，遗传基因朝着脂肪存储方向进化。那么，身体脂肪什么时候开始成为了问题？超重的消极影响直到18世纪才在医学记载中出现。接着，科技进步与公共健康措施一起提升了食物的产量、质量和丰富性。大量优质食物的持续供给使更健康的人口经济地增长。随着产量的增加，人们的业余时间和腰围也随之增加。到19世纪中期，极度超重或肥胖被认为是不健康的，而一个世纪以后，肥胖则被宣告是致命的。超重和肥胖之间的区别是什么？BMI公式为我们解释了这个问题。举例来说，如果一个人体重65千克身高1.5米，其BMI值大约是29。肥胖意味着身体脂肪超标，即BMI超过30；BMI在25-29.9之间则是刚刚超重。虽然BMI对估算健康的体重有一定帮助，但身体实际的脂肪百分比只能由腰围和肌肉群等信息决定。就像运动员天生就拥有较高的BMI。那么，一个人如何肥胖起来的？从根本上来说，肥胖是由能量的不均衡导致的。如果来自卡路里的能量输入高于物理运动所输出的能量，身体存储的多余卡路里就成了脂肪。大多数情况下，这种不平衡来自环境和选择的结合。成年人每个星期至少要拥有2.5小时的运动量，而儿童每天应有1个小时的运动时间。但是全世界有四分之一的成年人和五分之四的青少年并不积极运动。高热量的加工食品、不断增加的食物分量和多样的食物市场共同导致了消极的过度饮食。而在贫困的社区，食物资源和得到健康又不太昂贵的食物的途径有限大大提升了出现问题的风险。还有，我们基因组成也有一定作用。对家庭和分开双胞胎的研究已经发现了基因遗传和体重增长的关系。最近的研究也找到了肥胖和我们消化系统中细菌种类变化的联系。无论何种原因，肥胖是一种逐步升级的全球性流行病。它更极大地提高了患上其他疾病的可能性，如糖尿病、心脏病、中风高血压和癌症。它无形中影响了所有年龄，性别和社会阶层的人群，无论是在发达国家还是发展中国家。在刚过去的二十年中，全球儿童的肥胖率提高了60%，肥胖问题已经足够严重且难以忽视。一旦肥胖起来，想要恢复就会非常的艰难。荷尔蒙的和新陈代谢的变化减少了身体对过度饮食的反应。在减去体重以后，一个原先肥胖的人，与原来就同样体重的人做同样的运动，会燃烧更少的脂肪，这也就使减去多余的脂肪变得更加困难。当人们体重增加时，大脑信号通路受到的伤害让大脑对食物摄入的测量和脂肪存储的判断难度上升。但是，一些证据显示行为上良好的控制和长期的改变能够帮助解决与肥胖相关的健康问题。而且坚持减肥的生活方式或者如减重手术之类的治疗能够提高胰岛素抵抗力，并减少炎症的发生。一个曾经的生存优势正在与我们对抗。随着世界的人口缓慢增长，拥有健康的体重，对于人类的幸福而言非常重要，却也更加困难。这种流行病正影响着全世界的每个国家。出于不同的社会经济原因，肥胖不应该被当成一个孤立的问题。更多全球性的保护措施对于管理世界人民的体重十分关键。

**P373 2016-06-24 How playing sports benefits your body ... and your brain - Leah Lagos**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=373)

The victory of the underdog over the favored team. The last minute penalty shot that wins the tournament. The high-energy training montages. Many people love to glorify victory on the playing field, cheer for favorite teams, and play sports. But here's a question: Should we be so obsessed with sports? Is playing sports actually as good for us as we make it out to be, or just a fun and entertaining pastime? What does science have to say? First of all, it's well accepted that exercise is good for our bodies and minds, and that's definitely true. Exercising, especially when we're young, has all sorts of health benefits, like strengthening our bones, clearing out bad cholesterol from our arteries, and decreasing the risk of stroke, high blood pressure, and diabetes. Our brains also release a number of chemicals when we workout, including endorphins. These natural hormones, which control pain and pleasure responses in the cental nervous system, can lead to feelings of euphoria, or, what's often called, a runner's high. Increased endorphins and consistent physical activity in general can sharpen your focus and improve your mood and memory. So does that mean we get just as much benefit going to the gym five days a week as we would joining a team and competing? Well, here's where it gets interesting: because it turns out that if you can find a sport and a team you like, studies show that there are all sorts of benefits that go beyond the physical and mental benefits of exercise alone. Some of the most significant are psychological benefits, both in the short and long term. Some of those come from the communal experience of being on a team, for instance, learning to trust and depend on others, to accept help, to give help, and to work together towards a common goal. In addition, commitment to a team and doing something fun can also make it easier to establish a regular habit of exercise. School sport participation has also been shown to reduce the risk of suffering from depression for up to four years. Meanwhile, your self-esteem and confidence can get a big boost. There are a few reasons for that. One is found in training. Just by working and working at skills, especially with a good coach, you reinforce a growth mindset within yourself. That's when you say, "Even if I can't do something today, I can improve myself through practice and achieve it eventually." That mindset is useful in all walks of life. And then there's learning through failure, one of the most transformative, long-term benefits of playing sports. The experience of coming to terms with defeat can build the resilience and self-awareness necessary to manage academic, social, and physical hurdles. So even if your team isn't winning all the time, or at all, there's a real benefit to your experience. Now, not everyone will enjoy every sport. Perhaps one team is too competitive, or not competitive enough. It can also take time to find a sport that plays to your strengths. That's completely okay. But if you spend some time looking, you'll be able to find a sport that fits your individual needs, and if you do, there are so many benefits. You'll be a part of a supportive community, you'll be building your confidence, you'll be exercising your body, and you'll be nurturing your mind, not to mention having fun.

**P373 2016-06-24 How playing sports benefits your body ... and your brain - Leah Lagos**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=373)

翻译人员: Mingying Wang 校对人员: Jenny Yang不被看好的黑马战胜了热门球队比赛最后一分钟的点球 让球队最终夺冠激情洋溢的训练视频剪辑人人都愿意 为比赛的胜利而狂欢，为喜爱的球队呐喊助威，也积极参加各项体育运动。但问题是， 我们有必要对运动如此着迷吗？参加体育 真有我们想象中的好处吗？还就是一个好玩的休闲娱乐？另外，科学对此有什么研究？首先，科学家普遍认可运动 对人们的身心健康有益这是毫无疑问的体育对健康有各种好处， 尤其是年轻的时候它可以让我们的骨头更结实清除我们动脉血管中不好的胆固醇降低患中风、高血压的糖尿病的风险当我们运动的时候 大脑也会释放出很多化学物质比如内啡肽这些天然的激素主管我们中枢神经的疼痛和兴奋反应,也引起我们运动后的愉悦感。内啡肽的增加和持续的体育运动可以使注意力更加集中， 情绪和记忆力也会变好这是不是意味着我们 一周去五次健身房和加入一个团队并参加比赛 所得到的好处是一样的呢？这是一个有趣的问题事实上，如果你能找到一项你热衷的运动 并加入一个你喜欢的团队研究表明 那么你将收获的益处远远超过独自锻炼所得到的 身体与精神上的收获尤其是心理层面的收获无论是短期还是长期的一部分的益处来源于 加入一个团队时所获得的集体归属感比如说，学着去相信队友、依靠队友学着接受别人的帮助学着去帮助别人一起为着相同的目标而努力除此之外 融入一个团队并做一些有趣的事情也可以促使日常运动习惯的形成学校体育社团的成员在四年之内患抑郁症的风险也大大降低同时，你的自尊心和自信心也会增强原因在于第一，在训练之中你通过不断的练习提高技巧在一个好教练的帮助下你就会形成这样一种观念你告诉自己：“哪怕 现在还无法达到目标，我也会坚持练习，并最终实现 我的目标。”这是能让你受益终生的心态第二，是从失败中学习这是体育运动所带来的 最有影响、最长久的益处之一走过失败时期的经历 能提高你的恢复能力以及自知之明 这对于面对学习上、社交上、以及身体方面的困难都大有裨益所以尽管你所在的球队并不能次次取胜 甚至是屡屡失败这些经历对于你而言都是有益的并不是每个人对每一项运动都有兴趣一支队伍里可能竞争太激烈或者竞争不够激烈找到一项自己喜欢的运动 也需要花费时间这没有关系如果你花时间去找你就能发现适合你的运动如果你找到了，那么你将获益无穷你会成为一个团结的队伍中的一员你会收获自信你能锻炼身体你还能完善自己的精神世界更不用说你还会收获快乐

**P374 2016-07-13 How coffee got quicker \_ Moments of Vision 2 - Jessica Oreck**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=374)

In a Moment of Vision... It's 1849. William H. Bovee leaves his job at a coffee producer in New York City to seek his fortune in gold-fevered California. But leaving behind the luxuries of the city, Bovee leaves behind a more expedient cup of joe. Out west, folks are still buying their coffee beans green, roasting the beans at home, then grinding them with a hand crank, all before actually brewing them. Bovee builds California's first coffee mill, packaging and selling pre-roasted beans. And in a moment of vision, he takes the process one step farther making his mill the world's first to grind the already roasted beans on a large scale, then pack them conveniently into small, consumer-friendly tins. Only a few years later, however, Bovee tires of the coffee business and sells his shares of the company to a young employee: James Folger. Folger changes the name and grows the company to a nationwide brand, jumpstarting a race to find the quickest, easiest way to that morning caffeine fix. For the 64% of Americans that drink coffee daily, an expedient cup is practically essential.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=374)

翻译人员: Xiangyi Chen 校对人员: jiahai tang试想一个时刻...现在是1849年。威廉 H 博维离开了他于 纽约市一个咖啡生产商中的工作前往时下正流行淘金热的 加利福利亚去寻求他的财富。可是舍弃了纽约 这座城市的富足，博维同时也舍弃了 一杯更方便的咖啡。在西部，当地人们 仍旧购买着绿咖啡豆，在家里自己烤豆，然后用手动曲柄 把烤好的咖啡豆磨碎，完成了这些步骤之后 才真正开始冲泡咖啡。博维制造了加利福利亚的 第一个咖啡研磨机包装并售卖未经烘焙的咖啡豆。并且试想一个时刻， 他使整个过程更进了一步使他的研磨机成为世上 第一部研磨烘焙咖啡豆的研磨机大规模地，然后十分方便地把它们包装进 小的便于消费者使用的罐子里。然而在仅仅的几年时间里， 博维厌倦了他的咖啡生意并把他持有的公司股份 卖给了一个年轻员工—詹姆斯 福尔杰。福尔杰改变了公司的名字并 把公司发展成了全国著名的品牌，引起了一场关于寻求获得早晨 咖啡因的最便捷途径的竞赛。对于64%的每天都喝 咖啡的的美国人来说，一杯方便的咖啡 几乎是必不可少的。

**P375 2016-07-13 Why the metric system matters - Matt Anticole**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=375)

What does the French Revolution have to do with the time NASA accidentally crashed a $200 million orbiter into the surface of Mars? Actually, everything. That crash happened due to an error in converting between two measurement systems, U.S. customary units and their S.I, or metric, equivalence. So what's the connection to the French Revolution? Let's explain. For the majority of recorded human history, units like the weight of a grain or the length of a hand weren't exact and varied from place to place. And different regions didn't just use varying measurements. They had completely different number systems as well. By the late Middle Ages, the Hindu-Arabic decimal system mostly replaced Roman numerals and fractions in Europe, but efforts by scholars like John Wilkins to promote standard decimal-based measures were less successful. With a quarter million different units in France alone, any widespread change would require massive disruption. And in 1789, that disruption came. The leaders of the French Revolution didn't just overthrow the monarchy. They sought to completely transform society according to the rational principles of the Enlightenment. When the new government took power, the Academy of Sciences convened to reform the system of measurements. Old standards based on arbitrary authority or local traditions were replaced with mathematical and natural relationships. For example, the meter, from the Greek word for measure, was defined as 1/10,000,000 between the Equator and North Pole. And the new metric system was, in the words of the Marquis de Condorcet, "For all people, for all time." Standardizing measurements had political advantages for the Revolutionaries as well. Nobles could no longer manipulate local units to extract more rent from commoners, while the government could collect taxes more efficiently. And switching to a new Republican Calendar with ten-day weeks reduced church power by eliminating Sundays. Adoption of this new system wasn't easy. In fact, it was a bit of a mess. At first, people used new units alongside old ones, and the Republican Calendar was eventually abandoned. When Napoléon Bonaparte took power, he allowed small businesses to use traditional measurements redefined in metric terms. But the metric system remained standard for formal use, and it spread across the continent, along with France's borders. While Napoléon's empire lasted eight years, its legacy endured far longer. Some European countries reverted to old measurements upon independence. Others realized the value of standardization in an age of international trade. After Portugal and the Netherlands switched to metric voluntarily, other nations followed, with colonial empires spreading the system around the world. As France's main rival, Britain had resisted revolutionary ideas and retained its traditional units. But over the next two centuries, the British Empire slowly transitioned, first approving the metric system as an optional alternative before gradually making it offical. However, this switch came too late for thirteen former colonies that had already gained independence. The United States of America stuck with the English units of its colonial past and today remains one of only three countries which haven't fully embraced the metric system. Despite constant initiatives for metrication, many Americans consider units like feet and pounds more intuitive. And ironically, some regard the once revolutionary metric system as a symbol of global conformity. Nevertheless, the metric system is almost universally used in science and medicine, and it continues to evolve according to its original principles. For a long time, standard units were actually defined by carefully maintained physical prototypes. But thanks to improving technology and precision, these objects with limited access and unreliable longevity are now being replaced with standards based on universal constants, like the speed of light. Consistent measurements are such an integral part of our daily lives that it's hard to appreciate what a major accomplishment for humanity they've been. And just as it arose from a political revolution, the metric system remains crucial for the scientific revolutions to come.

**P375 2016-07-13 Why the metric system matters - Matt Anticole**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=375)

翻译人员: Valkyrie Cain 校对人员: Yaqi Huang法国大革命和美国国家航空航天局有次不小心把一个造价两亿的人造卫星撞向了火星表面有什么关系呢？它们其实有千丝万缕的关系。坠毁的发生，源于两个度量体制之间换算时，所出现的错误：这两个体制分别是美制单位，和与其对应的国际单位制（米制）。那和法国大革命的关系又在哪里呢？容我解释。在大部分有记载可循的人类历史中，度量单位-比如一粒谷物的重量，或者一只手的长度-都不是精确的，并且在不同地区有所不同。不同地区不只是衡量制度不同，他们连使用的记数系统都完全不同。到了中世纪末，印度-阿拉伯数字和小数系统已经大部分取代了欧洲的罗马数字和分数，但是约翰·威尔金斯等学者推广标准化的、以小数为基础的度量制度的努力却不那么成功。举个例子，光是法国本土就有25万种不同的度量单位。因此，任何大规模的改动都需要巨大的变革去推动。而1789年，这个变革降临了。法国大革命的领导者们不仅仅推翻了君主制，他们追求的，是本着启蒙运动尊崇理性的原则，彻底地改造社会。新政府上任后，法国科学院开展了改革度量制度的工作。施政者独断建立或依赖地方惯例的旧标准被基于数学和自然关系的制度所取代。以“米”为例，它的名字 meter 来自希腊语表示 measure的那个词，指量度它被定义为赤道和北极之间距离的亿分之一。新的米制系统，用馬奎斯·孔多塞的话来说，是「给全人类的，给全世代的。」将度量标准化对于革命者来说，也有政治上的好处。贵族不能再通过操纵地方度量单位，来向平民榨取更多地租，而政府本身也可以更有效率地征税。此外，新启用的法国共和历以十天为一星期，其中摒弃了星期日，从而削弱了教会的权利。采取这些新系统的过程并不简易。实际上，它是有些混乱的。一开始，人们同时使用新和旧的度量单位，而共和历也最终被废除了。拿破崙·波拿巴掌权后，准许小型商家使用以米制重新定义过的传统度量制度。但是在正式用途中，米制仍然是标准的度量系统；而且米制系统的使用随着法国的国界一起在欧洲大陆上向外扩张，尽管拿破崙的帝国只有八年的寿命，它的建树却流传深远。一些欧洲国家在取得独立后，还原了旧的度量制度。另一些则意识到标准化和统一性在国际贸易时代的重要性。随着葡萄牙和荷兰自愿启用了米制，其他的国家纷纷效仿。借助着各国的殖民帝国，米制在全球传播开来。作为法国的头号劲敌，英国一直抵制着革命思想，并且保留着她的传统度量单位。但是，在接下来的两个世纪中，大英帝国经历了缓慢的转变；首先认可了米制作为可供选择的另一系统，再逐渐使其成为官方的度量制度。但是，这个转变对于十三个前殖民地来说来得太晚了-他们已经取得了独立。美利坚共和国和她殖民时代留下的英式度量单位 已经变得不可分割了，因此是今天仅剩的三个没有接受米制的国家之一。尽管多次提倡米制化，许多美国人觉得像英尺、磅这样的单位更加直观，讽刺的是，他们中的一些人认为曾经革命性的米制反而是全球一致性的代表。尽管如此，米制在科学和医学的领域中几乎是全球通用，并且继续遵循它原本的原则演变。有很长一段时间，标准化的单位是以小心维护的实体样板而定义的。但是，多亏了不断进步的科技和精确度，这些不轻易拿到、又没有长久可靠的寿命的样板物件也正在被宇宙中的一些常数所取代，作为新的标准，比如光的速度。要特意去欣赏它们为人类做出的大贡献，难免有些困难，因为一致的度量标准对于我们的日常生活已经如此的根深蒂固了。米制起源于一场政治革命；同样的，它也在将要到来的科学革命中，继续承担一个至关重要的角色。

**P376 2016-07-14 Why do we hiccup - John Cameron**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=376)

Charles Osborne began to hiccup in 1922 after a hog fell on top of him. He wasn't cured until 68 years later and is now listed by Guinness as the world record holder for hiccup longevity. Meanwhile, Florida teen Jennifer Mee may hold the record for the most frequent hiccups, 50 times per minute for more than four weeks in 2007. So what causes hiccups? Doctors point out that a round of hiccups often follows from stimuli that stretch the stomach, like swallowing air or too rapid eating or drinking. Others associate hiccups with intense emotions or a response to them: laughing, sobbing, anxiety, and excitement. Let's look at what happens when we hiccup. It begins with an involuntary spasm or sudden contraction of the diaphragm, the large dome-shaped muscle below our lungs that we use to inhale air. This is followed almost immediately by the sudden closure of the vocal chords and the opening between them, which is called the glottis. The movement of the diaphragm initiates a sudden intake of air, but the closure of the vocal chords stops it from entering the wind pipe and reaching the lungs. It also creates the characteristic sound: "hic." To date, there is no known function for hiccups. They don't seem to provide any medical or physiological advantage. Why begin to inhale air only to suddenly stop it from actually entering the lungs? Anatomical structures, or physiological mechanisms, with no apparent purpose present challenges to evolutionary biologists. Do such structures serve some hidden function that hasn't yet been discovered? Or are they relics of our evolutionary past, having once served some important purpose only to persist into the present as vestigial remnants? One idea is that hiccups began many millions of years before the appearance of humans. The lung is thought to have evolved as a structure to allow early fish, many of which lived in warm, stagnant water with little oxygen, to take advantage of the abundant oxygen in the air overhead. When descendants of these animals later moved onto land, they moved from gill-based ventilation to air-breathing with lungs. That's similar to the much more rapid changes faced by frogs today as they transition from tadpoles with gills to adults with lungs. This hypothesis suggests that the hiccup is a relic of the ancient transition from water to land. An inhalation that could move water over gills followed by a rapid closure of the glottis preventing water from entering the lungs. That's supported by evidence which suggests that the neural patterning involved in generating a hiccup is almost identical to that responsible for respiration in amphibians. Another group of scientists believe that the reflex is retained in us today because it actually provides an important advantage. They point out that true hiccups are found only in mammals and that they're not retained in birds, lizards, turtles, or any other exclusively air-breathing animals. Further, hiccups appear in human babies long before birth and are far more common in infants that adults. Their explanation for this involves the uniquely mammalian activity of nursing. The ancient hiccup reflex may have been adapted by mammals to help remove air from the stomach as a sort of glorified burp. The sudden expansion of the diaphragm would raise air from the stomach, while a closure of the glottis would prevent milk from entering the lungs. Sometimes, a bout of hiccups will go on and on, and we try home remedies: sipping continuously from a glass of cold water, holding one's breath, a mouthful of honey or peanut butter, breathing into a paper bag, or being suddenly frightened. Unfortunately, scientists have yet to verify that any one cure works better or more consistently than others. However, we do know one thing that definitely doesn't work.

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翻译人员: wangjingyi liao 校对人员: fuyu you1922年，查尔斯·奥斯本 被一只猪压倒后开始了打嗝直到68年后才痊愈他现在被吉尼斯记为世界上打嗝时间最长的保持者。同时，弗洛里达的小女孩 詹妮·弗眉可能是世界上打嗝频率最高的人在2007年，她连续四周以上 每分钟打嗝50次那么，是什么导致了打嗝？医生指出 打嗝常常出现在胃壁受到牵拉刺激之后例如 吸入大量空气或者吃喝频率太快打嗝也可能与剧烈的情绪变化或与对情绪的反应相关 例如：大笑哭泣焦虑和兴奋让我们看看打嗝的时候都发生了什么。它开始于一种无意识的痉挛 或膈肌的收缩膈肌是个大的，圆顶形的肌肉 位于胃的下方用于吸入空气几乎在膈肌收缩的同时两片声带就开始合拢 关闭它们之间的缝隙也就是所谓的声门膈肌的收缩将导致 空气被突然吸入肺部。而声带的闭合则阻止空气的进入这也造成了一种特别的声音： “嗝”。直至今天，我们也不知道打嗝的作用它看起来并没有任何医学上 或物理上的功能为何刚开始吸入空气就突然阻止 它真正进入肺部呢？打嗝在解剖结构或者生理机制上 并没有显而易见的用途这使解释它变成了一个对于进化生物学家的挑战难道这种结构服务于 什么未知的隐藏机能吗？或者它是我们进化过程中的遗留物曾经服务于一些重要的目的但现在只是因为存在而存在， 就像残留的遗迹一样？有一个理论是说打嗝开始于 几百万年以前人类还没有出现的时候肺被视为一种允许早期鱼类存活于温暖， 污浊，空气稀缺的水中的一种结构使它们可以利用水面上的大量空气当这些生物的后代移居到陆地上它们从用腮呼吸变成了用肺呼吸这个变化与如今从蝌蚪到青蛙之间的 快速改变相似就像从用腮呼吸的蝌蚪变成用肺呼吸的成熟青蛙这个假设提出打嗝是我们祖先 从水生变成陆生的遗留产品一次把水过腮的吸气之后声门的快速闭合阻止了水进入肺部有证据表明产生打嗝的神经模式和 两栖动物的呼吸模式几乎一致另一个科学家小组认为这种反射 如今依然存在于我们身体因为它实际上提供了一种重要的优势他们指出真正的打嗝只在哺乳动物上发生而并没有保留在鸟类，蜥蜴，龟类或者其他只呼吸空气的动物上而且，打嗝在婴儿出生之前就出现了甚至在婴儿身上比成人更加常见他们解释说这个是因为 哺乳动物独有的哺乳活动哺乳动物可能将原始的打嗝反射演化为排除胃内空气的一系列饱嗝这种横膈膜的突然膨胀可能 引起胃部空气的上升同时声门的闭合可以 避免乳液进入肺部有些时候，打嗝会连续不断的发生然后我们尝试使用一些偏方：比如一口气喝完一瓶冷水屏住呼吸吃一嗓子蜂蜜或者花生酱向一个纸袋呼吸或者一个突然的惊吓不幸的是，科学家还没有证实任何一种方法可以比其他的方式更有效持久但是，我们知道有些一定不管用。

**P377 2016-07-18 Should we be looking for life elsewhere in the universe - Aomawa Shie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=377)

Astronomers have discovered thousands of planets orbiting stars other than the Sun. They come in all sizes, at different orbital distances from their stars. The closest of them are trillions of miles away, and even the largest are just fuzzy patches in the fields of high-powered telescopes. But if one of these planets is close in size to the Earth and orbits not too close and too far away from its parent star, it could be rocky and warm enough to have oceans and perhaps life. Astronomers discover these potentially habitable planets, and their eyes get big and wide. Could one of these distant worlds carry the building blocks of life? Or even a living, breathing, civilization? Is the question, "Are we alone in the universe?" about to be answered? But wait. Maybe we should ask a different question first. Should we try to find out if we're alone in the universe? If we do find the atmospheric fingerprints of life on one of these small, distant worlds, should we try to contact any beings who may live there? Is that wise? Three decades ago, NASA decided the answer was yes. Voyager 1 and 2 were launched in 1977 to explore the giant planets in the solar system. Each spacecraft carried a golden phonograph record, a time capsule of sorts that included clues and messages meant to convey the story of human civilization. The contents of these gold-plated copper disks were chosen by a committee chaired by American astronomer and author Carl Sagan. They included over 100 images, and a range of sounds from the natural world: ocean waves, thunder, the sounds of birds and whales. The records also included music from many different time periods and cultures, greetings in 55 languages, and messages from the President of the United States, and the UN Secretary General. They also included a map. Each golden record displays the location of our solar system with respect to fourteen pulsars. Their precise, unique frequencies were indicated so that intelligent, extraterrestrial lifeforms could use them to find the Earth. Many years later, renowned physicist Stephen Hawking said that it was a mistake to give an alien species a roadmap to our planet. Hawking suspected that any extraterrestrial life probably wasn't any more complex than microbes, but he warned that if an advanced alien species did visit Earth, it could be as catastrophic as Christopher Columbus's arrival was for the Native Americans. Meanwhile, the golden records continue their journeys. In 1990, both Voyager spacecraft passed beyond the orbit of Pluto. Voyager 1 entered interstellar space in 2012, and will reach the nearest stellar system in 40,000 years. If either spacecraft is discovered by extraterrestrial life, there's a possibility that they could decipher the clues from the golden record and one day reach our planet. That's particularly true if theirs is a much more technologically advanced civilization. That life could be benevolent, as we would hope to be if humans are one day able to achieve interstellar travel. Or it could be hostile. Searching for planets that might have life means staring into a great abyss. We'll likely have no clear knowledge of the evolutionary stage, sentience, character, or intentions of the first form of life we discover. So it's a risk to turn our eyes outwards. We risk our very way of life. But it may be a greater risk not to look, to deny the very pioneering spirits that help shape our own species. We are all born curious about the world and the universe. Pursuing that curiosity is one of humankind's greatest achievements. Perhaps there is room to push the frontiers of science, provided that we cradle alongside our fervor another of humankind's greatest assets: hope.

**P377 2016-07-18 Should we be looking for life elsewhere in the universe - Aomawa Shie**

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翻译人员: Yi Wen 校对人员: Jiawei Ni除了太阳以外，天文学家已经发现了成千上万的环绕恒星的行星行星的大小都不相同行星环绕恒星的轨道距离也不同距离最近的也有数万亿英里之远甚至在高能望远镜下最大的也像是模糊的补丁但是如果其中一个行星的大小与地球接近并且与其环绕运动的恒星的距离也是不远不近它就可能有很多岩石，并且足够温暖还有海洋或许还有生命天文学家发现这些可能适合居住的恒星他们非常惊讶其中一个遥远的世界可能有存在生命的基本条件吗?或者是一种有生命的、会呼吸的文明?“我们在宇宙是否是孤独的”这个问题将得到回答吗？但是，等一下或许我们首先可以提出一个不同的问题我们是否应该尝试去寻找我们是宇宙中唯一的生命吗？如果我们在大气层发现发现生命的迹象在一个很小又很远的世界我们是否应该尝试与可能生活在那里的生物接触？这是否明智呢？30年前，NASA决定这个答案是肯定的航行者1号和2号在1977年发射去探索太阳系里的巨大星球每一个宇宙飞船都携带了一个金色的留声机唱片有点像个包含着线索和消息的时间胶囊旨在传达人类文明的故事这些镀金铜磁盘的内容都由委员会决定委员会主席为美国天文学家和作家卡尔·萨根它们包括了100张图片以及一系列来自自然世界的声音海浪声雷声鸟声鲸鱼声记录还包括许多不同时期和文化的音乐55种语言的问候以及来自美国总统和联合国秘书长的问候金唱片还附有一张地图每个金唱片都显示着我们太阳系相对于14个脉冲星的位置它们的精确度、独特的频率都标示了出来这样有智慧的外星生命形式就可以通过它们找到地球很多年以后，著名物理学家斯蒂芬·霍金说为外星物种提供到我们地球的路线图是一个错误霍金怀疑任何外星生命可能并不比细菌更复杂但他警告说，如果先进的外星物种访问地球可能是一场大灾难就像克里斯托弗·哥伦布给印第安人造成的灾难一样与此同时，金唱片继续着它们的旅程1990年，两个旅行者号飞船飞越了冥王星的轨道旅行者1号在2012年进入星际空间并在4万年内将达到最近的恒星系统如果两个宇宙飞船中的一个被外星生命发现有可能他们可以破译金唱片提供的线索有一天到达我们的星球如果这个外星文明是一个技术更先进的文明更是尤为如此这种生命可能是善良的就像我们希望如果有一天人类能够实现星际旅行或者这种生命可能是不友好的寻找可能有生命的行星意味着窥探一个巨大的深渊我们可能没有清晰的进化阶段的相关知识知觉性格或者我们所发现的第一个生命的目的我们探索外星是有风险的我们让我们的生活方式面临风险但不进行探索可能是更大的风险这是拒绝打造我们人类这一物种的开拓精神我们都生来对世界和宇宙感到好奇追求好奇是人类最伟大的成就之一也许推动科学进步的前沿还有一定空间前提是只要我们有热情并且延续人类另一个最伟大的资产：那就是希望

**P378 2016-07-26 Real life sunken cities - Peter Campbell**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=378)

While touring the remains of ancient Alexandria, Egypt, there are a few things that present-day explorers should look for. First, as you travel along the Great Harbor, keep your eyes open for large columns and statues. Across the bay to your left is the island where the Great Lighthouse once stood. And as you make your way through the palaces of the Royal Quarter and reach the area where the Library of Alexandria once stood, keep your eyes open for sharks. Because if you visit this section of Alexandria, you'll be fifteen feet deep in the Mediterranean Sea. Though people are most familiar with Plato's fictional Atlantis, many real underwater cities actually exist. Places like Alexandria, Port Royal, Jamaica, and Pavlopetri, Greece. Sunken cities are studied by scientists to help us understand the lives of our ancestors, the dynamic nature of our planet, and the impact of each on the other. Water is essential for life, food sources, and transport, so many cities have been built along coast lines and river banks. However, these benefits also come with risks because natural forces that can sink a city are at their doorstep. Take, for instance, an earthquake. June 7, 1692 seemed like a normal morning in Port Royal, Jamaica, then one of the richest ports in the world, but when a massive earthquake struck, two-thirds of Port Royal immediately sank to its rooftops. Today, many buildings and elements of everyday life remain surprisingly intact on the sea floor, frozen in time. That includes a 300-year-old pocket watch that stopped at 11:43, the moment Port Royal slipped beneath the Carribean. And during the winter of 373 BCE, the Greek city of Helike was struck by an earthquake so strong that it liquefied the sandy ground upon which the city was built. Minutes later, a tsunami struck the city, and Helike and its inhabitants sunk downwards into the Mediterranean Sea. Centuries later, Roman tourists would sail on the lagoon that formed and peer down at the city's remains. Earthquakes are sudden, unpredictable disasters that have drowned cities in an instant. Luckily, however, throughout history, the majority of sunken cities were not submerged by a single cataclysmic event, but by a combination of more gradual processes. For instance, Pavlopetri, the oldest known sunken city, was built on the southern coastline of Greece 5,000 years ago. It's an example of a city that was submerged due to what is called isostatic sea level change. 18,000 years ago when the Ice Age ended, glaciers began melting and the sea level rose globally until about 5,000 years ago. Isostatic sea level change isn't caused by that melt water, but rather the Earth's crust slowly springing back from the released weight of the glaciers, making some places rise, and others sink. The ground around Pavlopetri is still sinking at an average rate of a millimeter per year. But the ancient inhabitants were able to move gradually inland over several generations before they finally abandoned the city about 3,000 years ago. Today, divers swim over the streets of Pavlopetri and peer through ancient door jams into the foundations of houses and community buildings. They learn about the people who lived there by observing what they left behind. Natural geological events, such as earthquakes and tsunamis, will continue to shape our continents, just as they have for millions of years. As increased global warming melts our polar ice caps at accelerated rates and sea levels rise, we will be forced to adapt, like Pavlopetri's inhabitants. Undoubtedly, over the coming centuries, some of the coastal areas that we live in today will eventually be claimed by the water, too - cities like Venice, New Orleans, Amsterdam, Miami, and Tokyo. Imagine what future civilizations will learn about us as they swim around the ancient ruins of the cities that we live in today.

**P378 2016-07-26 Real life sunken cities - Peter Campbell**

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翻译人员: Yuan Ma 校对人员: Cissy Yun当你在埃及的亚历山大港遗迹游览时，有一些地方是今日的探险者们应寻觅的。首先，当你沿着大港湾旅行，留意那些大的柱子和雕像。在你左手边的海湾那一边就是大灯塔 曾经矗立过的岛屿。当你径直通过皇城的那些宫殿，抵达亚历山大图书馆曾经矗立过的地区，你得睁大眼睛，小心鲨鱼！因为假如你造访了亚历山大港的这个区域，你将置身于地中海15英尺深的水下。尽管人们多已熟知柏拉图虚构的亚特兰蒂斯，许多真实的水下城市确实存在。比如像亚历山大港、牙买加罗亚尔港和希腊帕夫洛佩特里这样的地方。科学家们研究沉没城市以帮助我们了解我们祖先的生活、地球的动态特性，以及两者的相互影响。水对于生命、食物来源和交通来说至关重要，因此许多城市沿着海岸和河岸建立。然而，这些好处也伴随着风险，因为能够使城市沉没的自然力量就在眼前。以地震为例，1692年6月7日，对于当时世界上最富裕的港口之一 牙买加罗亚尔港来说，似乎只是个平常的早晨，但是当大地震袭来，罗亚尔港的三分之二立即下沉到只能看见屋顶。现在，海底的许多建筑和日常生活的物品出人意料地保持完好，如同时间被冻结了一般。这其中包括一只300年前的怀表，指针停在11点43分，罗亚尔港沉入加勒比海的那一刻。公元前373年的冬天里，希腊城市赫里克遭受了一次地震袭击， 地震是如此强烈，以至于城市的沙质地基都液化了。几分钟以后，海啸袭击了城市，于是赫里克及其居民一同沉没在地中海中。几个世纪以后，罗马的游客们可以 在形成的咸水湖上泛舟，朝水下俯视城市的遗迹。地震是突发而不可预料的灾难，令城市在瞬间淹没。但是幸运的是，纵观历史，大多数沉没城市并不是遭受 一次单独的灾难事件而沉如水下，而是一系列渐进过程的结果。比如帕夫洛佩特里，已知最古老的沉没城市，在5000年前建于希腊的南部海岸。它是由于被称为地壳均衡海平面变动的影响而沉入水中的城市的典型案例。18000年以前，当冰河时期结束，冰川开始融化，全球海平面上升直到5000年前。地壳均衡海平面变动并非由融化的海水导致，而是地球的地壳因为冰川释放的重量缓慢回弹，使一些地方上升，另一些地方下沉。帕夫洛佩特里周围的地面仍在以平均每年1毫米的速度下沉。但古代的居民们能够在许多代的时间里逐渐迁徙至内陆，直到在约3000年前最终废弃了这座城市。现在，潜水者们在帕夫洛佩特里的街道上游泳，通过古代的门框往里观察房屋和社区建筑的地基。他们通过观察遗留物了解曾生活在那里的人。诸如地震和海啸这样的地质事件将持续塑造我们的大陆，正如百万年来一样。由于全球气温变暖导致极地冰盖加速融化，海平面上升，我们可能会被迫适应，正如帕夫洛佩特里的居民一样。毫无疑问的是，在未来的几个世纪里，我们现在生活的一些沿海区域最终也将会被水淹没——诸如威尼斯、新奥尔良、阿姆斯特丹、迈阿密、和东京这样的城市。想象一下，当未来文明的人们在 我们现在生活城市的遗迹周围游泳时，他们会了解我们些什么呢？

**P379 2016-07-26 Which sunscreen should you choose - Mary Poffenroth**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=379)

Sunscreen comes in many forms, each with its own impacts on your body and the environment. With so many options, how do you choose which sunscreen is best for you? To answer that question, we first have to understand how sunscreens work. Sunlight is composed of electromagnetic waves and is our primary source of ultraviolet radiation, which has a shorter wavelength than visible light and carries more energy. UVA, UVB, and UVC are classified according to their wavelengths. Short wavelength UVC never reaches the Earth's surface, but UVB and UVA do. Medium wavelength UVB rays can enter the skin's superficial layers and long length UVA rays can penetrate into the deeper layers. UVB in small amounts actually helps us make vitamin D, which enables our bodies to build and maintain strong bones. However, prolonged exposure to UVA and UVB can damage DNA, age your skin, and promote the development of potentially deadly skin cancer. Sunscreen protects your skin either physically by deflecting UV rays with an inorganic blocker like zinc oxide or titanium dioxide, or chemically by using carbon-based compounds to absorb UV photons that are then harmlessly dissipated as heat. So, what differentiates one sunscreen from another? When we choose a sunscreen, we can compare application method, the SPF, and the active ingredients. Sprays can be convenient to put on, especially when you're wet, but a recent study found that most people don't apply a thick enough layer to get full protection. And the possible health risks of inhaling sunscreen compounds from a spray cloud might make you consider reaching for that bottle of lotion instead. Opt for a sunscreen with an SPF of at least 15, although 30 is better. SPF is a nonlinear scale of how much UVB radiation is needed to give protected skin a sunburn. SPF 15 does a pretty good job by blocking 93% of UVB rays. You get a slight increase as SPF goes up, with SPF 30 blocking 97%, and 50 blocking 98%. SPF is based on the quantity of solar exposure. So how much time you have before you start to burn really depends on a long list of factors, including your genetics, and when, where, and how you spend your time in the sun. Even though US marketed sunscreens have been deemed safe by the FDA, scientists are still researching the effects of many active ingredients on the human body. So if you're worried about potential irritants, look for mineral-based formulas with zinc oxide or titanium dioxide. Even though they may go on a bit thick at first, they're less irritating than carbon-based chemical sunscreens. These mineral-based sunscreens are preferential for the environment, too. If you plan on catching rays while splashing in a river or the ocean, keep in mind that carbon-based chemical sunscreens can harm marine life. Take coral reefs, for example. Although they cover less than 1% of the Earth's underwater surface, they're home to nearly 25% of all fish species, making them the most diverse and productive marine ecosystems. Research shows that carbon-based chemical sunscreen ingredients, like oxybenzone, butylparaben, octinoxate, and 4MBC contribute to a stress condition called coral bleaching in corals, which are living creatures. Exposure to these organic compounds results in the death of the coral's symbiotic algae. In addition to providing a reliable food source, these algae give coral their brilliant rainbow of colors. Without them, corals turn a bleached white and are susceptible to disease and possibly death. And once the coral dies, the entire reef ecosystem is not far behind. So you're now ready to make an informed choice when picking out your next sunscreen. SPF is clearly labeled on the front. On the back under "active ingredients," you can find whether zinc oxide, titanium dioxide, and those coral-harming components are present. Taking a bit more time to check can be well worth it for both you and the environment.

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翻译人员: Cissy Yun 校对人员: Jiawei Ni防晒霜有各种形式的每一种对于你的身体和大环境都有着不同的影响有这么多的选择你应该如何选择最适合你的防晒霜呢？为了解答这个问题我们首先需要知道防晒霜是如何起到它的作用的太阳光是由电磁波组成的也是我们接收到的紫外线的主要来源它有相较可见光更短的波长 也带有更多的能量a波紫外线b波紫外线和c波紫外线是由它们的波长来区分的短波长的c波紫外线 到不了地球表面但是a波和b波紫外线可以到达中等波长的b波紫外线 可以进到皮肤的表层而长波长的a波紫外线 则可进入皮肤的深层少量的b波紫外线可以帮助人体产生维他命D它能让我们的身体保持强壮的骨骼然而，过长的暴露在a波和b波紫外线下 会损坏DNA并使皮肤衰老还会增加得致命性皮肤癌的可能防晒霜保护皮肤 一是以物理护肤的方式偏转紫外线运用的是一种无机的阻隔物 例如二氧化锌或二氧化钛二是通过化学方式 用碳化物类吸收紫外线中的光子使它们以热的形式消散那么，是什么区分一种防晒霜于另一个？当我们选择防晒霜时我们可以比较它们的使用方法比较SPF和其他的成分防晒喷雾使用起来很方便 尤其在你的肌肤是湿润的时候然而，最近的一个研究发现大多数人 并不会喷上足够保护皮肤的量而且，也存在不小心吸入防晒喷雾而产生的 健康隐患这也许使你想去换用那瓶防晒乳液选择至少有SPF15的防晒产品 当然SPF30的会更好SPF是一种非线性的比例 关于的是造成晒伤的b波紫外线的量SPF15的防晒可以阻挡93%的b波紫外线SPF值的升高，它的阻挡力也会稍许增加SPF30可以阻挡97%而SPF50则可以阻挡98%SPF值根据的是太阳曝光的量所以你是否容易被晒伤有很多的因素包括你的基因你在哪里，多长时间，如何晒太阳的虽然美国认证的防晒霜被美国食品药品监督管理局 认可为安全的科学家仍旧在继续研究 许多成分对人体会产生的影响所以如果你担心潜在的刺激可以选用矿物配方以及有二氧化锌或二氧化钛的 防晒产品它们一开始可能会有一些厚但是它们相对于碳配方的防晒霜 对皮肤少刺激矿物配方的防晒产品对 环境也有保护如果你想要在沐浴着阳光 又想在河或者海洋中戏水要记住 碳配方的化学防晒霜对海洋生物有害就拿珊瑚礁来说虽然它们只覆盖了百分之一的地球水下面积但是它们是百分之二十五的鱼类的家园让它们成为了最多样的和生产力最强的海洋生态系统研究显示 碳配方的化学防晒中的一些物质例如说氧苯酮，尼泊金丁酯，桂皮酸钠和4MBC会给海洋带来很不好的影响 比如说珊瑚漂白而它们都是有生命的生物当珊瑚暴露在这些有机化合物前会导致珊瑚的共生藻的死亡这些共生藻除了提供食物源它们还带给珊瑚彩虹般绚烂的色彩没有了它们， 珊瑚就像被漂白过一样而且很容易会有疾病，和死亡的可能性一旦珊瑚死去后整个珊瑚礁生态系统都将会崩溃你现在一定可以在选防晒霜时 做出有所依据的选择SPF值在防晒产品上都会清楚地标明在背后的“成分表”中你可以发现防晒产品是否含有二氧化锌二氧化钛或是对珊瑚有害的成分花稍微多一点的时间来做出一个对你，对环境都好的选择

**P380 2016-08-02 How smart are orangutans - Lu Gao**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=380)

Fu Manchu was one of the most notorious escape artists at the Omaha Zoo in the 1960s. But he wasn't a performer, he was an orangutan. The keepers who locked his enclosure every night were baffled to find him outside the next day hanging out with friends in a tree, or sunning on the roof. Only after installing cameras did they realize Fu Manchu had been picking the lock with a metal wire that he kept hidden under his cheek pouch. The keepers shouldn't have been surprised at Fu Manchu's cunningness. Along with our other great ape cousins, the gorillas, chimps, and bonobos, they belong to our Hominidae family tree, which stretches back 14 million years. But it's not just their striking red hair that makes orangutans unique among our cousins. As the only great apes from Asia, orangutans have adapted to a life high in the rain forest canopies. Many of the skills they learn are transmitted through the special bond they have with their mothers, the most extended in the animal kingdom next to humans. Orangutan mothers usually give birth to one baby at a time, waiting up to eight years before having another. This gives the young, who begin as fully dependent infants, plenty of time to learn how to climb and distinguish the hundreds of plants and fruits that make up their diet. Female orangutans even stay with their mothers into their teen years to learn child-rearing. As they grow up, orangutans also develop a complex set of cooperative social skills by interacting with their peers and siblings. Much like ourselves, young orangutans involuntarily mimic the facial expressions and emotions of their playmates, with behaviors that closely parallel human smiling and laughter. Once they finally venture out on their own, orangutans continue to develop their resourcefulness, putting the skills they've learned into practice. Adults build a new nest each night by carefully weaving twigs together, topping them with soft leaves, pillows, and blankets. This process requires dexterity, coordination, and an eye for design. Orangutans also use a variety of tools to make their lives in the jungle easier. They turn branches into fly swatters and back scratchers, construct umbrellas when it rains, make gloves from leafy pads, and even use leaves as bandages to dress their wounds. But orangutan intelligence goes far beyond jungle survival. Research in controlled environments has shown that orangutans are self-aware, being one of the few species to recognize their own reflections. They also display remarkable foresight, planning, and cognition. In one experiment, researchers taught an orangutan to use a straw to extract his favorite fruit soup from a box. That orangutan was later given the choice between the straw or a grape that could be eaten right away, and he chose the straw just in case he was given another box of soup. In another experiment, orangutans figured out how to reach peanuts at the bottom of long tubes by spitting water into them. While orangutans are able to pass cognitive tests with flying colors, there are certain problems that they need our help to solve. Indonesia has the world's highest rate of deforestation, and millions of acres of rain forest are burned annually to support the logging and palm oil industries. Deforestation exposes the 30,000 orangutans remaining in the wild to poachers. They kill mothers so that baby orangutans can be sold as exotic pets. But fortunately, the story often doesn't end here. Orphans can be confiscated and given a second chance. At special forest schools, they recover from emotional trauma and continue to develop essential life skills. Against all odds, these orphans demonstrate incredible resilience and readiness to learn. In Malay, the word orangutan translates literally to "the person of the forest," a reminder of our common lineage. And despite orangutans being some of the smartest animals on Earth, outsmarting their extinction requires the creativity, empathy, and foresight that our species share.

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翻译人员: Yinan Xiong 校对人员: x Vicky傅满楚曾是十九世纪六十年代 奥马哈市动物园里最为臭名昭著的越狱高手之一但它不是演员它是一只红毛猩猩每天晚上负责锁笼子的工作人员第二天都很困惑 它怎么跑到了外面它要么是和朋友在树上闲逛要么就是在屋顶上晒太阳直到装上了监控器他们才知道傅满楚是用藏在颊囊下面的一条铁丝打开锁头的动物管理员们没必要 为傅满楚的狡猾感到惊讶因为和人类的其他猿类表亲如大猩猩黑猩猩倭黑猩猩一样它们也属于人科这种根源可以追溯到 一千四百万年以前但决不是因为红毛猩猩 一头醒目的红发才使得它们相比其它猿类更特别作为亚洲唯一的大型猿类红毛猩猩适应了雨林树冠层上的生活它们的技能很多都是从母亲身上习得的这点和人类尤其相似红毛猩猩的母亲通常 一次只生育一个后代至多八年后才会再次生育因此这些一出生就有很强依赖性的幼年猩猩就有充裕的时间学习如何爬树和从上百种植物和果实中 鉴别出哪些是它们的食物雌性猩猩甚至会 跟在母亲身边十几年学会如何养育子女在成长的过程中，它们通过 和家人以及同龄猩猩互动发展出一系列复杂的社交技能这点和人类非常相似幼年猩猩不自觉地模仿玩伴的面部表情和情绪类似于人类的笑一旦它们开始独立生活它们将不断提高智力水平并且将学到的东西应用于生活成年猩猩每天晚上细心地把小树枝编成窝再铺上柔软的树叶、枕头和毯子整个过程要求一定的灵巧、协调和审美能力红毛猩猩使用各种工具改善它们在丛林中的生活它们把树枝用做苍蝇拍和痒痒挠下雨的时候用做雨伞把树叶做成手套甚至是做为绷带保护伤口但是红毛猩猩的智商相对于雨林中的其它动物 还远不只这么简单受环境控制的研究表明，红毛猩猩具有自我意识它们是少数几个能够辨别自己外貌的物种它们还表现出卓越的远见、规划以及认知能力有一个实验是研究人员教授红毛猩猩使用吸管汲取箱子里它最喜欢的一种果汁然后让它在吸管和即食葡萄之间选择一样为了自己能得到另一盒果汁，它选择了吸管在另一个实验中，红毛猩猩知道用吐口水的办法拿到长管底部的花生即使红毛猩猩还通过了动态颜色的认知测试有些问题它们自己是解决不了的印度尼西亚有着世界上最高的森林砍伐率每年有上百万的雨林被焚烧掉以支撑伐木业和棕榈油工业森林砍伐导致三万多的红毛猩猩暴露在偷猎者面前他们把母猩猩杀掉，这样小猩猩就可以作为外来宠物卖掉幸运的是，故事并没有就此结束猩猩孤儿可能会被官方没收并得到第二次机会它们在特殊森林学校接受心理康复学习基本的生存技能尽管困难重重，这些孤儿还是表现出了惊人的韧性和学习禀赋在马来西亚，“红毛猩猩”这个词的意思是“树人”提醒着我们同根同源即使红毛猩猩是地球上最聪明的动物之一，要克服它们的灭绝 仍旧需要我们种族所共同享有的创造力，同情心和远见

**P381 2016-08-09 One of the most difficult words to translate... - Krystian Aparta**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=381)

Which is the hardest word to translate in this sentence? "Know" is easy to translate. "Pep rally" doesn't have a direct analog in a lot of languages and cultures, but can be approximated. But the hardest word there is actually one of the smallest: "you." As simple as it seems, it's often impossible to accurately translate "you" without knowing a lot more about the situation where it's being said. To start with, how familiar are you with the person you're talking to? Many cultures have different levels of formality. A close friend, someone much older or much younger, a stranger, a boss. These all may be slightly different "you's." In many languages, the pronoun reflects these differences through what's known as the T–V distinction. In French, for example, you would say "tu" when talking to your friend at school, but "vous" when addressing your teacher. Even English once had something similar. Remember the old-timey "thou?" Ironically, it was actually the informal pronoun for people you're close with, while "you" was the formal and polite version. That distinction was lost when the English decided to just be polite all the time. But the difficulty in translating "you" doesn't end there. In languages like Hausa or Korana, the "you" form depends on the listener's gender. In many more, it depends on whether they are one or many, such as with German "Du" or "ihr." Even in English, some dialects use words like "y'all" or "youse" the same way. Some plural forms, like the French "vous" and Russian "Вы" are also used for a single person to show that the addressee is that much more important, much like the royal "we." And a few languages even have a specific form for addressing exactly two people, like Slovenian "vidva." If that wasn't complicated enough, formality, number, and gender can all come into play at the same time. In Spanish, "tú" is unisex informal singular, "usted" is unisex formal singular, "vosotros" is masculine informal plural, "vosotras" is feminine informal plural, and "ustedes" is the unisex formal plural. Phew! After all that, it may come as a relief that some languages often leave out the second person pronoun. In languages like Romanian and Portuguese, the pronoun can be dropped from sentences because it's clearly implied by the way the verbs are conjugated. And in languages like Korean, Thai, and Chinese, pronouns can be dropped without any grammatical hints. Speakers often would rather have the listener guess the pronoun from context than use the wrong one and risk being seen as rude. So if you're ever working as a translator and come across this sentence without any context: "You and you, no, not you, you, your job is to translate 'you' for yourselves" ... Well, good luck. And to the volunteer community who will be translating this video into multiple languages: Sorry about that!

**P381 2016-08-09 One of the most difficult words to translate... - Krystian Aparta**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=381)

翻译人员: zixuan chen 校对人员: Jenny Yang哪一个单词是这个句子中最难翻译的“know”是很容易翻译的“pep rally”（比赛前的动员大会）在许多语言与文化中没有一个直接的对应意义但是可以被猜出含义出乎意料的是这里最难的单词实际上是最短小的“you”尽管它看起来很简单实际上经常很难准确翻译出“you”在不大清楚具体被应用的语境下首先，你对你讲话的对象到底有多熟悉在许多文化中都有着不同标准的礼节一个亲近的朋友一个年长或是年幼许多的人一个陌生人一个上司这些用“you”的时候都有细微的差别在许多文化中，代词的不同通过被称为T－V distinction（即用复数形态来表示来表示敬语）来反映这些差异比如说在法语中你可能会在学校里和你的朋友聊天时用“tu”来称呼对方但是当与你的老师讲话时便会用“vous”甚至在英语中也曾经有过相似的还记得古风的的“thou”吗讽刺的是，它实际上是对你亲近的人的不正式的人称代词然而现在所用的 “you” 才是一种更加正式，礼貌的版本这种差异不过已经在英语决定只维持礼节性之时就遗失了不过在翻译“you”的时候的差异并没有就此终结比如说在豪萨语和科拉纳语中“you”的这个形式取决于听者的性别而更多的情况下，它取决于听者究竟是一个还是很多比如说德语中的“du”和ihr“即使在英语中某些方言以同样的方式用类似于“y‘all”或者是“youse”的词有些复数形式，比如说法语中的‘vous’和俄语中的“Вы”也都是由一个人来表示语言接收方的至关重要性非常像高贵版的“we”并且很多语言甚至都有特殊的形式来额外强调仅仅两个人比如说斯洛文尼亚语的“vidva”如果那还不够复杂的话关系，数量与性别都可以同时出现对选词产生影响在西班牙语中，“tu”是一个阴阳皆宜的非正式的单数词“usted”是一个阴阳皆宜的正式单数词“vosotros”是一个阳性的非正式的复数词“vosotras”是一个阴性的非正式的复数词“ustedes”是一个阴阳皆宜的正式的复数词唉哟说了那么多让人释然的是，有些语言常常省略掉第二人称代词在像罗马尼亚语和葡萄牙语中代词可能从句子中省略掉因为动词结合的方式很明显地顺便就将其给指了出来又比如在韩语，泰语及汉语中代词可以在没有任何语法暗示的情况下给省略掉讲话的人常常会宁愿听众根据文本来猜这些代词而不是使用错误的代词然后冒着被当成是粗鲁的风险所以如果你曾有当过笔译者然后碰见这个句子并且没有任何上下文联系“你和你，不，不是你，你，你的工作是为了你自己翻译“你”那么，祝你好运咯然后对于那些将要把这个视频翻译成多种语言的义务翻译者们抱歉咯

**P382 2016-08-11 How to visualize one part per million - Kim Preshoff + The TED-Ed Com**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=382)

What does it mean to be one in a million? Not in the greeting card sense, in the scientific sense, where one part per million is a unit of measurement. Parts per million counts the number of units of one substance per one million units of another. It can measure concentrations when a small amount makes a big difference. For example, a concentration of just 35 ppm of carbon monoxide in the air is poisonous to us. We encounter measurements like this pretty often, but because it's hard to conceptualize really large numbers, it's difficult to wrap our brain around what one part per million really means. So here are nine helpful ways to visualize it. If you had 11,363 pianos-worth of piano keys, one of those keys would be about one part per million. So would a single granule of sugar among 273 sugar cubes, one second in eleven and a half days, or four dots in the painting, "A Sunday Afternoon on the Island of La Grande Jatte." Your bath tub's capacity is about 60 gallons, so seven drops of ink would be one part per million. The English version of the Harry Potter series has 1,084,170 words, which makes "hippogriff" on page 221 of "The Prisoner of Azkaban" a little less than one part per million. A million kernels of corn is about 1,250 ears, so one kernel in that truckload would be one part per million. There are 10 million bricks in the Empire State Building, so one part per million would be a pile of just ten. And finally, 100 people worked together to animate this video. Collectively, they have about 10 million hairs on their heads. Pluck ten of those hairs, and you have one in a million.

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翻译人员: jianhuan lai 校对人员: Ellen Tung百万分之一意味着什么？不是在贺卡上的意义，從科学的角度來說，一百萬分之一是一个测量单位。每百萬分之計為一種物質單位的百萬分之一的數值。測量濃度時，百萬分之一的誤差會導致兩種完全不同的結果。例如，對我們而言，空氣中浓度為35 ppm（英文parts per million的缩写）的一氧化碳都是有毒的。我们经常会遇到这样的测量，但是，因为很难对如此巨大的数值形成清晰的认识，所以弄清楚一百万分之真正意味着什么是很难的。那么，现在这里有九个有助于弄清楚它的方法。如果你有11363台钢琴（每台标准钢琴由88个键），那些钢琴键中的一个就会是一百万分之一。所以，273个糖立方中的一个颗粒，十一天半中的一秒（共993600秒），或者这幅画上的四个点（大碗岛上的周日下午--乔治。修拉）它们都有关于一百万分之一。一般浴缸的容量是60加仑所以，60加仑墨水中的一滴，就会是一百万分之一。英文版的哈利波特系列的第三部，从骏鹰那一章到221页的阿兹卡班的囚徒，共有1084170个字母，表示其中一个字母为：1/1084170，略小于一百万分之一。125根玉米棒大约有壹佰万科玉米粒，所以，在那相当于一卡车载荷量的玉米中的一粒就会是一百万分之一。帝国大厦的建造使用了1000万块砖头，那么，帝国大厦的一百万分之一就会是十块砖头。最后，100个人一起创作这个视频，把他们手上的体毛加起来就会有一千万根，如果其中一个人拔掉他手上的十根，那么，这十根就是一千万根手毛的一百万分之一。

**P383 2016-08-12 How the Königsberg bridge problem changed mathematics - Dan Van der V**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=383)

You'd have a hard time finding Königsberg on any modern maps, but one particular quirk in its geography has made it one of the most famous cities in mathematics. The medieval German city lay on both sides of the Pregel River. At the center were two large islands. The two islands were connected to each other and to the river banks by seven bridges. Carl Gottlieb Ehler, a mathematician who later became the mayor of a nearby town, grew obsessed with these islands and bridges. He kept coming back to a single question: Which route would allow someone to cross all seven bridges without crossing any of them more than once? Think about it for a moment. 7 6 5 4 3 2 1 Give up? You should. It's not possible. But attempting to explain why led famous mathematician Leonhard Euler to invent a new field of mathematics. Carl wrote to Euler for help with the problem. Euler first dismissed the question as having nothing to do with math. But the more he wrestled with it, the more it seemed there might be something there after all. The answer he came up with had to do with a type of geometry that did not quite exist yet, what he called the Geometry of Position, now known as Graph Theory. Euler's first insight was that the route taken between entering an island or a riverbank and leaving it didn't actually matter. Thus, the map could be simplified with each of the four landmasses represented as a single point, what we now call a node, with lines, or edges, between them to represent the bridges. And this simplified graph allows us to easily count the degrees of each node. That's the number of bridges each land mass touches. Why do the degrees matter? Well, according to the rules of the challenge, once travelers arrive onto a landmass by one bridge, they would have to leave it via a different bridge. In other words, the bridges leading to and from each node on any route must occur in distinct pairs, meaning that the number of bridges touching each landmass visited must be even. The only possible exceptions would be the locations of the beginning and end of the walk. Looking at the graph, it becomes apparent that all four nodes have an odd degree. So no matter which path is chosen, at some point, a bridge will have to be crossed twice. Euler used this proof to formulate a general theory that applies to all graphs with two or more nodes. A Eulerian path that visits each edge only once is only possible in one of two scenarios. The first is when there are exactly two nodes of odd degree, meaning all the rest are even. There, the starting point is one of the odd nodes, and the end point is the other. The second is when all the nodes are of even degree. Then, the Eulerian path will start and stop in the same location, which also makes it something called a Eulerian circuit. So how might you create a Eulerian path in Königsberg? It's simple. Just remove any one bridge. And it turns out, history created a Eulerian path of its own. During World War II, the Soviet Air Force destroyed two of the city's bridges, making a Eulerian path easily possible. Though, to be fair, that probably wasn't their intention. These bombings pretty much wiped Königsberg off the map, and it was later rebuilt as the Russian city of Kaliningrad. So while Königsberg and her seven bridges may not be around anymore, they will be remembered throughout history by the seemingly trivial riddle which led to the emergence of a whole new field of mathematics.

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翻译人员: Yuyang Zhao 校对人员: Lipeng Chen在现在的地图上，你很难找到哥尼斯堡这个城市但是它在地理上奇特之处使得它在数学上成为最为著名的城市之一。这个中世纪的德国城市坐落于普雷格尔河的两岸。河的中央有两座大的岛屿。这两座岛屿通过七座桥与河的两岸以及与彼此连接。后来成为附近小镇市长的数学家卡尔·戈特利布·埃勒，对这些桥和岛屿十分着迷。他一直在考虑一个问题：哪一条路径可以使人穿过所有这七座桥并且同一座桥只能经过一次？思考一下。7654321放弃了吗？应该是的。这是不可能的。但是，大数学家莱昂哈德·欧拉 在试图解释这个数学问题时，开拓了一个新的数学领域。卡尔向欧拉写信求助。开始，欧拉认为这个问题和数学 无关，所以不关心这个问题。但是随着他对该问题的思考，他越来越发现该问题有一定的意义。他得出的答案与一类几何学相关但当时并不存在，他称之为位置几何学，就是现在著名的图论。欧拉最初的想法是进入岛屿或河岸和离开岛屿或河岸的路线实际上并不重要。这样，地图上便可以简化为四个岛用四个简单的点表示，我们现在称之为节点它们之间的线或边代表桥。这样，简化的图使我们比较容易计算每个节点的度，即连接岛之间桥的数量。为什么度很重要呢？试想，根据这个问题的规定，一旦有人想要通过一座桥到达一个岛屿，他就必须通过另外的桥离开。也就是说，在任何路线上，通往和离开每个节点的桥必须是不同的桥，这意味着连接每个岛的桥的数量一定是偶数。唯一可能的例外是在出发的位置和离开的位置。看下图，很明显所有四个节点的度都为奇数。于是，无论选择什么样的路线，在一些点上，一座桥势必会被经过两次。欧拉用这个证明发展出了一个通用的理论，适用于存在两个或两个以上节点的图。每一个边仅经过一次的欧拉路径只在两种情况下有可能。第一，当仅有两个节点为奇数度时，这意味着其它的都是偶数度。这样，开始点就是奇数度的一个，结束点是另外一个。第二，当所有的节点都是偶数度时，那么，欧拉路径就从同一个位置开始和结束，这被称为欧拉回路。于是，你怎么才能在格尼斯堡找到欧拉路径呢？这很简单。只要移走任一座桥。事实说明，历史创造了欧拉路径。二战期间，苏联空军摧毁了两个城市之间的一座桥，这便创造出了欧拉路径。虽然，公平来说，他们的目的不是这样。这些炸弹从地图上抹掉了格尼斯堡，并且这里被重建为之后的俄罗斯加里宁格勒市。所以尽管格尼斯堡和她的七座桥不再存在，但是它们会因这个导致全新数学 领域出现的谜团被历史记录下来。

**P384 2016-08-15 What is a vector - David Huynh**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=384)

Physicists, air traffic controllers, and video game creators all have at least one thing in common: vectors. What exactly are they, and why do they matter? To answer, we first need to understand scalars. A scalar is a quantity with magnitude. It tells us how much of something there is. The distance between you and a bench, and the volume and temperature of the beverage in your cup are all described by scalars. Vector quantities also have a magnitude plus an extra piece of information, direction. To navigate to your bench, you need to know how far away it is and in what direction, not just the distance, but the displacement. What makes vectors special and useful in all sorts of fields is that they don't change based on perspective but remain invariant to the coordinate system. What does that mean? Let's say you and a friend are moving your tent. You stand on opposite sides so you're facing in opposite directions. Your friend moves two steps to the right and three steps forward while you move two steps to the left and three steps back. But even though it seems like you're moving differently, you both end up moving the same distance in the same direction following the same vector. No matter which way you face, or what coordinate system you place over the camp ground, the vector doesn't change. Let's use the familiar Cartesian coordinate system with its x and y axes. We call these two directions our coordinate basis because they're used to describe everything we graph. Let's say the tent starts at the origin and ends up over here at point B. The straight arrow connecting the two points is the vector from the origin to B. When your friend thinks about where he has to move, it can be written mathematically as 2x + 3y, or, like this, which is called an array. Since you're facing the other way, your coordinate basis points in opposite directions, which we can call x prime and y prime, and your movement can be written like this, or with this array. If we look at the two arrays, they're clearly not the same, but an array alone doesn't completely describe a vector. Each needs a basis to give it context, and when we properly assign them, we see that they are in fact describing the same vector. You can think of elements in the array as individual letters. Just as a sequence of letters only becomes a word in the context of a particular language, an array acquires meaning as a vector when assigned a coordinate basis. And just as different words in two languages can convey the same idea, different representations from two bases can describe the same vector. The vector is the essence of what's being communicated, regardless of the language used to describe it. It turns out that scalars also share this coordinate invariance property. In fact, all quantities with this property are members of a group called tensors. Various types of tensors contain different amounts of information. Does that mean there's something that can convey more information than vectors? Absolutely. Say you're designing a video game, and you want to realistically model how water behaves. Even if you have forces acting in the same direction with the same magnitude, depending on how they're oriented, you might see waves or whirls. When force, a vector, is combined with another vector that provides orientation, we have the physical quantity called stress, which is an example of a second order tensor. These tensors are also used outside of video games for all sorts of purposes, including scientific simulations, car designs, and brain imaging. Scalars, vectors, and the tensor family present us with a relatively simple way of making sense of complex ideas and interactions, and as such, they're a prime example of the elegance, beauty, and fundamental usefulness of mathematics.

**P384 2016-08-15 What is a vector - David Huynh**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=384)

翻译人员: Mingyu Cui 校对人员: Qiyun Xing物理学家，航空管制员，以及电子游戏设计者都有一个共同的东西：矢量（数学中称向量）。它们到底是什么？ 又为什么这么重要？为了回答这个问题， 首先我们需要理解标量。标量是一个有大小的量。它告诉我们一个东西的多少。你和长椅之间的距离，杯子里饮料的体积和温度都由标量来描述。矢量也有大小， 此外还有一个另外的信息：方向。要走到长椅边上，你得知道它离你多远， 还要知道要走的方向，不是距离， 而是位移。使矢量特殊并且在各个领域中都有用的是它们不随视角的变化而变化而是相对参考系保持不变。这是什么意思呢？比如你和你的朋友要搬一个帐篷。你们站在帐篷两边， 所以你们面对着相反的方向。你的朋友向右走两步， 向前走三步。而你向左走两步， 向后退三步。即使看起来你们的移动方向不同，你们其实都像矢量描述的那样，向相同的方向移动了相同的距离。无论你们朝向哪个方向，或是你们在地上建起怎样的坐标系，这个矢量都不变。我们用很熟悉的笛卡尔坐标系解释一下。笛卡尔坐标系有x和y两条坐标轴。我们把这两个方向叫做基向量因为它们可以描述图中的任何向量。我们设帐篷从原点开始，最后被搬到了B点。连接两点的直箭头就是从原点到B点的矢量。当你的朋友思考他该怎么移动时，这个向量可以在数学上被写成2x+3y。或者表示成这样，叫做一个数组。但你正好面对着相反的方向，你的基向量也指向相反的方向，叫做x'和y'，你的运动可以被表示成这样，或者用这个数组。如果我们看这两个数组，它们显然不同，但是一个数组并不能完全表示一个矢量。数组需要基向量来给条件，当我们把它们安排好，就可以看出它们其实描述的是同一个矢量。你可以把数组中的元素想成一个个字母。就像一串字母 在已知语言的条件下才能成为一个单词，一个数组在给了基向量的条件下 才有了矢量的意义。就像不同的单词在不同语言里 有相同的含义，不同基向量下的不同数组 也可以表示同一个矢量。矢量是交流的精髓，无论用哪组基向量来描述。标量也有在不同基坐标下不变的性质。事实上，所有有这个性质的量都是“张量群”的成员。不同类型的张量包含不同的信息量。这是否意味着还有比矢量表达更多信息的量呢？当然。比如你在设计一个电子游戏，你想要真实地模拟水的行为。即使有些力作用方向相同，大小也相同，由于它们的作用点不同， 结果可能是波或者漩涡当一个矢量：力，与另一个描述作用点的矢量结合，我们就有了一个叫“应力”的物理量，应力是一个二阶张量的例子。这些张量也被用于电子游戏之外的各种用途，包括科学模拟，汽车设计，和脑图。标量，矢量，和张量家族 给了我们一个相对简单的方法来解释复杂的动作和物理量。就这样，它们是数学的优雅和美， 已及实用性的最好的例子。

**P385 2016-08-18 Are spotty fruits and vegetables safe to eat - Elizabeth Brauer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=385)

In 2010, $30 billion worth of fruits and vegetables were wasted by American retailers and shoppers in part because of cosmetic problems and perceived spoilage. That's a poor use of about 30% of the produce on the market, not to mention the water and energy required to grow and transport it, and the landfill space getting used up by rotting fruit. So what are those cosmetic problems? You've probably passed over a spotty apple in the grocery store, or accidentally sunk your thumb into a mushy patch on a tomato. These blemishes can doom produce to the trash can. But what are they anyway, and are they actually bad for you? Those spots are evidence of an epic battle between plants and microbes. Like humans, plants coexist with billions of fungi and bacteria. Some of these microbes are beneficial to the plant, suppressing disease and helping it extract nutrients. Others are pathogens, attacking the produce, still alive as it sits in a store display or your refrigerator and siphoning off molecules they can use themselves. The good news is they're almost never bad for you. These fungi and bacteria have spent millions of years developing strategies to overcome a plant's immune system. But healthy human immune systems are different enough that those strategies just don't work on us. So in a plant, what does this process look like? Microbes can reach plants in a number of ways, like getting splashed onto it during watering or fertilization. Under the right conditions, the microbes grow into large enough colonies to attack the waxy outer layer of fruit or leaves. Their target: the delicious sugars and nutrients inside. This type of pathogen often makes spots like this. A clump of bacteria drains the nutrients and color from the fruit's cells making that yellow halo. It then moves outward, leaving a black spot of dead cells in its wake. Each spot, which could contain hundreds of thousands of microbes is actually caused by a combination of microbial attack and the host defending itself. For example, this is the bacterial pathogen Pseudomonas syringae. Once on a tomato, it enters the fruit and leaves, multiplies in the space between the cells, and produces toxins and proteins that allow it to disrupt the plant's immune response. One toxin coronatine makes plants' stomata open up, allowing bacteria to enter more freely. Coronatine also activates pathways leading to chlorophyll degradation, which you can see as yellow spots. As the bacteria continue to feed and multiply, they start to kill off the plant cells. That explains spots, but what about mushy blemishes? Those are usually caused when the fruit is attacked by microbes after it's detached from the plant. If the plant is wounded during transport, necrotic fungi can infiltrate through the wound, kill the cells, absorb their nutrients, and leave your food looking mushy or brown. Those spots in particular can taste pretty bad. You're eating dead and decomposing tissue, after all. But you can usually salvage the rest of the fruit. The non-mushy spots, like the ones you typically see on apples or tomatoes, are just on the surface and don't usually affect flavor. Of course, microbes that do make us sick, like E. coli and salmonella, can hitch a ride on vegetables, too. But because they're not plant pathogens, they don't typically cause spots. They just hang out invisibly on the surface. So it's washing fruit and veggies, not avoiding the spotty ones, that will help you avoid getting sick. So the next time you're at the grocery store, don't be afraid to pick up funky-looking fruit. Some stores will even give you a discount. Wash them well and store them properly, as some produce like apples and cabbages will keep in the fridge for weeks. The spotty ones may not be eye candy, but they're safe and just as delicious.

**P385 2016-08-18 Are spotty fruits and vegetables safe to eat - Elizabeth Brauer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=385)

翻译人员: Weibo Huang 校对人员: 梦佳 庄2010年，价值三百亿美元的蔬菜水果被美国的商家和消费者白白浪费掉，其中一部分是因为 品相问题和表面的污损。这些损失就占到了市场上30%的农产品，更不用说其生长和运输过程中 所耗费的水电了，连垃圾场也不得不 腾出空间来倾置腐烂的水果。那么品相问题是什么？你一定在水果店嫌弃过 带有斑点的苹果，或是不小心捏到了番茄上塌软的部分。这些污损注定了这样的农产品要被扔掉。但它们究竟是什么，对我们真的有害吗？这些污损实际上是微生物侵入植物的证据。和人类一样，植物生长的环境 也存在着数不尽的真菌和细菌。有些是对植物有益的，比如抑制病虫害和增强养分吸收。其它则是病原菌，能够破坏植株，即使蔬果被摆上了商品架或者 放入冰箱，它们还有残留，继续榨取宿主养分以供自己存活。所幸它们对人体几乎是无害的。这些真菌和细菌已经用了 几百万年的时间进化出抵御植物免疫系统的能力。但是由于健康人体的 免疫系统和植物的大相径庭，它们的抗免疫能力对我们不起作用。那么在植株上， 这一过程是如何发生的呢？微生物接触植株的方式很多样，比如在浇水施肥的时候洒落到植株上。然后在合适的条件下，微生物繁殖成大块菌落，并开始破坏水果或者叶片的蜡状表皮。它们的目标是内部美味的糖分和养分。这种病原菌通常会导致这样的斑点。凝块的细菌摄取养分 促使水果细胞发生了颜色变化，出现黄色的圆形斑点。之后它们向外扩散，在待过的地方留下黑斑状的死细胞。一个斑点里可能有成百上千的微生物，实际上这是它们入侵和宿主自卫的过程中共同造就的产物。举个例子，这是丁香假单胞菌。一旦接触到番茄， 它就会侵入果实和叶子，在细胞间隙繁殖，分泌毒素和蛋白质从而使植株的免疫反应失效。一旦有毒的冠菌素打开了植株的气孔，细菌入侵就畅通无阻了。冠菌素同时还能降解叶绿素，所以我们才会看到黄色的斑点。随着细菌不断得到滋养和繁殖，它们开始杀死植株细胞。这是斑点的由来，但是 塌软的部分又作何解释呢？它们通常是在果实被微生物入侵并且离开后才形成的。如果植物在运输过程中表面受到破损，坏死性真菌可以从伤口渗入杀死植株细胞，榨取养分，导致食物看起来 呈褐色或者塌软的样子。这类斑点尝起来尤其难吃。毕竟你吃下去的 是坏死和分解后的组织。但是其余完好的部分 还是可放心食用。你在苹果或番茄上 常见的没有塌陷的斑点只是不美观，但并不影响味道。当然，有些微生物是致病的， 比如大肠杆菌和沙门氏菌，它们也会搭蔬菜的顺风车。但是因为它们不是植物病原菌， 所以不会导致斑点。它们只会无形地附着在表面。因而正确的做法是清洗蔬果， 而不是避开斑点，这样才能让你预防疾病。所以下一次你再去买水果，请放心挑选看上去很丑的水果。没准老板还会给你优惠。只要洗干净它们，合理贮藏，一些农产品如苹果和卷心菜 是可以冷藏保鲜几个星期的。带斑点的蔬果也许不美观， 但它们是安全的，而且同样美味。

**P386 2016-08-18 Is graffiti art Or vandalism - Kelly Wall**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=386)

Spray-painted subway cars, tagged bridges, mural-covered walls. Graffiti pops up boldly throughout our cities. It can make statements about identity, art, empowerment, and politics, while simultaneously being associated with destruction. And, it turns out, it's nothing new. Graffiti, or the act of writing or scribbling on public property, has been around for thousands of years. And across that span of time, it's raised the same questions we debate now: Is it art? Is it vandalism? In the 1st century BCE, Romans regularly inscribed messages on public walls, while oceans away, Mayans were prolifically scratching drawings onto their surfaces. And it wasn't always a subversive act. In Pompeii, ordinary citizens regularly marked public walls with magic spells, prose about unrequited love, political campaign slogans, and even messages to champion their favorite gladiators. Some, including the Greek philosopher Plutarch, pushed back, deeming graffiti ridiculous and pointless. But it wasn't until the 5th century that the roots of the modern concept of vandalism were planted. At that time, a barbaric tribe known as the Vandals swept through Rome, pillaging and destroying the city. But it wasn't until centuries later that the term vandalism was actually coined in an outcry against the defacing of art during the French Revolution. And as graffiti became increasingly associated with deliberate rebellion and provocativeness, it took on its vandalist label. That's part of the reason why, today, many graffiti artists stay underground. Some assume alternate identities to avoid retribution, while others do so to establish comradery and make claim to territory. Beginning with the tags of the 1960s, a novel overlap of celebrity and anonymity hit the streets of New York City and Philadelphia. Taggers used coded labels to trace their movements around cities while often alluding to their origins. And the very illegality of graffiti-making that forced it into the shadows also added to its intrigue and growing base of followers. The question of space and ownership is central to graffiti's history. Its contemporary evolution has gone hand in hand with counterculture scenes. While these movements raised their anti-establishment voices, graffiti artists likewise challenged established boundaries of public property. They reclaimed subway cars, billboards, and even once went so far as to paint an elephant in the city zoo. Political movements, too, have used wall writing to visually spread their messages. During World War II, both the Nazi Party and resistance groups covered walls with propaganda. And the Berlin Wall's one-sided graffiti can be seen as a striking symbol of repression versus relatively unrestricted public access. As the counterculture movements associated with graffiti become mainstream, does graffiti, too, become accepted? Since the creation of so-called graffiti unions in the 1970s and the admission of select graffiti artists into art galleries a decade later, graffiti has straddled the line between being outside and inside the mainstream. And the appropriation of graffiti styles by marketers and typographers has made this definition even more unclear. The once unlikely partnerships of graffiti artists with traditional museums and brands, have brought these artists out of the underground and into the spotlight. Although graffiti is linked to destruction, it's also a medium of unrestricted artistic expression. Today, the debate about the boundary between defacing and beautifying continues. Meanwhile, graffiti artists challenge common consensus about the value of art and the degree to which any space can be owned. Whether spraying, scrawling, or scratching, graffiti brings these questions of ownership, art, and acceptability to the surface.

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翻译人员: Lily Liu 校对人员: Jiawei Ni喷涂的地铁车厢，贴了艺术贴纸的大桥，画满壁画的墙。涂鸦大胆地占据了我们的城市。涂鸦可以用来表达 个性，艺术，权利以及政治，然而也同时具有破坏的意味。事实上，涂鸦并不是新鲜事物。涂鸦，或者说是在公共财产上 乱涂乱画的艺术，已经存在了上千年。当然，在这段时间内，涂鸦引出了我们至今还在辩论的话题：涂鸦是一种艺术形式吗？还是一种破坏行为呢？在公元前1世纪，罗马人经常会在 公共墙壁上面刻写信息，而在海洋的另一边，玛雅人大量地在他们的墙壁上刻画。当然，涂鸦并不总是破坏性的行为。在庞培，普通民众定期会 在公共墙壁上刻画关于单相思之情的咒语和诗文，以及政治宣传口号，甚至是为了支持他们热爱的角斗士而撰写的留言。但是一些人，包括希腊的哲学家 普鲁塔克，在那个年代也认为涂鸦是荒诞且无意义的。但是直到公元5世纪，对于破坏文物行为的概念才开始形成。在那个时候， 野蛮部落汪达尔席卷罗马，掠夺并摧毁这个城池。但是直到几个世纪以后的法国文艺复兴时期，破坏文物行为这个词才被创造出来， 用来反对文艺复兴时期对艺术的丑化。然而，随着涂鸦越来越多的和有计划地叛乱和煽动活动联系在一起。涂鸦被加上了恶意破坏的标签。这就是在当今好多涂鸦艺术家 都隐藏自己身份的部分原因。一些人认为隐藏涂鸦艺术家的身份可以避免惩罚，另一些人这么做是为了 建立同志关系或者宣誓主权。标签1960年代，一部混杂着名人和匿名者的小说，开始在纽约和费城的大街小巷一炮而红。使用密码符号来标记他们在城市里的行踪而且常常显示出他们的发源地。由于涂鸦的是非常不合法的， 这迫使它变成地下行动。这也增加它的好奇性 而带来更多的追随者。空间和归属权是涂鸦历史的主要问题。它的现代演化 是紧随着反主流文化背景的。随着涂鸦运动出现了反对它们的声音，涂鸦艺术家相应地挑战着 社会公共财产的固定界限。他们开拓到了地铁，广告牌，甚至有一次还画到了动物园大象身上。也包括了政治运动，他们使用墙壁来用图画表达他们的心声。在二战期间，纳粹党和反对团体在墙壁上涂满了宣传标语。柏林墙的一面涂鸦墙就可以被视为压制的突出标志和于此相对的无法限制的公众。当与涂鸦艺术相关的，反主流文化运动成为了主流。那涂鸦也被接受了么？从1970年代开始成立了所谓的涂鸦联盟，10年后涂鸦艺术家的作品也可以进驻博物馆，涂鸦一直在主流的内外之间徘徊。涂鸦艺术被商人和印刷者采用着，这使得对它的定义更加模糊。涂鸦艺术家们同传统博物馆及同行业之间的看起来不可能的伙伴关系，这使得这些艺术家重见天日来到聚光灯下。尽管涂鸦与破坏关联着，它也是一种适中的无限制的艺术表达方式。如今，对于丑化和美化的边界的辩论还在进行。同时，涂鸦艺术家 对于人们对艺术价值的传统定义，以及对空间的所有权进行了挑战。不论是喷漆，乱画，亦或是乱写，涂鸦引出了对于所有权、艺术和社会容忍性的问题的讨论。

**P387 2016-08-21 How do animals see in the dark - Anna Stöckl**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=387)

To human eyes, the world at night is a formless canvas of grey. Many nocturnal animals, on the other hand, experience a rich and varied world bursting with details, shapes, and colors. What is it, then, that separates moths from men? Moths and many other nocturnal animals see at night because their eyes are adapted to compensate for the lack of light. All eyes, whether nocturnal or not, depend on photoreceptors in the retina to detect light particles, known as photons. Photoreceptors then report information about these photons to other cells in the retina and brain. The brain sifts through that information and uses it to build up an image of the environment the eye perceives. The brighter the light is, the more photons hit the eye. On a sunny day, upwards of 100 million times more photons are available to the eye than on a cloudy, moonless night. Photons aren't just less numerous in darkness, but they also hit the eye in a less reliable way. This means the information that photoreceptors collect will vary over time, as will the quality of the image. In darkness, trying to detect the sparse scattering of randomly arriving photons is too difficult for the eyes of most daytime animals. But for night creatures, it's just a matter of adaptation. One of these adaptations is size. Take the tarsier, whose eyeballs are each as big as its brain, giving it the biggest eyes compared to head size of all mammals. If humans had the same brain to eye ratio, our eyes would be the size of grapefruits. The tarsier's enlarged orbs haven't evolved to make it cuter, however, but to gather as much light as possible. Bigger eyes can have larger openings, called pupils, and larger lenses, allowing for more light to be focused on the receptors. While tarsiers scan the nocturnal scene with their enormous peepers, cats use gleaming eyes to do the same. Cats' eyes get their shine from a structure called the tapetum lucidum that sits behind the photoreceptors. This structure is made from layers of mirror-like cells containing crystals that send incoming light bouncing back towards the photoreceptors and out of the eye. This results in an eerie glow, and it also gives the photoreceptors a second chance to detect photons. In fact, this system has inspired the artificial cats' eyes we use on our roads. Toads, on the other hand, have adapted to take it slow. They can form an image even when just a single photon hits each photoreceptor per second. They accomplish this with photoreceptors that are more than 25 times slower than human ones. This means toads can collect photons for up to four seconds, allowing them to gather many more than our eyes do at each visual time interval. The downside is that this causes toads to react very slowly because they're only receiving an updated image every four seconds. Fortunately, they're accustomed to targeting sluggish prey. Meanwhile, the night is also buzzing with insects, such as hawk moths, which can see their favorite flowers in color, even on a starlit night. They achieve this by a surprising move - getting rid of details in their visual perception. Information from neighboring photoreceptors is grouped in their brains, so the photon catch of each group is higher compared to individual receptors. However, grouping photoreceptors loses details in the image, as fine details require a fine grid of photoreceptors, each detecting photons from one small point in space. The trick is to balance the need for photons with the loss of detail to still find their flowers. Whether eyes are slow, enormous, shiny, or coarse, it's the combination of these biological adaptations that gives nocturnal animals their unique visual powers. Imagine what it might be like to witness through their eyes the world that wakes up when the Sun goes down.

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翻译人员: Cynthia Zhang 校对人员: Amy Lu在人类眼中，夜晚的世界是无序杂乱的灰色而对于夜间动物而言它们眼中的世界更为精彩： 充满各类细节、形状、颜色蛾子与人类的眼睛到底有何不同？蛾子与其他的夜间动物能夜间视物因为它们的眼睛可以自动调节适应 缺少光线的情况所有动物的眼睛，无论是不是夜间动物都是依靠视网膜上的光感器来捕捉 光线粒子也就是光子然后，光感器向大脑和视网膜内其他细胞报告光子的信息大脑通过筛选信息来建立眼睛所看到的周围环境的图像光线越强，越多光子进入眼睛阳光明媚的天气你的眼睛接收的光子比多云阴暗的夜晚多一亿倍在黑暗中光子并不会减少数量但它们进入眼球的方式更不稳定这意味着光感器收集的信息会随着时间的流逝而改变图片的质量也会下降黑暗中想要捕捉到随机分散 又稀少的光子对于日间动物的双眼 是个困难的任务但对于夜间动物它们只需要适应一下它们需要调整尺寸以眼镜猴为例，它们的眼球和大脑 一般大小是哺乳动物中眼球大脑相对值最大的如果人类拥有同等的相对值， 我们的眼睛会像葡萄柚一样大眼镜猴的大眼球不是为了显得可爱而是为了捕捉到尽可能多的光眼睛越大，瞳孔越大晶状体越大越多的光能够聚集在光感器上眼镜猴用巨大的双眼扫描夜间景象而猫用细小闪光的双眼也能做到它们使用脉络膜层来获得图像这个结构在光感器后方这种结构是由多层镜状细胞组成细胞中含结晶体，其作用是反射接收的光线 传递给光感器并将光送出眼睛这造成了一种诡异的光流光感器因此有机会再次侦测光子实际上，这种结构是车辆远光灯的灵感 来源而另一种动物，蟾蜍习惯了慢慢来它们的眼睛能构成一幅图像即使每个光感器每秒只能捕捉一个光子秘诀在于它们的光感器比人类的慢了不止25倍这意味着蟾蜍能接收光子长达4秒因此它们在视觉间隔中收集的信息比我们更多这个系统的缺点就是减缓了 蟾蜍的反应速度因为它们每四秒才能收到 一次信息更新幸运的是，它们习惯捕食行动缓慢的猎物夜晚充斥着昆虫的鸣叫声比如说鹰蛾即使夜晚没有任何光源，它们也能看见 花朵的颜色它们达成这点的方式令人惊奇去除视觉接收系统中所有的细节相邻光感器的信息在大脑处理时 放在了一起因此每个群组的光子捕捉比单一光感器的数量多然而，以群组为单位的光感器 失去了图像的种种细节因为完整的细节呈现需要精密网格 状的光感器每个光感器在每个点都要捕捉到光子这种方法牺牲了细节，平衡光子数量蛾子仍然能找到花朵无论双眼速度是快是慢，是大是小 是亮是暗，是粗是细它们都是生物适应性的组合给予了夜间动物独一无二的视力想象我们通过它们双眼看世界的景象太阳落下之后夜世界的绮丽

**P388 2016-08-24 How do contraceptives work - NWHunter**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=388)

Here's what has to happen for pregnancy to occur after sexual intercourse. Sperm must swim up the vagina, through the cervical opening, upwards through the uterus, and into one of the two fallopian tubes. If an egg, released during that month's ovulation, is in the tube, one sperm has a chance to fertilize it. Contraceptives are designed to prevent this process, and they work in three basic ways. They block the sperm, disable sperm before they reach the uterus, or suppress ovulation. Block is the simplest. Male and female condoms prevent sperm from coming into contact with the vaginal space. That barrier is also why they, unlike other contraceptive methods, are able to prevent transmission of certain sexually transmitted diseases. Meanwhile, the diaphragm, cervical cap, and sponge work by being placed over the cervix, barricading the entrance to the uterus. These contraceptives are sometimes called barrier methods and can be used with spermicides, an example of the second category, disable. A spermicide is a chemical that immobilizes and destroys sperm. Today's spermicides come as foam, cream, jelly, suppositories, and even a thin piece of translucent film that dissolves in the vagina. These products can be inserted directly into the vagina before intercourse, or can be combined with block methods, like a diaphragm or condom, for added proection. The third category for preventing pregnancy works by suppressing the action of an egg maturing in the ovary. If there isn't an egg available in the fallopian tube, there's nothing for sperm to fertilize. Hormonal contraceptives, including the pill, the patch, the Depo shot, and the vaginal ring all release synthetic versions of various combinations of progesterone and estrogen. This hormone cocktail suppresses ovulation, keeping the immature egg safely sequestered in the ovary. Synthetic progesterone also has a block trick up its sleeve. It makes cervical mucus too thick and sticky for sperm to swim through easily. There are other contraceptives that use multiple approaches at the same time. For example, many IUDs, or intrauterine devices, contain synthetic hormones which suppress ovulation. Some also contain copper, which disable sperm while also making egg implantation in the uterus difficult. Block, disable, or suppress: is one strategy better than the other? There are differences, but a lot of it has to do with how convenient and easy it is to use each contraceptive correctly. For example, male condoms would be about 98% effective if everyone used them perfectly. That 98% means if 100 couples correctly used condoms for a year, two women would get pregnant. But not everyone uses them correctly, so they're only 82% effective in practice. Other methods, like the patch and pill, are 99% effective when they're used perfectly. But in practice, that's 91%. Spermicide is only 85% effective, even with perfect usage, and just 71% effective with typical usage. Another important consideration in the choice of contraceptives are side effects, which almost exclusively affect women rather than men. Hormonal methods in particular can cause symptoms like headaches, nausea, and high blood pressure, but they vary from woman to woman. That's why these methods require a prescription from a doctor. The choice of contraceptive method is a personal one, and what works best for you now may change later. Scientists also continue to research new methods, such as a male pill that would prevent sperm production. In the meantime, there are quite a few options to block sperm, disable them, or suppress eggs and keep them out of reach.

**P388 2016-08-24 How do contraceptives work - NWHunter**

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翻译人员: Yuyang Zhao 校对人员: 颖 曾今天要讲的是在性交之后怀孕是如何发生的精子必须游向阴道通过宫颈口向上通过子宫然后进入两个输卵管中的一个如果在那个月产生的卵子正好在输卵管中那么就会有一个精子有机会与卵子结合避孕用品就是用来阻止这个过程的它有三种基本的工作原理它们阻止精子使精子在到达输卵管前失活或者抑制排卵阻止是最简单的方式男女用避孕套阻止精子与阴道接触与其它避孕方法不同的是 这种方式能避免某些性病的传播。同时 隔膜 子宫帽和海绵状的东西放在子宫颈上一起发挥作用 阻碍精子进入子宫这些避孕方法有时被称为障碍避孕法并且也能与杀精子剂一起使用杀精子剂是第二类使精子丧失活性的方法杀精子剂是一种使精子丧失机动性进而破坏精子的化学药物现在的杀精子剂主要是泡沫 油脂 胶体 栓剂甚至是一种能在阴道内溶解的半透明薄膜这些产品可以在性交前直接插入阴道或者与阻止法相结合 比如隔膜或者避孕套用以增加避孕效果第三类防止怀孕的方法是通过抑制卵子在卵巢中的成熟进程如果在输卵管中没有可利用的卵子也就没有精子和卵子的结合激素类避孕药物包括口服药片 膏药 避孕针和阴道环都能释放人造的各种孕酮和雌性激素的结合物这种激素类混合物抑制排卵使卵巢中未成熟的卵子被安全隔绝合成孕酮对付避孕也自有一招它将子宫液变得又粘又稠 使得精子不易通过其它的避孕方式就是将上面几种方式同时使用例如，许多子宫内避孕器或者宫内避孕环含有抑制排卵的合成激素一些含有铜的合成激素可使精子丧失活性 同时使卵子在子宫内难以生存阻止 失去活性 或者抑制难道这个办法就比另外一个好吗有一定的区别 但这些方法必须要与怎样才能方便简单地正确使用这些避孕用具例如 男用避孕套如果能被正确地使用的话有百分之九十八都会有效果98%着 如果100对夫妇在一年中正确的使用避孕套只有两个女性会怀孕但并不是每个人都能正确使用避孕套 所以事实上只有82%有效果其它方法 比如膏药 药片 如果它们被正确地使用99%都有效果可是在实践中 只有91%有效果而杀精子剂即使正确使用 效果也仅有85%如果只是没有方法地使用 那么效果仅为71%另一个选择避孕方式的重要因素是其副作用这几乎仅仅影响女人 而不是男人尤其是激素类方法会引起一些症状 比如 头疼恶心以及高血压但这也只是因人而异这就是为什么这些方法需要医生开处方的原因选择避孕的方法是比较私人的并且好的方法对同一个人的效果也可能前后不一科学家也在继续研究新的方法比如阻止精子产生的男性避孕药同时 阻止精子也有相当多的方法进行选择使它失去活性或者抑制卵子 使它和精子无法接触

**P389 2016-09-07 Could we survive prolonged space travel - Lisa Nip**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=389)

Prolonged space travel takes a severe toll on the human body. Microgravity impairs muscle and bone growth, and high doses of radiation cause irreversible mutations. As we seriously consider the human species becoming space-faring, a big question stands. Even if we break free from Earth's orbit and embark on long-duration journeys among the stars, can we adapt to the extreme environments of space? This won't be the first time that humans have adapted to harsh environments and evolved superhuman capabilities. Not fantastical powers like laser vision or invisibility, but physiological adaptations for survival in tough conditions. For example, on the Himalayan mountains where the highest elevation is nine kilometers above sea level, an unacclimated lowland human will experience symptoms of hypoxia, commonly known as mountain sickness. At these altitudes, the body usually produces extra red blood cells, thickening the blood and impeding its flow. But Himalayans who have lived on these mountains for thousands of years permanently evolved mechanisms to circumvent this process and maintain normal blood flow. Cases like that prove that humans can develop permanent lifesaving traits. But natural adaptation for entire human populations could take tens of thousands of years. Recent scientific advances may help us accelerate human adaptation to single generations. To thrive as a species during space travel, we could potentially develop methods to quickly program protective abilities into ourselves. A beta version of these methods is gene therapy, which we can currently use to correct genetic diseases. Gene editing technology, which is improving rapidly, allows scientists to directly change the human genome to stop undesirable processes or make helpful substances. An example of an unwanted process is what happens when our bodies are exposed to ionizing radiation. Without an atmospheric barrier and a magnetic field like Earth's, most planets and moons are bombarded with these dangerous subatomic particles. They can pass through nearly anything and would cause potentially cancerous DNA damage to space explorers. But what if we could turn the tables on radiation? Human skin produces a pigment called melanin that protects us from the filtered radiation on Earth. Melanin exists in many forms across species, and some melanin-expressing fungi use the pigment to convert radiation into chemical energy. Instead of trying to shield the human body, or rapidly repair damage, we could potentially engineer humans to adopt and express these fungal, melanin-based energy-harvesting systems. They'd then convert radiation into useful energy while protecting our DNA. This sounds pretty sci-fi, but may actually be achievable with current technology. But technology isn't the only obstacle. There are ongoing debates on the consequences and ethics of such radical alterations to our genetic fabric. Besides radiation, variation in gravitational strength is another challenge for space travelers. Until we develop artificial gravity in a space ship or on another planet, we should assume that astronauts will spend time living in microgravity. On Earth, human bone and muscle custodial cells respond to the stress of gravity's incessant tugging by renewing old cells in processes known as remodeling and regeneration. But in a microgravity environment like Mars, human bone and muscle cells won't get these cues, resulting in osteoporosis and muscle atrophy. So, how could we provide an artificial signal for cells to counteract bone and muscle loss? Again, this is speculative, but biochemically engineered microbes inside our bodies could churn out bone and muscle remodeling signaling factors. Or humans could be genetically engineered to produce more of these signals in the absence of gravity. Radiation exposure and microgravity are only two of the many challenges we will encounter in the hostile conditions of space. But if we're ethically prepared to use them, gene editing and microbial engineering are two flexible tools that could be adapted to many scenarios. In the near future, we may decide to further develop and tune these genetic tools for the harsh realities of space living.

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翻译人员: Yulin Li 校对人员: Jenny Yang长时间的太空旅行会对人体造成严重的伤害。微重力会阻碍肌肉和骨骼的生长，高剂量的辐射会引起不可逆转的变异。当人类在宇宙中翱翔变得可行，有一个重要问题值得我们思考即使我们能逃离地球轨道起航长距离恒星间太空旅程，我们能适应宇宙中极端的环境吗？这并不会是人类第一次适应艰难的环境并且因此而进化出“超人”的能力不是像激光视力或者隐身那样幻想般的超能力而是在极端条件下生存的生理适应例如，在喜马拉雅山上最高高度高于海平面九公里，一个不适应高原的低地人会有缺氧症状也被叫做高原反应或高山症在这样的高海拔里，人体通常会制造额外的红血细胞这会让血液变浓稠，并且会减缓血液循环但是已经住在这些山里上千年的喜马拉雅山人已经进化出能够规避这个过程并且保持正常血液循环的机制这样的案例证明 人类可以进化出永久的、可以救命的特征。但是一整个人类种族的自然适应需要成千上万年的时间。近期的科学进展也许可以帮助加速人类适应把成千上万年减到一代人。为了让这个物种在宇宙旅行中茁壮成长，我们有潜能来研究新的方式来快速在我们的身体里规划自我保护技能。基因治疗是这些方式的测试版之一当前，我们可以通过基因治疗来纠正遗传疾病。正在高速发展的基因编辑技术让科学家直接改变人类的基因组以此来停止不被渴望的过程，或者制造有用的物质。一个不被渴望过程的例子是当我们的身体被暴露在电离辐射中。没有了地球的大气屏障和磁场，大部分的行星和月亮都被这些危险的亚原子粒子包围。这样的粒子可以穿过几乎所有东西并且有引起癌变DNA的潜力。但是如果我们改变辐射与人体的关系呢？人体的皮肤制造黑色素黑色素可以在地球上帮助我么免受辐射的伤害。许多其他的物种也有不同种类的黑色素，一些带有黑色素的菌类运用黑色素来将辐射转换为化学能量。与其尝试屏蔽起人类的身体，或者快速的修补损伤，我们或许可以改变人类让人类也可以适应和运用这些和菌类一样的，使用黑色素来收获能量的系统。这样，人们就可以将辐射转换成可以被利用的能量，并且保护我们的DNA。这听起来很像科幻小说，却事实上可以被当前的科技实现。但是，科技并不是唯一的阻碍。这样对基因改变的后果和伦理都不断被讨论。除了辐射，其他重力的变化会对太空旅行者造成挑战。直到我们研究出可以用在宇宙飞船或者另一个星球的人工重力我们应该推断宇航员们会一直在微重力的环境里生活。在地球上，人类的骨头、肌肉和保管细胞在重力的牵引下通过重塑和再生来更新久细胞。但是在一个像火星一样的微重力环境，人体的骨头和肌肉无法得到这样的信号，也就导致了骨质疏松和肌肉萎缩。那么，我们要如何制造出给细胞的人造信号来防止骨头和肌肉流失呢？这也同样是尝试和投机，但是我们身体里通过生物化学产生的微生物可以引起重塑骨头和肌肉信号的条件。或者人类可以在基因上被改变以此在失重的时候制造更多这样的信号。辐射和微重力只是我们会在宇宙中遇到的挑战的其中两个但是如果我们在伦理上准备好了来运用它们，基因编辑和微生物工程是两个灵活的工具，它们可以在许多不同的情况下被应用。在不久的将来，我们也许会决定去发展这些基因工具让艰难的宇宙生活变得可行。

**P390 2016-09-09 The history of the Cuban Missile Crisis - Matthew A. Jordan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=390)

It's not hard to imagine a world where at any given moment, you and everyone you know could be wiped out without warning at the push of a button. This was the reality for millions of people during the 45-year period after World War II, now known as the Cold War. As the United States and Soviet Union faced off across the globe, each knew that the other had nuclear weapons capable of destroying it. And destruction never loomed closer than during the 13 days of the Cuban Missile Crisis. In 1961, the U.S. unsuccessfully tried to overthrow Cuba's new communist government. That failed attempt was known as the Bay of Pigs, and it convinced Cuba to seek help from the U.S.S.R. Soviet premier Nikita Khrushchev was happy to comply by secretly deploying nuclear missiles to Cuba, not only to protect the island, but to counteract the threat from U.S. missiles in Italy and Turkey. By the time U.S. intelligence discovered the plan, the materials to create the missiles were already in place. At an emergency meeting on October 16, 1962, military advisors urged an airstrike on missile sites and invasion of the island. But President John F. Kennedy chose a more careful approach. On October 22, he announced that the the U.S. Navy would intercept all shipments to Cuba. There was just one problem: a naval blockade was considered an act of war. Although the President called it a quarantine that did not block basic necessities, the Soviets didn't appreciate the distinction. In an outraged letter to Kennedy, Khrushchev wrote, "The violation of freedom to use international waters and international airspace is an act of aggression which pushes mankind toward the abyss of world nuclear missile war." Thus ensued the most intense six days of the Cold War. While the U.S. demanded the removal of the missiles, Cuba and the U.S.S.R insisted they were only defensive. And as the weapons continued to be armed, the U.S. prepared for a possible invasion. On October 27, a spy plane piloted by Major Rudolph Anderson was shot down by a Soviet missile. The same day, a nuclear-armed Soviet submarine was hit by a small-depth charge from a U.S. Navy vessel trying to signal it to come up. The commanders on the sub, too deep to communicate with the surface, thought war had begun and prepared to launch a nuclear torpedo. That decision had to be made unanimously by three officers. The captain and political officer both authorized the launch, but Vasili Arkhipov, second in command, refused. His decision saved the day and perhaps the world. But the crisis wasn't over. For the first time in history, the U.S. Military set itself to DEFCON 2, the defense readiness one step away from nuclear war. With hundreds of nuclear missiles ready to launch, the metaphorical Doomsday Clock stood at one minute to midnight. But diplomacy carried on. In Washington, D.C., Attorney General Robert Kennedy secretly met with Soviet Ambassador Anatoly Dobrynin. After intense negotiation, they reached the following proposal. The U.S. would remove their missiles from Turkey and Italy and promise to never invade Cuba in exchange for the Soviet withdrawal from Cuba under U.N. inspection. Once the meeting had concluded, Dobrynin cabled Moscow saying time is of the essence and we shouldn't miss the chance. And at 9 a.m. the next day, a message arrived from Khrushchev announcing the Soviet missiles would be removed from Cuba. The crisis was now over. While criticized at the time by their respective governments for bargaining with the enemy, contemporary historical analysis shows great admiration for Kennedy's and Khrushchev's ability to diplomatically solve the crisis. But the disturbing lesson was that a slight communication error, or split-second decision by a commander, could have thwarted all their efforts, as it nearly did if not for Vasili Arkhipov's courageous choice. The Cuban Missile Crisis revealed just how fragile human politics are compared to the terrifying power they can unleash.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=390)

翻译人员: Xuejin Peng 校对人员: xuanan lin不难想象，有这样一个世界，某个瞬间，你和所有认识的人都毫无预警兆的灰飞烟灭，只需要按动某个键。在二战之后45年间，这对于数百万人来说都曾是事实这段时期如今被称为冷战。美国和苏联在世界范围内对峙，他们知道，彼此拥有足以毁灭世界的核武器这种威胁，在古巴导弹危机的13天里曾史无前例的逼近人类。1961年，美国没能阻止古巴建立共产主义政府这次失败，即是后世熟知的“猪湾事件“而这次事件，也促使古巴转向苏联，寻求帮助。当时苏联主席赫鲁晓夫，非常乐意提供帮助：秘密地向古巴出售核导弹。不仅是为了保护古巴，也是为了平衡美国在意大利和土耳其设置导弹所带来的威胁。当美国情报部门发现这个计划，制造导弹的原材料，已经准备妥当。在1962年10月16日的紧急会议上，军事顾问煽风点火，提出空袭导弹发射基地，同时，入侵古巴的方案。但是，当时的总统肯尼迪，选择了更谨慎的方法。在10月22号，他宣布：美国海军可以拦截所有通往古巴的船只。这样做存在一个问题：海上封锁，视同战争。虽然肯尼迪总统称之为：隔离，并没有阻断基础物资的运输。但是苏联显然对此无法苟同。在一封给肯尼迪的信中，赫鲁晓夫义愤填膺的写道：“侵害他国自由使用公海和公共领空的权利，是侵略行为。这是会将人类推向世界核导弹战争的深渊。“随之而来的，是冷战中最紧张的六天。美国坚持移除导弹，而古巴和苏联坚称，自己只是出于自卫。随着武器一步步装备完善，美国在为可能存在的入侵做准备。10月27日，一架由飞行员鲁道夫.安德逊少校驾驶的侦察机，被苏联导弹击落。同一天，苏联一艘核潜艇被美国海军的深水炸弹攻击，意图标志该核潜艇位置。此时，核潜艇上的指挥官，因为水深无法与地面沟通，误以为战争已经开始，准备发射载核鱼雷。这个决定需要三位军官一致通过。船长和政委都已经同意发射鱼雷，但是阿尔希波夫副官，否决了该项决议。他的决定拯救了这一天，甚至可能拯救了世界。但是危机并未过去。这是史上第一次。美军进入全面戒备状态，这种状态离核战争，只有一步之遥。有数百个核导弹随时准备发射，离末日之钟的敲响，只有分毫之差。但是外交开始发挥作用。在华盛顿特区,总指挥官罗伯特.肯尼迪秘密会见了苏联大使：阿纳托利.杜布莱宁。通过激烈的谈判，他们达成了以下决议：美国移除在土耳其和意大利设立的导弹，并且承诺永不侵略古巴。作为交换，苏联军队将在联合国的监视下撤离古巴。当会议结束，杜布莱宁给莫斯科发电报称：时机可贵，我们不能错失良机。在第二天的早上9点，赫鲁晓夫发来消息，宣布苏联将移除古巴的导弹，危机得以解除。虽然当时，他们被各自代表的政府所诟病，称其与虎谋皮。但是当代史的分析给予了极高的评价。肯尼迪和赫鲁晓夫用外交手段解决了危机。令人后怕的是：一个小小的沟通问题，或者指挥官一瞬间的决定，都能使他们的努力前功尽弃。感谢阿希波夫的勇敢抉择。古巴导弹危机展现出了，与我们所无法控制的可怕力量相比，人类政治的脆弱性。

**P391 2016-09-13 Aphasia - The disorder that makes you lose your words - Susan Wortman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=391)

Language is an essential part of our lives that we often take for granted. With it, we can communicate our thoughts and feelings, lose ourselves in novels, send text messages, and greet friends. It's hard to imagine being unable to turn thoughts into words. But if the delicate web of language networks in your brain became disrupted by stroke, illness, or trauma, you could find yourself truly at a loss for words. This disorder, called aphasia, can impair all aspects of communication. People who have aphasia remain as intelligent as ever. They know what they want to say, but can't always get their words to come out correctly. They may unintentionally use substitutions called paraphasias, switching related words, like saying "dog" for "cat," or words that sound similar, such as "house" for "horse." Sometimes, their words may even be unrecognizable. There are several types of aphasia grouped into two categories: fluent, or receptive, aphasia and non-fluent, or expressive, aphasia. People with fluent aphasia may have normal vocal inflection but use words that lack meaning. They have difficulty comprehending the speech of others and are frequently unable to recognize their own speech errors. People with non-fluent aphasia, on the other hand, may have good comprehension but will experience long hesitations between words and make grammatical errors. We all have that tip-of-the-tongue feeling from time to time when we can't think of a word, but having aphasia can make it hard to name simple, everyday objects. Even reading and writing can be difficult and frustrating. So how does this language loss happen? The human brain has two hemispheres. In most people, the left hemisphere governs language. We know this because in 1861, the physician Paul Broca studied a patient who lost the ability to use all but a single word, "tan." During a postmortem study of that patient's brain, Broca discovered a large lesion in the left hemisphere now known as Broca's area. Scientists today believe that Broca's area is responsible in part for naming objects and coordinating the muscles involved in speech. Behind Broca's area is Wernicke's area near the auditory cortex. That's where the brain attaches meaning to speech sounds. Damage to Wernicke's area impairs the brain's ability to comprehend language. Aphasia is caused by injury to one or both of these specialized language areas. Fortunately, there are other areas of the brain which support these language centers and can assist with communication. Even brain areas that control movement are connected to language. FMRI studies found that when we hear action words, like "run" or "dance," parts of the brain responsible for movement light up as if the body was actually running or dancing. Our other hemisphere contributes to language, too, enhancing the rhythm and intonation of our speech. These non-language areas sometimes assist people with aphasia when communication is difficult. So how common is aphasia? Approximately 1 million people in the U.S. alone have it, with an estimated 80,000 new cases per year. About one-third of stroke survivors suffer from aphasia making it more prevalent than Parkinson's disease or multiple sclerosis, yet less widely known. There is one rare form of aphasia called primary progressive aphasia, or PPA, which is not caused by stroke or brain injury, but is actually a form of dementia in which language loss is the first symptom. The goal in treating PPA is to maintain language function for as long as possible before other symptoms of dementia eventually occur. However, when aphasia is acquired from a stroke or brain trauma, language improvement may be achieved through speech therapy. Our brain's ability to repair itself, known as brain plasticity, permits areas surrounding a brain lesion to take over some functions during the recovery process. Scientists have been conducting experiments using new forms of technology, which they believe may encourage brain plasticity in people with aphasia. Meanwhile, many people with aphasia remain isolated, afraid that others won't understand them or give them extra time to speak. By offering them the time and flexibility to communicate in whatever way they can, you can help open the door to language again, moving beyond the limitations of aphasia.

**P391 2016-09-13 Aphasia - The disorder that makes you lose your words - Susan Wortman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=391)

翻译人员: Zifan Meng 校对人员: Xinyu Wang语言是生活中非常基本的部分，我们经常会觉得它的存在是理所应当的有了它，我们可以交流我们的思想和感情沉浸在书本里发送短信向朋友打招呼很难想象当我们不能把想法变成语言时会是怎么但是如果大脑中脆弱的语言网络被中风，疾病，或者外伤所损坏了你会发现自己真的哑口无言这种叫做失语症的病症，可以阻碍所有的交流方式失语症患者患病后智商不变他们知道自己想说什么但是不能每次都准确无误的说出他们可能会不经意的用错词语像用“狗”代替“猫” 一样用相关联的词替换或者是听上去相似的词 例如“house“说成"horse”有些时候他们说的词语甚至不被认知失语症被分为几种，归属于两大类流畅的，或者善于倾听的失语症和不流畅的，表达类的失语症患有流畅失语症的人有正常的语调变化但是用的词没有任何意义他们无法理解别人在说什么也经常时常无法找出自己语句里的错误另一方面，非流畅型失语症患者或许有好的理解能力但是会说话时出现长时间的停顿以及语法错误我们都有过那种话到嘴边却找不到适合的词的感觉但是患有失语症意味着连简单的日常生活用品都无法表达连阅读和写作都会变得困难和沮丧那么这个失语症是怎么发生的呢人的大脑里有两个半球我们知道大部分人的左脑负责语言这要归功于1861年一位叫做保罗布洛卡的内科医生的研究他的研究的病患只能说一个词 tan通过对他的大脑的尸检布洛卡发现了患者左脑有一大块区域受到了损伤现在这一区域被称为布洛卡区现在，科学家发现布洛卡区负责给物体取名字并且协调说话用的肌肉在布洛卡区的后面是威尔尼克区 靠近听觉皮质这里是大脑把意思和声音所联系起来的地方威尔尼克区受伤会干涉到大脑理解语言的能力失语症就是由于二者之一或全部受损产生的幸运的是 大脑里还有别的地方支持着这两个中心区域同时可以帮助交流甚至有些控制运动的大脑区域都和语言有联系功能性磁共振成像发现了当我们听到动作词 例如“跑”或“跳”大脑中负责控制运动的部分会亮起来好像身体真的在跑步或者跳舞一样我们右脑半球也对语言有贡献它加强我们讲话时的节奏和声调当交流十分困难的时候这些非语言区域有时也会帮助失语症患者那失语症有多常见呢？在美国，大约有一百万人患有这种疾病估计每年还会新增八万名病患中风活下来的人里面大约有三分之一被失语症所折磨这让它比帕金森综合症和多发性硬化症更加普遍但是知道的人却更少有一种罕见的失语症叫做原发性进行性失语症 简称PPA它不是由中风或者大脑受损引起的而实际上是失智症的一种表现语言能力退化是失智症的第一症状治疗PPA的目的是让患者在其他症状最终出现之前尽量长时间的保持语言能力如果失语症是由大脑受损或中风引起的语言治疗或许可以提高语言能力我们的大脑有自我修复的能力 被称之为大脑的可塑性在大脑受伤区域自我修复的过程中这使得它周围的部分行使部分功能科学家们在用新的技术开展实验希望达到增强失语症患者大脑可塑性的目标现在 许多失语症患者依然与世隔绝他们怕别人不理解他们在说什么 或者不给他们多一点时间去表达通过付出一些时间，用他们可以做到的方式灵活的交流你可以帮助他们重新打开语言的大门超越失语症的限制

**P392 2016-09-13 Why are there so many types of apples - Theresa Doud**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=392)

Have you ever walked into a grocery store and wondered where all those variety of apples came from? You might find SnapDragon, Pixie Crunch, Cosmic Crisp, Jazz, or Ambrosia next to the more familiar Red Delicious and Granny Smith. These delightfully descriptive names belong to just a handful of the over 7,500 apple varieties in the world. This huge diversity exists largely because of humanity's efforts to bear new fruit. Fruit breeding is a way to fulfill the expectations of farmers and consumers who seek specific qualities in an apple. On the one hand, farmers may want them to be disease-resistant and to store well. On the other, consumers are swayed by appearance, taste, and novelty. So, breeders have to consider everything from how well apples grow in certain climates to their color, taste, and size. And sometimes finding the perfect fit means breeding something new. To create apples with desirable characteristics, breeders first need to find parent apples that carry those characteristics. Once the parents have been selected, they have to wait until the trees bloom in the spring. The breeder takes the pollen from one bloom, called the father, and transfers it by hand to the other parent bloom, called the mother, through a process called cross-pollination. Once the mother bloom turns into an apple, the seeds are collected and then planted. It takes about five years for these seeds to grow into trees that produce apples, but because of the way traits are inherited, all of the seedlings produced will have different sets of genes and characteristics. This means that to achieve a desired quality, it takes a lot of offspring, not to mention patience on the breeder's part. When a seedling does bear fruit with the desired qualities, it's selected for further evaluation. Of the original crossed seedlings, about one in every 5,000 makes it to this prestigious stage. They're then sent to new farms where breeders can assess how various climates and soil types affect the plant's growth. The fruit of the seedling and its many clones must then be collected and sampled to ensure consistency. Breeders study about 45 traits in an apple, like the texture and firmness of the flesh, when it ripens, how sugary its juice is, and how long it stays fresh. Over several years, they weed out all the bad apples, selecting only those whose fruits are the best. These exclusive plants officially form the cultivar, or new apple variety. To ensure an exact copy of this cultivar, all apple trees must be grafted from the original seedling. Branches, called scion wood, are cut from the original tree and grown to generate more scion wood. Segments of these trees are then grafted onto root stalk - that's the lower section of another tree that's been chosen from a different cultivar for its superior roots and growing ability. Finally, this fusion creates a new apple tree with the desired qualities. Each new plant takes up to four years before it starts producing the fruit we eat. Apple breeding may be a difficult art, but it's accessible to all: universities, companies, and even individuals can create new cultivars. But to fully own an apple, the breeder faces a final challenge - naming the fruit. After a cultivar is patented, a breeder chooses a name for its trademark. That final step grants them long-lasting rights over the apple and its clones. That name must be completely original, and the catchier, the better, of course. With over 7,500 varieties and counting, that's why we have apples called Pink Lady, Sweet Tango, Kiku, and EverCrisp. The more we work with nature's bounty to breed new cultivars, the more creative and delectable these names will become.

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翻译人员: Tianyu Qiao 校对人员: Gabriella Hu在你走进超市的时候有没有想过那么多种类的苹果都是从哪来的呢？你也许能看到龙果皮克西果笑脆果爵士苹果或者安波西亚苹果旁边还有我们更熟悉的红美味和澳洲青苹这些有着讨人欢喜名字的苹果品种只是世界上7500种苹果中的一小部分这种庞大的多样性归功于人类发明新果种的努力苹果育种的方式可以满足农民和消费者对于苹果特殊品质的期望一方面，农民们希望他们种的果树不轻易染病，产的苹果容易储藏另一方面，消费者们则倾向于购买好看，好吃和新奇的品种因此，育种人员就要考虑到各种因素包括苹果在不同气候中的生长情况以及果子的颜色，味道和大小有时候最完美的方案就是发明一个新品种要想育出各方面都出色的苹果品种育种人员先得找到一对出色的苹果“父母”选好父母之后育种人员要等到它们的果树在春天开花然后从被称作父亲的果树中取出花粉再用手将花粉转移到母亲果树那里这个过程叫做“异花授粉”当母树开花并结出果实育种人员会取出果核，对其进行栽种从这些果核生长成树到结出苹果，大概需要5年的时间但是由于继承特点的方式有异这些果核都会具有不同的基因和特性因此，想要配出质量令人满意的苹果需要经过很多实验育种人员需要非常地耐心当他们发现某种果核正是他们所要这个果核将被选中进行下一步检测在最初开始参加配种的果核中每5000个中大概只有1个会有幸被选中这些幸运果核会被送到一个新农场在那里育种人员会对气候和土壤种类进行检测看看这里是否适合果树种植这些果核和它们的克隆体必须被进行整理和筛选，以确保它们的特性一致育种人员会学习一个苹果的45种特性比如口感和果肉的紧实度当苹果成熟后果肉的含糖度以及果子的保鲜时间经过几年的研究，育种人员会筛掉较差的果种只选出成果上乘的果种这些幸运儿会正式成为“培育对象”或者是新型果种为了确保不出差错地复制出更多的“培育对象”所有果树必须直接由原始果种移植而成树枝，在这称作“接穗”枝会被从原始果树剪下，并被用来种植更多接穗枝接下来，这些树的各个部分会被嫁接到树根上也就是另一棵树最低的部分这个部分是从不同的培育对象那里选来的因为它的根部健壮，生长能力强最终，这个融合过程创造出一颗新的果树并富有我们想要的特质每颗新果树都要花4年以上的时间才会开始产出可供我们享受的果实苹果育种听起来像是一种艰难的艺术，但却是谁都可以尝试：大学各种公司甚至普通人都能在家创造新果苗但要是真想拥有新苹果的产权，育种人员还面临着一个终极挑战 －给苹果起名字在一个果种取得专利后育种人员会给它选一个名字来作为商标完成这一步后才可以永远拥有这个苹果和它的复制果这个名字必须是没人用过的名字而且当然是越好记越有利目前我们有7500多种苹果，而且这个数字还在增加这就是为什么我们现在看到的苹果有像粉红佳人绝美探戈蜜酷久脆果这样的苹果名字如果我们能更好利用自然界中的丰富果类来育种就能有更多具特色和更美味的苹果问世

**P393 2016-09-17 Is it bad to hold your pee - Heba Shaheed**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=393)

It begins with a bit of discomfort and soon becomes a pressing sensation that's impossible to ignore. Finally, it's all you can think about, and out of sheer desperation, you go on a hunt for a bathroom until "ahh." Humans should urinate at least four to six times a day, but occasionally, the pressures of modern life forces us to clench and hold it in. How bad is this habit, and how long can our bodies withstand it? The answers lie in the workings of the bladder, an oval pouch that sits inside the pelvis. Surrounding this structure are several other organs that together make up the whole urinary system. Two kidneys, two ureters, two urethral sphincters, and a urethra. Constantly trickling down from the kidneys is the yellowish liquid known as urine. The kidneys make urine from a mix of water and the body's waste products, funneling the unwanted fluid into two muscular tubes called ureters. These carry it downward into the hollow organ known as the bladder. This organ's muscular wall is made of tissue called detrusor muscle which relaxes as the bladder fills allowing it to inflate like a balloon. As the bladder gets full, the detrusor contracts. The internal urethral sphincter automatically and involuntarily opens, and the urine is released. Whooshing downwards, the fluid enters the urethra and stops short at the external urethral sphincter. This works like a tap. When you want to delay urinating, you keep the sphincter closed. When you want to release it, you can voluntarily open the flood gates. But how do you sense your bladder's fullness so you know when to pee? Inside the layers of detrusor muscles are millions of stretch receptors that get triggered as the bladder fills. They send signals along your nerves to the sacral region in your spinal cord. A reflex signal travels back to your bladder, making the detrusor muscle contract slightly and increasing the bladder's pressure so you're aware that it's filling up. Simultaneously, the internal urethral sphincter opens. This is called the micturition reflex. The brain can counter it if it's not a good time to urinate by sending another signal to contract the external urethral sphincter. With about 150 to 200 milliliters of urine inside of it, the bladder's muscular wall is stretched enough for you to sense that there's urine within. At about 400 to 500 milliliters, the pressure becomes uncomfortable. The bladder can go on stretching, but only to a point. Above 1,000 milliliters, it may burst. Most people would lose bladder control before this happens, but in very rare cases, such as when as a person can't sense the need to urinate, the pouch can rupture painfully requiring surgery to fix. But under normal circumstances, your decision to urinate stops the brain's signal to the external urethral sphincter, causing it to relax and the bladder to empty. The external urethral sphincter is one of the muscles of the pelvic floor, and it provides support to the urethra and bladder neck. It's lucky we have these pelvic floor muscles because placing pressure on the system by coughing, sneezing, laughing, or jumping could cause bladder leakage. Instead, the pelvic floor muscles keep the region sealed until you're ready to go. But holding it in for too long, forcing out your urine too fast, or urinating without proper physical support may over time weaken or overwork that muscular sling. That can lead to an overactive pelvic floor, bladder pain, urgency, or urinary incontinence. So in the interest of long-term health, it's not a great habit to hold your pee. But in the short term, at least, your body and brain have got you covered, so you can conveniently choose your moment of sweet release.

**P393 2016-09-17 Is it bad to hold your pee - Heba Shaheed**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=393)

翻译人员: 小布 陈 校对人员: Jiawei Ni刚开始还只是有点不舒服但是很快就变成了不可忽视的尿意最终，这变成你脑子里唯一想做的事情而且纯粹出于绝望你冲去厕所，直到“啊。”人每天至少要排尿四到六次偶尔情况下，都市生活的压力迫使我们只能憋着这个习惯有多坏？我们身体能憋多久？答案就在于膀胱的工作原理骨盆里的一个椭圆囊这个结构组织的旁边是几个其他的器官合起来就组成了排尿系统两个肾两个输尿管两个尿道括约肌一个尿道从肾脏连续流出来的黄色液体就是尿液形成于肾脏里的尿液由身体里的水分和终末产物合成废液通过漏斗般的口子流到两个叫着输尿管的肌管中然后注入一个中空的器官，就是膀胱这个器官壁是由一种叫做逼尿肌的组织构成的当膀胱注入尿液时，它会像气球一样膨胀扩张当膀胱涨满时，逼尿肌收缩尿道内括约肌自然而然的张开尿就排出来了液体飞速的向下流进尿道从膀胱经尿道排出体外这个过程就像水龙头当你想憋尿时，括约肌就会关上当你想排尿时，你会无意识地打开这扇大门但你怎样才能意识到你膀胱满了没有呢所以你能知道你什么时候该尿尿了呢？在逼尿肌里有千万层交织成网的牵张感受器当膀胱尿量增加时，会牵拉这些感受器它们通过神经发送信号到骨髓骶的中枢区域一个反射信号再反射到膀胱使括约肌轻微收缩增加膀胱的压力，从而让使人知道膀胱已经满了同时，括约肌内壁开始打开这叫做排尿反射大脑会判断现在是不是排尿的合适时机通过发射另一个信号来控制尿道外括约肌膀胱内尿量达到150到200毫升时，膀胱壁扩张能让人感觉到尿意当有400到500毫升时，这种尿意使人感到不舒服膀胱还是可以扩张，但是有一个极限点尿液超过1000毫升时，膀胱可能会炸掉多数人会在这种情况发生前就排尿但是在极少数的情况下例如当一个人感受不到要尿意时膀胱会痛苦的破裂，需要手术来修复但是在正常情况下你要排尿的决定阻止了大脑向尿道外括约肌发出信号使得它开始放松，膀胱排空尿道外括约肌是一种盆底肌它向尿道和膀胱颈提供支撑能有这些盆底肌是幸运因为像咳嗽打喷嚏大笑或者跳跃时对这个系统产生的压力可能会时膀胱漏尿相反的，盆底肌使这个区域封闭着直到你准备好去排尿但是憋着的时间太长会导致你排尿的速度特别快或者尿的时候没有合适的身体支撑可能会使尿道括约肌痉挛或者逼尿肌无力这可能会导致盆底肌松弛膀胱痛尿急或者尿失禁为了长期健康的考虑憋尿不是好习惯但是短期来说，至少你的身体和大脑都正常的情况下你可以合理的来选择排尿的时间

**P394 2016-09-20 The history of African-American social dance - Camille A. Brown**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=394)

This is the Bop. The Bop is a type of social dance. Dance is a language, and social dance is an expression that emerges from a community. A social dance isn't choreographed by any one person. It can't be traced to any one moment. Each dance has steps that everyone can agree on, but it's about the individual and their creative identity. Because of that, social dances bubble up, they change, and they spread like wildfire. They are as old as our remembered history. In African-American social dances, we see over 200 years of how African and African-American traditions influenced our history. The present always contains the past. And the past shapes who we are and who we will be. (Clapping) The Juba dance was born from enslaved Africans' experience on the plantation. Brought to the Americas, stripped of a common spoken language, this dance was a way for enslaved Africans to remember where they're from. It may have looked something like this. Slapping thighs, shuffling feet and patting hands: this was how they got around the slave owners' ban on drumming, improvising complex rhythms just like ancestors did with drums in Haiti or in the Yoruba communities of West Africa. It was about keeping cultural traditions alive and retaining a sense of inner freedom under captivity. It was the same subversive spirit that created this dance: the Cakewalk, a dance that parodied the mannerisms of Southern high society -- a way for the enslaved to throw shade at the masters. The crazy thing about this dance is that the Cakewalk was performed for the masters, who never suspected they were being made fun of. Now you might recognize this one. 1920s -- the Charleston. The Charleston was all about improvisation and musicality, making its way into Lindy Hop, swing dancing and even the Kid n Play, originally called the Funky Charleston. Started by a tight-knit Black community near Charleston, South Carolina, the Charleston permeated dance halls where young women suddenly had the freedom to kick their heels and move their legs. Now, social dance is about community and connection; if you knew the steps, it meant you belonged to a group. But what if it becomes a worldwide craze? Enter the Twist. It's no surprise that the Twist can be traced back to the 19th century, brought to America from the Congo during slavery. But in the late '50s, right before the Civil Rights Movement, the Twist is popularized by Chubby Checker and Dick Clark. Suddenly, everybody's doing the Twist: white teenagers, kids in Latin America, making its way into songs and movies. Through social dance, the boundaries between groups become blurred. The story continues in the 1980s and '90s. Along with the emergence of hip-hop, African-American social dance took on even more visibility, borrowing from its long past, shaping culture and being shaped by it. Today, these dances continue to evolve, grow and spread. Why do we dance? To move, to let loose, to express. Why do we dance together? To heal, to remember, to say: "We speak a common language. We exist and we are free."

**P394 2016-09-20 The history of African-American social dance - Camille A. Brown**

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翻译人员: Shengwei Cai 校对人员: Yuyang Zhao这是博普舞属于社交舞的一种舞蹈是一种语言社交舞是从群体社会中衍生来的一种表达方式它不是由任何单独的个人编排出来的也不能追溯到某个特定的时刻每个舞蹈都有所有人都能合拍的舞步但是它有关个人和他们的个性正因如此社交舞迅速发展它们改变像野火般蔓延从有历史以来就有社交舞的存在我们从过去两百年的非-美洲社交舞发展我们从过去两百年的非-美洲社交舞发展可见非洲传统和非-美洲传统对我们历史的影响现在包含着过去过去塑造了我们现在的身份和我们将要什么样的人（拍掌声）朱巴舞是根据非洲黑奴在种植园的经历而来的朱巴舞是根据非洲黑奴在种植园的经历而来的后被带到美洲除去共同语言它是非洲奴隶用来铭记自己从何处来的方式看起来可能是这个样子拍大腿来回动脚还有拍手他们就这样应付禁止击鼓的奴隶主创造出复杂节奏就像祖先在海地做的击鼓或是西非约鲁巴人做的那样为的是存续文化传统为的是在奴役下保持内在自由为的是在奴役下保持内在自由在同样的颠覆精神下还创造了另一种舞蹈踢踏舞这是种滑稽模仿美国南部上流社会举止的舞蹈奴隶用这种方式来嘲笑他们的主人更好笑的是奴隶们还要把踢踏舞跳给奴隶主看但却不觉得奴隶在取笑他们可能现在你们认识这个舞二十世纪二十年代的查尔斯顿舞查尔斯顿舞完全是即兴和乐感然后发展成林迪舞摇摆舞甚至Kid N Play原先称为时髦查尔斯顿舞发源于南卡罗来纳州查尔斯顿附近一个密集的黑人社区查尔斯顿舞风靡于各大舞厅年轻女郎尽情享受着踢脚和动腿的自由年轻女郎尽情享受着踢脚和动腿的自由现今，社交舞关系着社区和纽带如果你懂这个舞步你就属于这个集体但如果这个舞步风靡全球了呢现在讲扭扭舞扭扭舞可以追溯到十九世纪并不为奇是在奴隶时期从刚果带到美国的舞蹈是在奴隶时期从刚果带到美国的舞蹈但在五十年代后期正值民权运动之前恰比·却克和迪克·克拉克把扭扭舞推广开来忽然间所有人都在跳扭扭舞比如白人青少年和拉美的小孩儿后来还融入到歌曲和电影中通过社交舞族群间的界限模糊了故事继续发展到八十年代及九十年代随着嘻哈舞的出现非裔社交舞受关注程度得到提高借鉴其悠久历史舞蹈和文化彼此影响、塑造现在，这些舞种持续进化、成长和传播我们为什么跳舞是为了移动为了放松为了表达我们为什么一起跳舞是为了和解为了铭记为了说：我们说着共同语言我们存在而且我们自由

**P395 2016-09-29 Could human civilization spread across the whole galaxy - Roey Tzezan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=395)

Translator: Jessica Ruby Reviewer: Brian Greene Could human civilization eventually spread across the whole Milky Way galaxy? Could we move beyond our small blue planet to establish colonies in the multitude of star systems out there? This question's a pretty daunting one. There are around 300 billion stars in the galaxy, which is about 160,000 light-years across. So far we've sent a single spacecraft outside our solar system, trudging along at 0.006% of the speed of light. At that rate, it would take over 2.5 billion years just to get from one end of the galaxy to the other. And then there's the question of human survival. The gulf between stars is simply enormous. We couldn't live sustainably on most planets, and we require a lot of resources to stay alive. And yet, decades ago, scholars found that it's theoretically possible to not just spread human civilization across the galaxy, but to do so quite quickly, without breaking any known laws of physics. Their idea is based on the work of a mathematician named John von Neumann, who designed on paper machines that could self-replicate and create new generations of themselves. These would later come to be known as von Neumann machines. In the context of space exploration, von Neumann machines could be built on Earth and launched into space. There, the self-sufficient machines would land on distant planets. They would then mine the available resources and harvest energy, build replicas of themselves, launch those to the nearest planets, and continue the cycle. The result is the creation of millions of probes spreading outwards into the universe like a drop of ink in a fishbowl. Scholars crunched the numbers and found that a single von Neumann machine traveling at 5% of the speed of light should be able to replicate throughout our galaxy in 4 million years or less. That may sound like a long time, but when you consider that our universe is 14 billion years old, on a cosmic scale, it's incredibly fast - the equivalent of about 2.5 hours in an entire year. Creating von Neumann machines would require a few technologies we don't have yet, including advanced artificial intelligence, miniaturization, and better propulsion systems. If we wanted to use them to spread actual humans throughout the galaxy, we would need yet another technological leap - the ability to artificially grow biological organisms and bodies using raw elements and genetic information. Regardless, if in the last billion years an alien civilization created such a machine and set it multiplying its way toward us, our galaxy would be swarming with them by now. So then where are all these machines? Some astronomers, like Carl Sagan, say that intelligent aliens wouldn't build self-replicating machines at all. They might hurtle out of control, scavenging planets to their cores in order to keep replicating. Others take the machines absence as proof that intelligent alien civilizations don't exist, or that they go extinct before they can develop the necessary technologies. But all this hasn't stopped people from imagining what it would be like if they were out there. Science fiction author David Brin writes about a universe in which many different von Neumann machines exist and proliferate simultaneously. Some are designed to greet young civilizations, others to locate and destroy them before they become a threat. In fact, in Brin's story "Lungfish," some von Neumann machines are keeping a close watch over the Earth right now, waiting for us to reach a certain level of sophistication before they make their move. For now, all we have is curiosity and theory. But the next time you look at the night sky, consider that billions of self-replicating machines could be advancing between stars in our galaxy right now. If they exist, one of them will eventually land on Earth, or maybe, just maybe, they're already here.

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翻译人员: Shengwei Cai 校对人员: Gabriella Hu人类文明能遍布银河系吗我们能在这个小小的蓝色星球之外的广袤星系建立殖民地吗这个问题还挺吓人的银河系有3000亿颗恒星左右从一边到另一边的距离是160000光年现在为止我们就发送了一艘宇宙飞船到太阳系外以0.006%光速缓慢前行以那个速度，得花不止25亿年才能横跨一个星系然后就有了这个人类生存的问题恒星间的距离简直大无边际在多数星球上我们都不能持续生存而且我们需要很多资源才能存活下来然而几十年前，学者发现从理论角度在银河系传播人类文明不仅是可行的而且还能很快实现还不违背现有的物理定律这个想法源于一名叫约翰·冯·诺依曼的数学家的研究他在纸上设计了一台能进行自动复制和创造新一代的机器他在纸上设计了一台能进行自动复制和创造新一代的机器后来这些机器被称为冯·诺依曼机器在太空探索的背景下冯·诺依曼机器可以建在地球上然后发射进太空太空中，这种自给机器会在遥远的星球着陆然后开采可用资源、搜集能量进行自我复制把复制的机器发射到最近的星球然后不断循环这个过程最后结果就是无数探测器像水里的一点墨水一样不断向外在宇宙中蔓延学者进行计算之后发现，一台冯·诺依曼机器以5%光速飞行要花400万年才能通过不断复制穿越银河系听起来时间很长但想到140亿岁高龄的宇宙从宇宙尺度看来已经非常快了也就是一整年里的两个半小时造一台冯·诺依曼机器需要几项目前没有的新技术造一台冯·诺依曼机器需要几项目前没有的新技术包括先进的人工智能微型化科技更好的推进系统如果想运用这些技术把人类送进银河系我们还得需要另一项技术性飞跃通过原始元素和基因信息来人为造出生物有机体和生物机体通过原始元素和基因信息来人为造出生物有机体和生物机体不管怎么说，如果过去10亿年间有外星文明造出了类似的机器通过不断复制的方式向我们驶来我们的银河系应该已经到处都是这些机器了但是那些机器在哪儿呢一些天文学家，比如卡尔·萨根，说聪明的外星人不可能建造自我复制机器这些机器会在横冲直撞后失去控制为了实现自我复制把星球洗劫一空另外一些人认为这种机器不存在是因为根本不存在智慧的外星文明或者在他们发展出必要科技前就已经灭绝了但这些想法并不妨碍人类想象，如果存在外星文明将是怎样一番景象科幻小说作家大卫·布林描写了一个存在许多不同的冯·诺依曼机器并同时扩散的宇宙描写了一个存在许多不同的冯·诺依曼机器并同时扩散的宇宙一些机器跟年轻文明打招呼另一些则定位年轻文明，并且在年轻文明成为威胁前将其摧毁实际上，布林的小说“Lungfish"里面一些冯·诺依曼机器正密切关注着地球等我们成熟到一定阶段后他们才采取行动目前，我们有的只是好奇心和理论但下次你仰望夜空时想象无数自我复制的机器正在银河系的恒星间穿梭如果它们存在，最后一定会降临地球也许，它们已经到地球了

**P396 2016-09-29 How the rubber glove was invented \_ Moments of Vision 4 - Jessica Ore**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=396)

In a Moment of Vision... It's the winter of 1890. Dr. William Halsted is the chief surgeon at Johns Hopkins Hospital. The scrub nurse under Halsted, a woman named Caroline Hampton, begins to develop a severe reaction to the strong disinfectants used to scour her hands and arms before surgery. Halsted takes an interest in her plight. In a moment of vision, he asks Goodyear rubber company to experiment with the production of a pair of thin rubber gloves. They fit Caroline, well, like gloves, and her hands begin to recover. In fact, the gloves are such a success that the good doctor orders more for his team and for himself. From these early experiments, a multibillion dollar rubber glove industry is born. And it turns out the doctor didn't just want to protect the nurse's hands. He also wanted to take them in holy matrimony. Halsted and Caroline were married just a few months after he gave her that first pair of gloves.

**P396 2016-09-29 How the rubber glove was invented \_ Moments of Vision 4 - Jessica Ore**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=396)

翻译人员: 颖 曾 校对人员: Gabriella Hu在"视觉的时机"中那是1890年的冬天威廉·霍尔斯特德博士 是约翰霍普金斯医院的主治外科医生霍尔斯特德手下的一个名叫 卡洛琳·汉普顿的手术助理护士她开始出现对强度消毒剂的一种严重反应该消毒剂用来在手术前擦洗她的双手和手臂霍尔斯特德对她的困境提起了兴趣没多久，他让固特异轮胎橡胶公司对一双薄橡胶手套的生产进行实验它们非常贴合卡洛琳的手， 就像手套一样，并且她的手开始愈合事实上，这双手套做得非常成功以至于霍尔斯特德医生为他的团队 以及他自己订购了更多的这种手套从这些早期实验中一个数十亿美元的橡胶手套产业诞生了人们发现医生不仅仅只是想要用来 保护这个护士的手他还想将它们用于神圣的婚礼中霍尔斯特德和卡罗琳结婚了婚礼就在他把这第一双手套送给她的几个月后

**P397 2016-10-04 How does the Nobel Peace Prize work - Adeline Cuvelier and Toril Roks**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=397)

What do a seventeen-year-old Pakistani, a Norwegian explorer, a Tibetan monk, and an American pastor have in common? They were all awarded the Nobel Peace Prize. Among the top prestigious awards in the world, this prize has honored some of the most celebrated and revered international figures and organizations in history. To understand how it all got started, we have to go back to the 1800s. Swedish chemist Alfred Nobel was then mostly known for the invention of dynamite, a breakthrough which launched his career as a successful inventor and businessman. 30 years later, he had become extremely wealthy, but never married, and had no children. When his will was opened after his death, it came as a surprise that his fortune was to be used for five prizes in physics, chemistry, medicine, literature, and peace. These prizes illustrated his lifelong commitment to sciences and his passion for literature. But what about peace? Because Nobel's name was tied to inventions used in the war industry, many have assumed that he created the peace prize out of regret. However, this is all speculation as he never expressed any such sentiments, and his inventions were also used for constructive purposes. Instead, many historians connect Alfred Nobel's interest for the peace cause to his decade-long friendship and correspondence with an Austrian pacifist named Bertha Von Suttner. Von Suttner was one of the leaders of the international peace movement, and in 1905, after Nobel's death, she became the first woman to be awarded the Nobel Peace Prize. Nobel's will outlined three criteria for the Peace Prize, which unlike the other Sweden-based prizes, would be administered in Norway. Disarmament, peace congresses, and brotherhood between nations. These standards have since been expanded to include other ways of promoting peace, such as human rights and negotiations. And the prize doesn't just have to go to one person. About a third of Noble Peace Prizes have been shared by two or three laureates. So how do nominations for the prize work? According to the Nobel Foundation, a valid nomination can come from a member of a national assembly, state government, or an international court. Eligible nominators also include university rectors, professors of the social sciences, history, philosophy, law, and theology, and previous recipients of the Peace Prize. But if you want to know more about who was recently nominated, you'll have to be patient. All information about nominations remains secret for 50 years. Take Martin Luther King Jr. We didn't actually know who nominated him until 2014. His nominators turned out to be the Quakers, who had won the prize previously, and eight members of the Swedish Parliament. There's no limit to the number of times a person or organization can be nominated. In fact, Jane Addams, recognized as the founder of social work in the United States, was nominated 91 times before finally being awarded the prize. The absence of a laureate can also be symbolic. The 1948 decision not to award the prize following the death of Mahatma Gandhi has been interpreted as an attempt to respectfully honor the so-called missing laureate. As with the other Nobel Prizes, the Peace Prize can't be awarded posthumously. The secret selection process takes almost a year, and is carried out by the five appointed members of the Norwegian Nobel Committee who are forbidden from having any official political function in Norway. Starting with a large pool of nominations, exceeding 300 in recent years, they access each candidate's work and create a short list. Finally, the chairman of the Nobel Committee publicly announces the laureate in October. The awards ceremony takes place on December 10th, the anniversary of Alfred Nobel's death. The prize itself includes a gold medal inscribed with the Latin words, "Pro pace et fraternitate gentium," or "For the peace and brotherhood of men," as well as a diploma and a large cash prize. Recently, it's been 8 million Swedish kronor, or roughly a million US dollars, which is split in the case of multiple laureates. And while laureates can use the prize money as they choose, in recent years, many have donated it to humanitarian or social causes. For many years, the Nobel Peace Prize was predominately awarded to European and North American men. But in recent years, significant changes have been taking place, making the prize more global than ever. 23 organizations and 103 individuals, that's 87 men and 16 women, have made up the 126 Nobel Peace Prize laureates in history. They include Desmond Tutu for his nonviolent campaign against apartheid in South Africa, Jody Williams for her campaign to ban and clear anti-personnel mines, Rigoberta Menchú Tum for her work for social justice and reconciliation based on respect for the rights of indigenous peoples, Martti Ahtisaari for his efforts to resolve international conflicts in Namibia, Kosovo, and Indonesia, and Aung San Suu Kyi for her nonviolent struggle for democracy and human rights in Myanmar. They're just a few examples of the people who have inspired us, challenged us, and demonstrated through their actions that there are many paths to peace.

**P397 2016-10-04 How does the Nobel Peace Prize work - Adeline Cuvelier and Toril Roks**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=397)

翻译人员: Fan Ye 校对人员: 添翼 徐一个十七岁的巴基斯坦人一个挪威探险家一个西藏僧侣和一个美国牧师有什么共同点？他们都获得过诺贝尔和平奖作为世界最权威的奖项之一诺贝尔和平奖被授予许多一些历史上最著名和最受尊敬的人物及组织为了了解这一切如何开始， 我们需要回到十九世纪瑞典化学家阿尔弗雷德·诺贝尔在当时以发明炸药而闻名这项突破性发明使他开始了一个成功的发明家和商人的事业三十年后，他变得非常富有但是他一生未婚也没有孩子当他的遗嘱在他去世之后被打开人们很惊讶地发现他的财产都被用在五个奖上关于物理、化学、医学、文学和和平这些奖表现了他对于科学终身的承诺和他对于文学的热爱那和平呢？因为诺贝尔的名字和用于战争的发明紧紧联系很多人认为诺贝尔是出于内疚而创造出和平奖但是，这只是猜测， 他从未表达过这样的观点他的发明也被用于建设性工作相反地，许多历史学家将 诺贝尔对和平产生兴趣的原因归结于他与奥地利和平主义者贝尔塔·冯·苏特纳数十年的友谊与通信冯·苏特纳曾是国际和平运动的领导者之一在1905年，诺贝尔去世之后她成为第一个获得诺贝尔和平奖的女性诺贝尔在遗嘱里列了三条和平奖的标准不像其它在瑞典颁发的奖项和平奖在挪威颁发取消或裁减常备军队、组织和 宣传和平会议和促进民族团结友好这些标准已经被扩展从而包括其它促进和平的方面像是人权和协商和平奖不是只能颁发给一个人大概有三分之一的诺贝尔和平奖由二或三个获奖者分享那么和平奖是如何提名的？根据诺贝尔基金会一个有效的提名只能来自国民议会的成员州政府或国际法庭有资格的提名者还包括大学校长，社会科学、历史、哲学、法律和神学的教授和诺贝尔奖的前获得者但是如果你想知道更多关于最近谁被提名的信息你恐怕得非常耐心所有关于提名的信息在五十年内都是保密的以马丁·路德·金为例我们事实上并不知道他被谁提名 直到2014年他的提名者原来是曾得奖的公谊服务委员会和瑞典议会的八名成员个人或组织能被提名的次数并没有限制事实上，简·亚当斯公认的美国社会工作的创立者在她最终获得诺贝尔和平奖之前被提名过91次和平奖的缺失也可以具有象征意义在莫罕达斯·甘地去世后， 1948年的诺贝尔和平奖并未颁发这被理解为对伟人表达敬意的举动也可以称为遗失的荣誉与其它诺贝尔奖一样和平奖不能被颁发给已逝者保密的选择工作持续几乎一年时间由挪威诺贝尔委员会任命的五名成员执行他们被禁止在挪威担任任何官方政治职务他们的工作从大量的提名开始近些年，提名会超过三百个他们评估每位候选人的成就 并创建一个短名单最后，由诺贝尔委员会主席在十月公开宣布获奖者颁奖仪式在十二月十日阿尔弗雷德·诺贝尔的逝世纪念日举行和平奖本身包括一枚金质奖章上面有拉丁文题词： “Pro pace et fraternizzate gentium”翻译为“为着和睦与手足情谊的人士”还包括诺贝尔和平奖证书和大量奖金近年奖金达到八百万瑞典克朗约合一百万美元若有多位获奖者，则由多位获奖者平分虽然获奖者可以任凭喜好地使用奖金但在近些年，许多获奖者将它 捐于人道主义和社会工作中许多年来，诺贝尔和平奖主要被授予欧洲人和北美人士但近年来，显著的改变正在发生使得诺贝尔和平奖从未有过地国际化23个组织和103个个人87位男性和16位女性组成了历史上126位诺贝尔和平奖获奖者他们包括：在南非， 以非暴力运动反对种族隔离制度的德斯蒙德·图图推动禁止和清除地雷运动的 乔迪·威廉姆斯在尊重原住民的权利的基础上 促进社会正义与和解的里戈韦塔·门楚·图姆在纳米比亚、科索沃和印度尼西亚， 缓解国际冲突努力的马尔蒂·阿赫蒂萨里以非暴力斗争促进缅甸民主和人权的昂山素季他们是一些激励着我们挑战着我们的例子以及以实际行动向我们展示通向和平的道路有许多许多

**P398 2016-10-04 What happens to our bodies after we die - Farnaz Khatibi Jafari**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=398)

Since the dawn of humanity, an estimated 100.8 billion people have lived and died, a number that increases by about .8% of the world's population each year. What happens to all of those people's bodies after they die and will the planet eventually run out of burial space? When a person's heart stops beating, the body passes through several stages before it begins decomposing. Within minutes after death, the blood begins settling in the lower-most parts of the body. Usually eight to twelve hours later, the skin in those areas is discolored by livor mortis, or post-mortem stain. And while at the moment of death the body's muscles relax completely in a condition called primary flaccidity, they stiffen about two to six hours later in what's known as rigor mortis. This stiffening spreads through the muscles, and its speed can be affected by age, gender, and the surrounding environment. The body also changes temperature, usually cooling off to match its environment. Next comes decomposition, the process by which bacteria and insects break apart the body. Many factors affect the rate of decomposition. There is, however, a basic guide of the effect of the environment on decompositon called Casper's Law. It says that if all other factors are equal, a body exposed to air decomposes twice as fast as one immersed in water and eight times as fast as one buried in earth. Soil acidity also greatly affects bone preservation. High-acidity soils with a pH of less than 5.3 will rapidly decompose bone, whereas in a neutral or basic soil with a pH of 7 or more, a skeleton can remain in relatively good condition for centuries. Different cultures throughout history have developed unique approaches to burials. As far back as the first Neanderthal burials, death was accompanied by rituals, like the positioning, coloring, or decorating of corpses. Traditional Christian burials decorate the body in dress, while in traditional Islam, a body is wrapped in a piece of ritual fabric with the face oriented toward Mecca. Traditional Hindus ceremonially burn the body, and Zoroastrians, followers of one of the oldest monotheistic religions, traditionally place bodies atop a tower to expose them to the Sun and scavenging birds.` Before the Industrial Revolution, burials were simple and accessible. These days, with suitable burial land running out in high-population areas, purchasing private gravesites can be costly, and many people can't afford simple burials. Even cremation, the second most common burial practice in the world, comes with a high cost. As for the question of running out of space, the issue isn't so much about total land in the world as it is that large populations cluster together within cities. Most of the big cities in the world may run out of suitable burial grounds within a century. For London, it's even sooner. That may happen by 2035. So are there alternatives to traditional burials that might help with the space issue? In some countries, skyscraper cemeteries enable vertical burials. Some options focus on the body's relationship with the environment. Promession, for example, freeze-dries and pulverizes the body, creating a powder that can turn into compost when mixed with oxygen and water. There are also green burials that use special materials, such as biodegradable caskets, urns that sprout trees, and burial suits that grow mushrooms. Eternal reefs take that concept to the depths of the ocean using a mixture of ashes and cement to create marine habitats for sea life. Death is an inevitable part of the human condition, but how we treat bodies and burials continues to evolve. We may each have different spiritual, religious, or practical approaches to dying, but the ever-increasing demand for burial space might give us a push to be creative about where our bodies go after the final stages of life.

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翻译人员: Yuyang Zhao 校对人员: Cissy Yun自从人类出现，估计一共有一千零八十亿人，这个数字大约以每年0.8%的速度增加。人类死亡后，他们的尸体到底怎么办?地球会不会有一天没有空间来埋葬逝者呢？当人的心脏停止跳动的时，身体在分解前要经历几个时期。在死后的几分钟内，血液开始在身体的底部沉积。通常八到十二个小时后，表面的皮肤会出现尸斑，或称死后污斑。人体的肌肉在死亡时会完全放松在前期肌肉萎缩的情况下尸体会在两到六个小时后僵硬，也就是“尸僵”这种僵硬通过肌肉扩展，其速度与年龄、性别和周围环境有关尸体的温度也会变化，通常会降温至环境的温度。接下来开始腐败，这个过程就是细菌和昆虫分解尸体。许多因素会影响分解快慢。但是，环境对尸体腐烂的影响还是有规律的它被称为卡斯波规律。也就是，其它的因素不变暴露在空气中的尸体的分解速度是浸入水中的两倍是埋入土中的8倍。土的酸度对骨骼的保留又很大影响。PH值小于5.3的高酸度土会迅速分解骨骼，而中性土或PH值大于等于7的土，骨架能很好地保留几个世纪。不同的文化发展出独特的埋葬方式。很久以前的穴居人的埋葬方式，死亡伴随着一种仪式，比如尸体的位置、染色和装饰。在传统的基督教葬礼上，尸体穿上服装，而传统的穆斯林葬礼，尸体用仪式用织物包裹面向麦加方向。在传统的印度教葬礼上，会将尸体火化索罗亚斯德教的教徒，最古老神教之一的追随者，传统上，把尸体放到塔顶，由太阳暴晒和任由鸟类啄食。工业革命以前，埋葬是简单而容易的。目前，人口密集地区的合适墓地已经快要用完，购买私人墓地是非常昂贵的，以至于很多人负担不起简单的葬礼。甚至火化，世界上第二种最普遍的埋葬形式，也需要很高的费用。至于有没有埋葬空间的问题，其实这与地球总体土地面积无多大关系因为大量的人口集聚在城市内。世界上的大部分大城市在一个世纪内，合适的墓地就会用尽对伦敦来说，甚至更快。可能在2035就用尽了。那么有可以替代传统埋葬的方式能解决墓地空间问题吗？在一些国家，出现了高楼墓地，可以垂直的埋葬更多逝者。一些方法集中在尸体与环境的关系方面。例如，专业的冻干和磨碎尸体，做成粉末，和氧气与水混合制成肥料也有采用特殊材料的绿色埋葬，比如生物降解骨灰盒，可以长成树的骨灰瓮可以生长蘑菇的骨灰装备。“永生珊瑚礁”将这一想法带到了深海用骨灰和水泥混合，可建造海洋生物的栖息地死亡是人类无法回避的，可是如何埋葬和处理尸体一直在发展我们每个人可能有不同的信仰，宗教，或者实际的死亡方式，可是，对于埋葬空间的持续需求使我们对人生最后一阶段后 尸体的去处有更多有创意的想法

**P399 2016-10-05 How much of human history is on the bottom of the ocean - Peter Campb**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=399)

Sunken relics, ghostly shipwrecks, and lost cities. These aren't just wonders found in fictional adventures. Beneath the ocean's surface, there are ruins where people once roamed and shipwrecks loaded with artifacts from another time. This is the domain of underwater archaeology, where researchers discover and study human artifacts that slipped into the sea. They're not on a treasure hunt. Underwater archaeology reveals important information about ancient climates and coastlines, it tells us how humans sailed the seas, and what life was like millennia ago. So what exactly can we find? At shallow depths mingled in with modern-day items, we've discovered all sorts of ancient artifacts. This zone contains evidence of how our ancestors fished, how they repaired their ships, disposed of their trash, and even their convicted pirates, who were buried below the tide line. And it's not just our recent history. 800,000-year old footprints were found along the shore in Norfolk, Britain. In these shallow depths, the remains of sunken cities also loom up from the sea floor, deposited there by earthquakes, tsunamis, and Earth's sinking plates. Almost every sunken city can be found at these shallow depths because the sea level has changed little in the several thousand years that city-building civilizations have existed. For instance, in shallow waters off the coast of Italy lies Baia, a Roman seaside town over 2,000 years old. There, it's possible to swim among the ruins of structures built by Rome's great families, senators, and emperors. And then there are shipwrecks. As ships grow too old for use, they're usually abandoned near shore in out-of-the-way places like estuaries, rivers, and shallow bays. Archaeologists use these like a timeline to map a harbor's peaks and declines, and to get clues about the historic art of shipbuiding. At Roskilde in Denmark, for example, five purposefully sunken vessels reveal how Vikings crafted their fearsome long ships 1,000 years ago. When we descend a bit further, we reach the zone where the deepest human structures lie, like ancient harbor walls and quays. We also see more shipwrecks sunk by storms, war, and collisions. We're still excavating many of these wrecks today, like Blackbeard's ship, which is revealing secrets about life as an 18th century pirate. But past 50 feet, there are even deeper, better preserved shipwrecks, like the wreck at Antikythera, which sank during the 1st century BC. When it was discovered, it contained statues, trade cargo, and also the earliest known computer, a mysterious device called the Antikythera mechanism that kept track of astronomical changes and eclipses. Today, it gives archaeologists vital information about the knowledge possessed by the Ancient Greeks. It is in this zone that we also begin to find aircraft and submarines, such as those from the World Wars. Plunging as deep as 200 feet, we can find some of the earliest and rarest signs of human history. Prior to 5,000 years ago, there was a lot more dry land because glaciers trapped much of the water that now forms the sea. Our ancestors spread across these lands, and so on the sea floor, we find their camps, stone tools, and the bones of animals they hunted. These sites give us invaluable knowledge about our ancestor's migration patterns, hunting methods, and technologies. In the deepest zone, no human has ever walked. This area has been submerged since well before mankind evolved. The only artifacts we find are those that have drifted down from above, like NASA's Saturn V rocket engines at 14,000 feet, and the deepest shipwrecks. The ocean is like a huge underwater museum that constantly adds to our knowledge about humanity. With only a fraction of it explored, discoveries are sure to continue long into the future.

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翻译人员: Chen Zou 校对人员: Cissy Yun沉没的文物幽灵沉船和消失的城市这些不仅仅是在 虚构冒险小说中的奇迹在海洋表面下是人们曾经游荡过的废墟和装满另一个时代工艺品的沉船这是水下考古现场在那里研究者发现和研究 沉入海底的人类工艺品他们不是在寻找宝藏水下考古揭示了 一些重要信息关于古代气候和海岸线它告诉我们人类如何航海以及1000年前 人类的生活是什么样的我们到底可以发现什么？在混合着一些现代物品的浅海中我们发现了各种古代的工艺品这个区域含有我们的祖先 如何钓鱼的证据他们如何修复船只丢弃他们的废物甚至是被埋在潮汐线下 被处死的海盗不仅是我们近代的历史80万年前的足迹 被发现在英国诺福克郡海岸在这些浅海沉没城市的遗骸露出海床它们沉积在海底，由于地震海啸和地球板块沉降几乎每一个沉没城市 都能在这些浅海被发现因为几千年来海平面的高度与当时城市文明刚被建造时 只上升了一点点例如，在意大利 浅水海岸，有巴亚一个2000多年的 罗马海边小镇人们都可以在那城市遗址中游泳这些废墟的构造是由罗马最大的家族 议员，和国王建造那里还有沉船当船只太破旧无法使用 它们常常被废弃在岸边在河口、小河以及浅湾 等偏僻的地方考古学家用这些作为时间轴 来推算港口的繁荣和没落的时期得到关于造船工艺史的线索例如，在丹麦的罗斯基勒 有五艘被刻意沉没的船只揭示出在1000年前 维京人如何建造超大的船只当我们再深入往下我们到达人类结构存在最深的海域就像古代港口的墙壁和码头我们也能看到更多由于暴风雨、战争和碰撞的沉船在今天，我们仍能发掘许多残骸比如黑胡子船它揭示了18世纪海盗的神秘生活可是一旦超过50英尺，那里甚至有更深的 更好保存的沉船遗骸比如安迪基西拉沉船残骸它在公元1世纪的沉入海底当被发现时 它里面有雕像贸易货物以及最早知道的计算机一种被称为“安迪基西拉”的神秘设备它可记录天体运行的变化和日食今天，它为考古学家提供了重要的关于被古希腊人持有的知识的信息正是在这个区域，我们也开始 发现飞机和潜艇诸如来自世界大战的东西到200英尺深度我们能发现一些最早的 最稀少的人类历史的信息在5000多年前的时代 有更多的干旱土地因为冰川蓄积了大量的水 那些水现在形成了海洋我们的祖先穿越这些土地所以在海床上 我们发现了他们的营地石器工具以及他们捕掠的动物的骨骼这些给了我们关于我们祖先迁移模式 的保贵知识狩猎方法以及科技在最深的区域 没有人类的痕迹这个区域在人类进化 很久之前就沉没我们发现的唯一工艺品 是那些从上部沉没下去的像在14000英尺的 NASA土星5火箭发射器以及最深的沉船海洋就像是一个巨大的 水下博物馆它不断地丰富我们关于人类的知识仅仅是被探索的一小部分可确定人类将会持续探索下去

**P400 2016-10-05 The Egyptian Book of the Dead - A guidebook for the underworld - Teja**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=400)

Ani stands before a large golden scale where the jackal-headed god Anubis is weighing his heart against a pure ostrich feather. Ani was a real person, a scribe from the Egyptian city of Thebes who lived in the 13th century BCE. And depicted here is a scene from his Book of the Dead, a 78-foot papyrus scroll designed to help him attain immortality. Such funerary texts were originally written only for Pharaohs, but with time, the Egyptians came to believe regular people could also reach the afterlife if they succeeded in the passage. Ani's epic journey begins with his death. His body is mummified by a team of priests who remove every organ except the heart, the seat of emotion, memory, and intelligence. It's then stuffed with a salt called natron and wrapped in resin-soaked linen. In addition, the wrappings are woven with charms for protection and topped with a heart scarab amulet that will prove important later on. The goal of the two-month process is to preserve Ani's body as an ideal form with which his spirit can eventually reunite. But first, that spirit must pass through the duat, or underworld. This is a realm of vast caverns, lakes of fire, and magical gates, all guarded by fearsome beasts - snakes, crocodiles, and half-human monstrosities with names like "he who dances in blood." To make things worse, Apep, the serpent god of destruction, lurks in the shadows waiting to swallow Ani's soul. Fortunately, Ani is prepared with the magic contained within his book of the dead. Like other Egyptians who could afford it, Ani customized his scroll to include the particular spells, prayers, and codes he thought his spirit might need. Equipped with this arsenal, our hero traverses the obstacles, repels the monsters' acts, and stealthily avoids Apep to reach the Hall of Ma'at, goddess of truth and justice. Here, Ani faces his final challenge. He is judged by 42 assessor gods who must be convinced that he has lived a righteous life. Ani approaches each one, addressing them by name, and declaring a sin he has not committed. Among these negative confessions, or declarations of innocence, he proclaims that he has not made anyone cry, is not an eavesdropper, and has not polluted the water. But did Ani really live such a perfect life? Not quite, but that's where the heart scarab amulet comes in. It's inscribed with the words, "Do not stand as a witness against me," precisely so Ani's heart doesn't betray him by recalling the time he listened to his neighbors fight or washed his feet in the Nile. Now, it's Ani's moment of truth, the weighing of the heart. If his heart is heavier than the feather, weighed down by Ani's wrongdoings, it'll be devoured by the monstrous Ammit, part crocodile, part leopard, part hippopotamus, and Ani will cease to exist forever. But Ani is in luck. His heart is judged pure. Ra, the sun god, takes him to Osiris, god of the underworld, who gives him final approval to enter the afterlife. In the endless and lush field of reeds, Ani meets his deceased parents. Here, there is no sadness, pain, or anger, but there is work to be done. Like everyone else, Ani must cultivate a plot of land, which he does with the help of a Shabti doll that had been placed in his tomb. Today, the Papyrus of Ani resides in the British Museum, where it has been since 1888. Only Ani, if anyone, knows what really happened after his death. But thanks to his Book of the Dead, we can imagine him happily tending his crops for all eternity.

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翻译人员: Cissy Yun 校对人员: Jiawei Ni阿尼站在巨大的金色审判之秤前，豺头人身神阿努比斯在秤是阿尼的心脏重还是真理之羽重。阿尼确有其人，他是一名来自古埃及底比斯市的抄写员，生活在公元前13世纪。这是他的《亡灵书》中的一幅场景，《亡灵书》是一幅将近24米长的莎草纸 ，旨在帮他获得永生。最开始，这种葬礼卷轴只为法老而作，不过渐渐的，埃及人开始相信，如果成功地走过那条过道，凡人也能拥有后世。阿尼那漫长而艰难地旅途从他的死亡开始：一群祭祀取出了他除了心脏以外的所有器官，把他制成了木乃伊，心脏是安放情感，记忆和智力的地方。接着他的身体被填满了泡碱，并被树脂泡过的亚麻布包了起来。除此之外，这些布还被施了保护的咒语，并且还放置了圣甲虫护身符。这个护身符在稍后起了大作用。两个月的制作过程是为了让阿尼的身体处在理想状态，这样他的灵魂可以最终与肉身团聚。不过一开始，灵魂必须要通过死亡之域，或者称为“阴间”，这是一个充满着巨大的洞穴，火海，以及魔力之门的领域，由骇人的野兽把守。有蛇，鳄鱼和被称为“血海狂舞者”的半兽人等等雪上加霜的是，那条蛇，阿佩普，“毁灭之神”，会潜伏在阴影之中，随时准备着吞噬阿尼的灵魂所幸，阿尼有备而来他带着有魔法的《亡灵书》就像当时能买得起亡灵书的其他埃及人阿尼定制了他的私人《亡灵书》， 里面写有他觉得有用的咒语，祷词和法典有了这样的“武器库”，我们的英雄穿过重重障碍，击退了怪物的袭击，小心翼翼的躲过了阿佩普，终于来到了正义与真理女神玛亚特的大厅在这里，阿尼迎来了他最终的挑战他要让42名评估神信服，他有着光明磊落的一生阿尼走近每一位神，说出自己的名字，和自己从没犯过的一项罪名。在这些忏悔，或是澄清中，他宣称自己从没把人弄哭过，不是个会偷听别人讲话的人，也从来没有污染过水。可是，阿尼真的有着这样完美的一生吗？并不是。不过这是圣甲虫护身符起作用的时候。护身符里写着：“别与我这个见证者为敌。”这会让阿尼的心脏不背叛他让阿尼想起他偷听邻居吵架或在尼罗河中洗脚的往事现在是对阿尼之语的审判时刻了 心脏之秤如果他的心脏比真理之羽要重 因为阿尼做的坏事它会被阿米特一只鳄鱼头豹身河马尾的怪物吞噬而阿尼则会永远消失但阿尼是幸运的他的心脏，经过审判，是纯净的太阳神，拉，将他带往奥西里斯，冥界之王将会给他最后的批准进入永生世界在无尽的，繁茂的芦苇田里，阿尼见到了他已逝的父母这里没有伤心，痛苦或是愤怒 但是，这并不是阿尼旅程的终点像别人一样，阿尼必须培育一块土地被放在他墓中舍波提娃娃会帮他一起培育土地今天，《阿尼的莎草纸》在大英博物馆展览从1888年起就一直在那只有阿尼真正知道 他死后经历的一切但是，多亏了他的《亡灵书》我们可以想象他开心地在 永生世界中照料他的庄稼了

**P401 2016-10-06 Plato’s best (and worst) ideas - Wisecrack**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=401)

Few individuals have influenced the world and many of today's thinkers like Plato. One 20th century philosopher even went so far as to describe all of Western philosophy as a series of footnotes to Plato. He created the first Western university and was teacher to Ancient Greece's greatest minds, including Aristotle. But even one of the founders of philosophy wasn't perfect. Along with his great ideas, Plato had a few that haven't exactly stood the test of time. So here are brief rundowns of a few of his best and worst ideas. Plato argued that beyond our imperfect world was a perfect unchanging world of Forms. Forms are the ideal versions of the things and concepts we see around us. They serve as a sort of instruction manual to our own world. Floating around the world of Forms is the ideal tree, and the ideal YouTube channel, and even the ideal justice, or ideal love. Our own reality is comprised of imperfect copies of ideal Forms. Plato argued that philosophers should strive to contemplate and understand these perfect Forms so that they may better navigate our misleading reality. While it may seem silly, the disconnect between the world as it appears and the greater truth behind it is one of philosophy's most vexing problems. It's been the subject of thousands of pages by theologians, philosophers, and screenwriters alike. It raises questions like should we trust our senses to come to the truth or our own reason? For Plato, the answer is reason. It alone provides us with at least the potential to contemplate the Forms. But reason didn't always pan out for Plato himself. When he sought to situate humankind amongst the animals, he lumped us in with birds. "Featherless bipeds" was his official designation. Diogenes the Cynic, annoyed by this definition, stormed into Plato's class with a plucked chicken, announcing, "Behold. Plato's man." But back to a few good ideas. Plato is one of the earliest political theorists on record, and with Aristotle, is seen as one of the founders of political science. He reasoned that being a ruler was no different than any other craft, whether a potter or doctor, and that only those who had mastered the craft were fit to lead. Ruling was the craft of contemplating the Forms. In his Republic, Plato imagined a utopia where justice is the ultimate goal. Plato's ideal city seeks a harmonious balance between its individual parts and should be lead by a philosopher king. Millennia before his time, Plato also reasoned that women were equally able to rule in this model city. Unfortunately, Plato was inconsistent with women, elsewhere likening them to children. He also believed that a woman's womb was a live animal that could wander around in her body and cause illness. This bad idea, also espoused by other contemporaries of Plato, was sadly influential for hundreds of years in European medicine. Furthermore, he thought that society should be divided into three groups: producers, the military, and the rulers, and that a great noble lie should convince everyone to follow this structure. The noble lie he proposed was that we're all born with gold, silver, or a mixture of brass and iron in our souls, which determine our roles in life. Some thinkers have gone on to credit the idea of the noble lie as a prototype for 20th century propaganda, and the philosopher king as inspiration for the dictators that used them. Should a few bad ideas tarnish Plato's status as one of the greatest philosophers in history? No! Plato gave the leaders and thinkers who came after him a place to start. Through the centuries, we've had the chance to test those ideas through writing and experience, and have accepted some while rejecting others. We are continuing to refine, amend, and edit his ideas which have become foundations of the modern world.

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翻译人员: Di SUN 校对人员: Chen Zou影响了世界的人极少数 当今许多思想者都推崇柏拉图一个20世纪的哲学家 甚至在现在所有西方哲学都是柏拉图 思想的一系列脚注他开创了第一个西方大学而且还是古希腊伟大思想家的老师包括亚里士多德在内但即使作为哲学的奠基人之一 他也并不是完美的伴随着他的一些伟大想法柏拉图也有一些想法 没能经得起时间的考验接下来就给大家简短地介绍一下 柏拉图思想的精髓和糟粕柏拉图认为 在我们这个不完美的世界之外是一个完美不变的世界的形式存在这个形式是我们看到的周围 事物和概念的理想化的版本它们就像我们的 世界指导手册围绕着世界的形式 飘浮的是理想树和理想化的YouTube频道甚至理想化的公正或理想化的爱情我们的现实世界是由 不完美的理想化的形式的复制版组成的柏拉图认为哲学家 应该努力地思索并理解这些完美的形态这样它们也许可以更好地 引导我们去认识困惑的现实尽管这个想法看似愚蠢呈现出来的 世界的断联以及这后面更深刻的内涵是困扰了哲学界许久的问题之一这是一个被理论家哲学家和编剧探讨了无数次的话题这个问题引发了一连串的思考 比如，探索真理时，我们应该相信我们的感性认知还是我们的理性？对于柏拉图来说，答案是理性它至少给我们提供了 探索这些形式的可能但柏拉图也有不理性的时候当他在思考人类 在动物世界的位置时他把人类和鸟类混为一谈认为人类是 “没有羽毛的两足动物”犬儒派的第欧根尼 对这个定义十分不满带着一只拔了毛的鸡 冲进柏拉图的教室大声说，“看啊，这是柏拉图眼中的人类。“但是回到柏拉图的一些好的想法柏拉图是有纪录以来 最早的政治理论家之一他和亚里士多德一起 被视为政治科学的奠基人之一他指出 统治者与其他工匠没有差别不论是制陶工人，或者医生只有熟练掌握技能的人 才能够做好领导工作统治是一项理解形式的技能在他的共和国，柏拉图设想一个理想国的存在 在那里，公正是终极目标柏拉图理想中的城市追求 各个部分的和谐共生并且应该由一个哲学家国王所统治在柏拉图时代的几千年前柏拉图也推测 女性也有统治这样城市的平等权利不幸的是，柏拉图对于女性的观点 是不一致的在其它地方，他把女性比作小孩他还认为女人的子宫 是一个活生生的动物这个动物会在女性身体里 游走并带来疾病这个愚蠢的观点也曾被 被柏拉图时代的人所信奉进而非常不幸地影响了 欧洲几百年药业的发展他还认为社会应该 被分成三类：生产者军人和统治者并且认为一个高贵的谎言应该 说服每一个人遵循这个结构他提出的这个高贵的谎言是我们都出生伴有金 银，或者黄铜和铁的混合物在我们的灵魂里这灵魂决定了我们人生的角色有些思想家曾赞扬 这个高贵谎言的想法作为二十世纪 政治宣传的样板并认为哲学家国王能启发 雇佣他们的独裁者们仅凭这几个不明智的观点就能够动摇柏拉图 作为史上最伟大的哲学家之一的地位吗？当然不是柏拉图给了后来的 领导者和思想家一个起点几个世纪以来我们有机会通过书面和实践 的形式去检验那些想法我们接受了其中一些观点 同时也否定了一些我们仍在继续提炼 改善，修正他的思想这些思想成为现代世界的奠基

**P402 2016-10-11 Are food preservatives bad for you - Eleanor Nelsen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=402)

Food doesn't last. In days, sometimes hours, bread goes moldy, apple slices turn brown, and bacteria multiply in mayonnaise. But you can find all of these foods out on the shelf at the grocery store, hopefully unspoiled, thanks to preservatives. But what exactly are preservatives? How do they help keep food edible and are they safe? There are two major factors that cause food to go bad: microbes and oxidation. Microbes like bacteria and fungi invade food and feed off its nutrients. Some of these can cause diseases, like listeria and botulism. Others just turn edibles into a smelly, slimy, moldy mess. Meanwhile, oxidation is a chemical change in the food's molecules caused by enzymes or free radicals which turn fats rancid and brown produce, like apples and potatoes. Preservatives can prevent both types of deterioration. Before the invention of artificial refrigeration, fungi and bacteria could run rampant in food. So we found ways to create an inhospitable environment for microbes. For example, making the food more acidic unravels enzymes that microbes need to survive. And some types of bacteria can actually help. For thousands of years, people preserved food using bacteria that produce lactic acid. The acid turns perishable vegetables and milk into longer lasting foods, like sauerkraut in Europe, kimchi in Korea, and yogurt in the Middle East. These cultured foods also populate your digestive track with beneficial microbes. Many synthetic preservatives are also acids. Benzoic acid in salad dressing, sorbic acid in cheese, and propionic acid in baked goods. Are they safe? Some studies suggest that benzoates, related to benzoic acid, contribute to hyperactive behavior. But the results aren't conclusive. Otherwise, these acids seem to be perfectly safe. Another antimicrobial strategy is to add a lot of sugar, like in jam, or salt, like in salted meats. Sugar and salt hold on to water that microbes need to grow and actually suck moisture out of any cells that may be hanging around, thus destroying them. Of course, too much sugar and salt can increase your risk of heart disease, diabetes, and high blood pressure, so these preservatives are best in moderation. Antimicrobial nitrates and nitrites, often found in cured meats, ward off the bacteria that cause botulism, but they may cause other health problems. Some studies linking cured meats to cancer have suggested that these preservatives may be the culprit. Meanwhile, antioxidant preservatives prevent the chemical changes that can give food an off-flavor or color. Smoke has been used to preserve food for millennia because some of the aromatic compounds in wood smoke are antioxidants. Combining smoking with salting was an effective way of preserving meat before refrigeration. For antioxidant activity without a smoky flavor, there are compounds like BHT and tocopherol, better known as vitamin E. Like the compounds in smoke, these sop up free radicals and stave off rancid flavors that can develop in foods like oils, cheese, and cereal. Other antioxidants like citric acid and ascorbic acid help cut produce keep its color by thwarting the enzyme that causes browning. Some compounds like sulfites can multitask. They're both antimicrobials and antioxidants. Sulfites may cause allergy symptoms in some people, but most antioxidant preservatives are generally recognized as safe. So should you be worried about preservatives? Well, they're usually near the end of the ingredients list because they're used in very small amounts determined by the FDA to be safe. Nevertheless, some consumers and companies are trying to find alternatives. Packaging tricks, like reducing the oxygen around the food can help, but without some kind of chemical assistance, there are very few foods that can stay shelf stable for long.

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翻译人员: 小布 陈 校对人员: Cissy Yun食物会变质几天时间，有时几个小时， 面包会发霉，苹果块变成褐色蛋黄酱里的细菌繁殖但你能在商店里的货架上找到这些食物希望是没有变坏的多亏了防腐剂但是到底什么是防腐剂呢它们是如何保持食物可食用呢？它们安全吗？有两个重要的因素会导致食物变质微生物和氧化作用微生物就像细菌和真菌入侵食物，破坏了他们的营养成分部分细菌会导致疾病像李斯特菌和肉毒杆菌其它的只是让食物变味，变小，发霉难看同时，氧化作用是食物分子的一种化学变化由酶或者是导致脂肪变臭、食物变色的自由基引起的就像使苹果和土豆变成褐色（的自由基）防腐剂可以防止这两种形式的恶化在发明人工制冷技术之前真菌和细菌可以在食物中疯狂地繁衍所以我们找到了些制造 一个细菌不可繁殖环境的方法例如，让食物变的很酸来分解酶使食物分子能够存活有些种类的细菌其实可以起帮助作用几千年来，人们用能来保存食物的细菌就是可以产生乳酸的细菌这种酸让易变质的蔬菜和牛奶变得可以长期保存像欧洲的德国酸菜韩国泡菜中东的酸奶这种人造食物含有的有益分子还能促进消化很多合成防腐剂也是酸沙拉酱里的苯甲酸奶酪里的山梨酸面包里的丙酸它们安全吗？有些研究表明与苯甲酸相关的苯酸盐会导致人们的多动行为但结论并非结论性的此外，这些酸似乎是非常安全的另一种抗菌方法是加大量的糖，例如果酱或者盐，例如腌肉糖和盐吸附了分子生长需要的水真正的吸干了任何细胞生长需要的湿度因而摧毁了他们当然，大量的糖和盐会导致一些疾病的风险，心脏病肥胖高血压所以这些防腐剂还是适量为好抗菌剂硝酸盐和亚硝酸盐多存在于熏肉里它们抑制了能导致肉毒杆菌中毒的细菌，但是他们可能会引起其他健康问题一些研究把熏肉和癌症联系在一起称防腐剂可能是罪魁祸首同时，抗氧化剂能够防止导致食物产生异味或者变颜色的化学变化千年来，人们用熏制的方法来保存食物因为使用木材熏制时产生的一些香味的合成物就是抗氧化剂在冷冻保存之前，加盐熏制是一种保存肉类有效的方法如果活性抗氧化剂没有烟熏的香味的话有些合成物像BHT（一种常用的抗氧化剂）和生育酚就是大家熟知的维生素E就像烟熏中的合成物，这些吸掉了一些自由激进分子避免产生腐臭可以在一些食物里产生，像油，奶酪和麦片其他的一些抗氧化剂 像柠檬酸和维生素C通过抑制酶导致食物变黄帮助食物保持新鲜的颜色有些合成物，像亚硫酸盐则是有多重功效它们兼任抗菌和抗氧化的作用亚硫酸盐可能会使有些人产生过敏症状但是大部分抗氧化剂通常被认为是安全的所以你应该担心防腐剂吗？它们通常被列在食物成分表的最后因为它们的分量很少是由FDA（食品药品监督管理局）通过的安全分量不管怎样，一些消费者和公司正在试图找到替代品通过包装的设计，例如真空压缩减少氧气有利于保存食物但是没有化学物质的帮助很少的食物可以长期保存

**P403 2016-10-13 What causes cavities - Mel Rosenberg**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=403)

When a team of archaeologists recently came across some 15,000 year-old human remains, they made an interesting discovery. The teeth of those ancient humans were riddled with holes. Their cavities were caused by the same thing that still plagues us today, specific tiny microbes that live in our mouths. These microbes are with us soon after birth. We typically pick them up as babies from our mothers' mouths. And as our teeth erupt, they naturally begin to accumulate communities of bacteria. Depending on what we eat, and specifically how much sugar we consume, certain microbes can overpopulate and cause cavities. Diets high in sugary foods cause an explosion of bacteria called mutans streptococci in our mouths. Like humans, these microorganisms love sugar, using it as a molecular building block and energy source. As they consume it, the bacteria generate byproducts in the form of acids, such as lactic acid. Mutans streptococci are resistant to this acid, but unfortunately, our teeth aren't. While each human tooth is coated in a hardy, protective layer of enamel, it's no match for acid. That degrades the armor over time, leaching away its calcium minerals. Gradually, acid wears down a pathway for bacteria into the tooth's secondary layer called the dentin. Since blood vessels and nerves in our teeth are enclosed deep within, at this stage, the expanding cavity doesn't hurt. But if the damage extends beyond the dentin, the bacterial invasion progresses causing excruciating pain as the nerves become exposed. Without treatment, the whole tooth may become infected and require removal all due to those sugar-loving bacteria. The more sugar our food contains, the more our teeth are put at risk. Those cavemen would hardly have indulged in sugary treats, however, so what caused their cavities? In meat-heavy diets, there would have been a low-risk of cavities developing because lean meat contains very little sugar, but that's not all our early human ancestors ate. Cavemen would also have consumed root vegetables, nuts, and grains, all of which contain carbohydrates. When exposed to enzymes in the saliva, carbohydrates get broken down into simpler sugars, which can become the fodder for those ravenous mouth bacteria. So while ancient humans did eat less sugar compared to us, their teeth were still exposed to sugars. That doesn't mean they were unable to treat their cavities, though. Archaeological remains show that about 14,000 years ago, humans were already using sharpened flint to remove bits of rotten teeth. Ancient humans even made rudimentary drills to smooth out the rough holes left behind and beeswax to plug cavities, like modern-day fillings. Today, we have much more sophisticated techniques and tools, which is fortunate because we also need to contend with our more damaging, sugar-guzzling ways. After the Industrial Revolution, the human incidence of cavities surged because suddenly we had technological advances that made refined sugar cheaper and accessible. Today, an incredible 92% of American adults have had cavities in their teeth. Some people are more susceptible to cavities due to genes that may cause certain weaknesses, like softer enamel, but for most, high sugar consumption is to blame. However, we have developed other ways of minimizing cavities besides reducing our intake of sugar and starch. In most toothpastes and many water supplies, we use tiny amounts of fluoride. That strengthens teeth and encourages the growth of enamel crystals that build up a tooth's defenses against acid. When cavities do develop, we use tooth fillings to fill and close off the infected area, preventing them from getting worse. The best way to avoid a cavity is still cutting down on sugar intake and practicing good oral hygiene to get rid of the bacteria and their food sources. That includes regular tooth brushing, flossing, and avoiding sugary, starchy, and sticky foods that cling to your teeth between meals. Gradually, the population of sugar-loving microbes in your mouth will decline. Unlike the cavemen of yesteryear, today we have the knowledge required to avert a cavity calamity. We just need to use it.

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翻译人员: Lipeng Chen 校对人员: Gabriella Hu当一群考古学家最近发掘出将近15000年前的人类骸骨时，他们有了一个有趣的发现：这些远古人的牙齿上有许多蛀洞。他们蛀牙的罪魁祸首和今天折磨我们的东西一样，那就是生活在我们口中的某些细菌。这些细菌从出生时就开始伴随着我们。一般而言，它们是从母亲的口中传给孩子的。当我们的牙齿开始生长时，它们便开始形成菌落。我们所吃的食物和我们所摄入的糖分，可以使得某些细菌过度增殖并形成龋齿。高糖饮食会导致我们口中一种叫做"变形链球菌"的细菌爆发式的增长。就像人类一样，这些微生物喜欢糖类，并将糖作为生长的基石和能量的来源。当细菌消耗糖类时，它们会产生一种酸性的副产品，比如"乳酸"。"变形链球菌"可以免疫乳酸的腐蚀，然而不幸的是，我们的牙齿并不可以。尽管我们每个人的牙齿上都有一层质 地坚硬，可以起到保护作用的"牙釉质"，但是这仍不是酸的对手。随着时间的推移，酸会侵蚀这层盔甲，溶解其中的钙元素。渐渐地，酸会为细菌侵蚀出一条通道，直达被称作"牙本质"的牙齿内层。因为牙齿的血管和神经都被保护在最深处，在这个阶段，逐渐扩大的龋齿并不会造成痛感。但是一当细菌继续侵蚀，超过"牙本质"的范围，神经就会被暴露，同时形成强烈痛感。如果不加治疗，整颗牙齿就会受到感染并且需要拔除，这都是由那些好糖类细菌导致的。摄入食物中的糖分越多，牙齿受到的威胁就越大。然而，那些山顶洞人几乎不会饕餮甜食盛宴，那么他们的龋齿是什么造成的呢？在多肉的饮食中，形成龋齿的风险较小，因为瘦肉中包含很少的糖分。但是我们的祖先不仅仅只吃瘦肉，山顶洞人还会吃根类蔬菜，坚果和谷物，这些食物都包含碳水化合物。当碳水化合物暴露在唾液中酶的环境时，它们便会被分解更为简单的糖，这为那些贪婪的细菌提供了养分。所以尽管我们的祖先相较我们摄入了更少的糖分，但他们的牙齿仍暴露在糖分之中。虽然如此，这并不代表他们不能治疗龋齿。考古遗迹显示在约14000年前，人类已经会使用磨尖的燧石去除烂牙。远古人甚至做了最原始的钻头用于磨平留下的粗糙的龋洞，并将蜂蜡注入蛀孔，就如今天的填充物一样。如今，我们有了更加成熟的技术和工具，这是非常幸运的，因为我们需要面对更具破坏性的更多糖分的饮食。工业革命后，人类龋齿发生率飙升，这是因为突然之间我们有了更加先进的技术使得精炼糖变得更加便宜和易得。今天，92%的美国成年人有龋齿问题，难以置信。某些人由于基因更易形成龋齿，这些基因会导致如更软的"牙釉质"等问题，但是对于大多数人而言，高糖的摄入才是罪魁祸首。但是，我们已经发展出了降低糖类和淀粉摄入之外减少龋齿的办法。在大部分的牙膏和自来水中，我们添加了少量的氟化物。氟化物可以增强牙齿并促使牙釉质生长以抵抗酸的侵蚀。当龋齿已经产生时，我们利用牙齿填充物去填补并封闭被感染区域，防止它们朝着更坏的方向发展。然而，预防龋齿的最佳方式仍是降低糖分摄入，形成良好的口腔卫生，以消除细菌和它们的食物来源。这包含日常的刷牙，剔牙，避免摄入糖类淀粉和在各餐之间会附着于牙齿上的粘性食物。渐渐地，口腔中的好糖类细菌便会减少。和以前的山顶洞人不同，今天的我们拥有更多预防龋齿的知识。我们只需运用它。

**P404 2016-10-19 What caused the French Revolution - Tom Mullaney**

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What rights do people have, and where do they come from? Who gets to make decisions for others and on what authority? And how can we organize society to meet people's needs? These questions challenged an entire nation during the upheaval of the French Revolution. By the end of the 18th century, Europe had undergone a profound intellectual and cultural shift known as the Enlightenment. Philosophers and artists promoted reason and human freedom over tradition and religion. The rise of a middle class and printed materials encouraged political awareness, and the American Revolution had turned a former English colony into an independent republic. Yet France, one of the largest and richest countries in Europe was still governed by an ancient regime of three rigid social classes called Estates. The monarch King Louis XVI based his authority on divine right and granted special privileges to the First and Second Estates, the Catholic clergy, and the nobles. The Third Estate, middle class merchants and craftsmen, as well as over 20 million peasants, had far less power and they were the only ones who paid taxes, not just to the king, but to the other Estates as well. In bad harvest years, taxation could leave peasants with almost nothing while the king and nobles lived lavishly on their extracted wealth. But as France sank into debt due to its support of the American Revolution and its long-running war with England, change was needed. King Louis appointed finance minister Jacques Necker, who pushed for tax reforms and won public support by openly publishing the government's finances. But the king's advisors strongly opposed these initiatives. Desperate for a solution, the king called a meeting of the Estates-General, an assembly of representatives from the Three Estates, for the first time in 175 years. Although the Third Estate represented 98% of the French population, its vote was equal to each of the other Estates. And unsurprisingly, both of the upper classes favored keeping their privileges. Realizing they couldn't get fair representation, the Third Estate broke off, declared themselves the National Assembly, and pledged to draft a new constitution with or without the other Estates. King Louis ordered the First and Second Estates to meet with the National Assembly, but he also dismissed Necker, his popular finance minister. In response, thousands of outraged Parisians joined with sympathetic soldiers to storm the Bastille prison, a symbol of royal power and a large storehouse of weapons. The Revolution had begun. As rebellion spread throughout the country, the feudal system was abolished. The Assembly's Declaration of the Rights of Man and Citizen proclaimed a radical idea for the time -- that individual rights and freedoms were fundamental to human nature and government existed only to protect them. Their privileges gone, many nobles fled abroad, begging foreign rulers to invade France and restore order. And while Louis remained as the figurehead of the constitutional monarchy, he feared for his future. In 1791, he tried to flee the country but was caught. The attempted escape shattered people's faith in the king. The royal family was arrested and the king charged with treason. After a trial, the once-revered king was publicly beheaded, signaling the end of one thousand years of monarchy and finalizing the September 21st declaration of the first French republic, governed by the motto "liberté, égalité, fraternité." Nine months later, Queen Marie Antoinette, a foreigner long-mocked as "Madame Déficit" for her extravagant reputation, was executed as well. But the Revolution would not end there. Some leaders, not content with just changing the government, sought to completely transform French society -- its religion, its street names, even its calendar. As multiple factions formed, the extremist Jacobins lead by Maximilien Robespierre launched a Reign of Terror to suppress the slightest dissent, executing over 20,000 people before the Jacobin's own downfall. Meanwhile, France found itself at war with neighboring monarchs seeking to strangle the Revolution before it spread. Amidst the chaos, a general named Napoleon Bonaparte took charge, becoming Emperor as he claimed to defend the Revolution's democratic values. All in all, the Revolution saw three constitutions and five governments within ten years, followed by decades alternating between monarchy and revolt before the next Republic formed in 1871. And while we celebrate the French Revolution's ideals, we still struggle with many of the same basic questions raised over two centuries ago.

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翻译人员: Juo-Han Michelle Kuo 校对人员: Cissy Yun人们有哪些权利， 而权利又从何而来？谁为其他人做决定， 而又是基于何种授权？我们又要如何组建社会 以满足人们的需求？这些问题 在法国大革命崛起时激荡着全国上下在十八世纪后期，欧洲历经了 重大的知识及文化转变，称之为“启蒙运动”哲学家及艺术家 提升了理性及人之自由，使其超越传统及信仰。中产阶级和印刷术的崛起激发了政治觉醒，而美国独立战争 也将早期的英国殖民地，转化成为 一个独立的共和政权然而法国，作为欧洲 其中一个最强大最富有的国家，却仍然以旧制度实行统治， 这是由古板的三个社会阶级组成，叫作“阶级制度”国王路易十六 利用君权神授稳固统治权，并赋予特权给 第一和第二阶级，分別是 天主教神职人员以及贵族。第三j阶级， 包含中产阶级、工匠，以及超过两千万的农民 他们拥有非常少的权利，而且他们是唯一 需要缴税的族群，不只纳税给国王， 还要缴纳给其他阶级收成不好的时候，纳税几乎让农民所剩无几，而国王和贵族却利用 这些榨取来的财富极尽奢侈不过由于支持美国独立战争 使得法国负债累累，加上其与英国的长期争战，现况亟须改变路易国王任命 雅克·内克尔为财务大臣，他奋力争取税务改革，并借由公布政府的财政走向 来赢得大众的支持。然而国王的顾问 却强烈地反对这些措施。苦求解决之道， 国王于是召集了三级会议，这个会议是由 三个阶级代表所组成，睽违了175年后首次举行。虽然第三阶级 代表多达98%的法国人民，但他们和其他庄园 拥有的投票数是一样的。不意外，两个上层阶级 都倾向保留他们的特权。意识到无法 获得平等的代表效力，第三阶级瓦解了，并宣示自己为“国民议会”，并誓言起草新的宪法， 其中包含或不包含其他阶级。路易国王命令 第一和第二阶级与国民议会会面，但他同时也解雇了 受人爱戴的财务大臣内克尔。因此， 几千名愤怒的巴黎人民加入了同样不满的士兵， 席卷了巴士底监狱，那里是皇室权力的象征， 也是相当大的军火库。于是大革命便展开了。当叛变蔓延至全国，封建制度就被废除了。国民议会的 《人权和公民权宣言》主张的想法 在当时相当前卫——个人的权利和自由 是人性之根本，而政府的存在 正是去保护这些。他们的特权没了， 许多贵族逃到国外，乞求国外的统治者 侵略法国并重建秩序。路易王作为 君主立宪制的虚位元首，他开始害怕的他的未来。1791年，他试图逃亡， 但最后被抓了。尝试逃走的行为 使人民对国王的信任瓦解，皇室家族因而被逮， 国王则被判叛国罪。审判确立后，曾受敬重的国王 被当众斩首，象征着长达千年的 王权统治的结束，並在9月21日宣告 建立了法国第一个共和政体，以“自由、平等、博爱”为其格言。九個月後，皇后玛丽·安东尼是个外国人，因奢侈无度而被讥讽为“赤字夫人”，她也被处决了。但大革命并没有就此结束。一些首领不满于 仅仅是改换政府，他们寻求 彻底改变法国的社会——宗教信仰、街道名称、甚至是历法。当众多歧见形成，以马克西米连·罗伯斯庇尔为首的 极端分子雅各宾派，展开了恐怖统治，连最轻微的异议都要镇压。 在雅各宾垮台前，处决了超过两万人。同时，法国也因邻国君王 试图遏止大革命的扩散，和邻国展开了战争。战乱之中， 拿破仑·波拿巴将军主持战事，在他主张捍卫大革命的 民主价值之时，当上了皇帝。總而言之，法國大革命 僅僅在十年之內，見證了三部憲法 和五個政權，接着的几十年 不断在君主政治及叛变间更迭，直到1871年 建立了下一个共和政权。而当我们在庆祝 法国大革命的理念时，我们仍旧挣扎于 许多两世纪前就存在的同样的根本问题。

**P405 2016-10-21 Can you solve the river crossing riddle - Lisa Winer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=405)

As a wildfire rages through the grasslands, three lions and three wildebeest flee for their lives. To escape the inferno, they must cross over to the left bank of a crocodile-infested river. Fortunately, there happens to be a raft nearby. It can carry up to two animals at a time, and needs as least one lion or wildebeest on board to row it across the river. There's just one problem. If the lions ever outnumber the wildebeest on either side of the river, even for a moment, their instincts will kick in, and the results won't be pretty. That includes the animals in the boat when it's on a given side of the river. What's the fastest way for all six animals to get across without the lions stopping for dinner? Pause here if you want to figure it out for yourself. Answer in: 3 Answer in: 2 Answer in: 1 If you feel stuck on a problem like this, try listing all the decisions you can make at each point, and the consequences each choice leads to. For instance, there are five options for who goes across first: one wildebeest, one lion, two wildebeest, two lions, or one of each. If one animal goes alone, it'll just have to come straight back. And if two wildebeest cross first, the remaining one will immediately get eaten. So those options are all out. Sending two lions, or one of each animal, can actually both lead to solutions in the same number of moves. For the sake of time, we'll focus on the second one. One of each animal crosses. Now, if the wildebeest stays and the lion returns, there will be three lions on the right bank. Bad news for the two remaining wildebeest. So we need to have the lion stay on the left bank and the wildebeest go back to the right. Now we have the same five options, but with one lion already on the left bank. If two wildebeest go, the one that stays will get eaten, and if one of each animal goes, the wildebeest on the raft will be outnumbered as soon as it reaches the other side. So that's a dead end, which means that at the third crossing, only the two lions can go. One gets dropped off, leaving two lions on the left bank. The third lion takes the raft back to the right bank where the wildebeest are waiting. What now? Well, since we've got two lions waiting on the left bank, the only option is for two wildebeest to cross. Next, there's no sense in two wildebeest going back, since that just reverses the last step. And if two lions go back, they'll outnumber the wildebeest on the right bank. So one lion and one wildebeest take the raft back leaving us with one of each animal on the left bank and two of each on the right. Again, there's no point in sending the lion-wildebeest pair back, so the next trip should be either a pair of lions or a pair of wildebeest. If the lions go, they'd eat the wildebeest on the left, so they stay, and the two wildebeest cross instead. Now we're quite close because the wildebeest are all where they need to be with safety in numbers. All that's left is for that one lion to raft back and bring his fellow lions over one by one. That makes eleven trips total, the smallest number needed to get everyone across safely. The solution that involves sending both lions on the first step works similarly, and also takes eleven crossings. The six animals escape unharmed from the fire just in time and begin their new lives across the river. Of course, now that the danger's passed, it remains to be seen how long their unlikely alliance will last.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=405)

翻译人员: Kai Ma 校对人员: Marini Qian一场大火席卷了草原三头狮子和三只牛羚正在逃命为了逃离这场大火他们必须渡过一条潜伏着鳄鱼的小河幸运的是，附近恰好有一个小木筏一次可供最多两只动物渡河但每次至少有一只动物控制小木筏渡河只有一个问题一旦河的任何一边 狮子的数量多于牛羚即使只是很短的时间狮子也会因本能而攻击牛羚小木筏上的动物将会同时算在河的两边那么 这六只动物怎样才能最快地渡河？并且牛羚不会被狮子所攻击（可以暂停视频 思考一下这个问题）（3秒后公布答案）（2秒后公布答案）（1秒后公布答案）如果你认为毫无头绪可以试着在纸上列举出 所有时刻的每一种的可能性以及它们所导致的后果比如 第一次渡河有五种选择一只牛羚一头狮子两只牛羚两头狮子或者每种一只如果第一次让一只动物渡河那么它只能原路返回而如果让两只牛羚渡河那么剩下的一只牛羚就会立刻被吃掉所以现在只剩下两种可能要么先让两头狮子渡河要么让一头狮子和一只牛羚渡河这两种选择后 各自又产生了五种可能性由于时间的关系 我们直接看第二种先让每种动物各一只渡河然后 如果让牛羚待在对岸 让狮子返回那么一边就会有三头狮子剩下的两只牛羚就性命难保了所以我们需要让狮子待在对岸让牛羚返回现在我们又有同样的五种选择但是既然对岸已经有一头狮子如果同时让两只牛羚渡河 剩下的一只就会被吃掉如果每种动物各取一只那么小木筏上的牛羚在到达对岸时就会被吃掉这两种方法又被排除掉了也就是说 第三次渡河只能让两只狮子同时渡河然后在对岸放下一只对岸就有两头狮子第三头狮子独自返回原来的一边还是有三只牛羚现在怎么办？既然我们已经让两头狮子到达了河对岸唯一的选择就是让两只牛羚过去然后 由于让这两只牛羚直接返回是毫无意义的也就是重复了上一步而如果让两只狮子同时返回又会导致狮子的数量多于牛羚所以只能各取一只返回河对岸每种动物各有一只原来的一边每种动物各有两只同理 让每种动物各一只再次渡河又会重复上一步骤所以现在只能让两头狮子渡河或者让两只牛羚渡河如果让两头狮子渡河 他们会立即吃掉对岸的牛羚所以只能让两只牛羚渡河现在 我们已经胜利在望了因为三只牛羚都到达了河对岸只需要再让剩下的一头狮子上船然后每次带着一只狮子渡河即可这样一共需要十一步也就是所有动物渡河所需的最少步骤如果第一步将两头狮子送往河对岸 最后也能以类似的方式解决这一问题同样需要十一步六只动物及时逃离了危险并在河的对岸开始了新的生活当然 既然危险已经过去他们的合作关系还能否继续呢？

**P406 2016-10-21 Why should you listen to Vivaldi's 'Four Seasons' - Betsy Schwarm**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=406)

Light, bright, and cheerful. It's some of the most familiar of all early 18th century music. It's been featured in uncounted films and television commercials, but what is it and why does it sound that way? This is the opening of "Spring" from "The Four Seasons," by Italian composer Antonio Vivaldi. "The Four Seasons" are famous in part because they are a delight to the ear. However, even more notable is the fact that they have stories to tell. At the time of their publication in Amsterdam in 1725, they were accompanied by poems describing exactly what feature of that season Vivaldi intended to capture in musical terms. In providing specific plot content for instrumental music, Vivaldi was generations ahead of his time. If one were to read the poems simultaneously to hearing the music, one would find the poetic scenes synchronizing nicely with the musical imagery. We are told that the birds welcome spring with happy song, and here they are doing exactly that. Soon, however, a thunderstorm breaks out. Not only is there musical thunder and lightning, there are also more birds, wet, frightened, and unhappy. In "Summer," the turtle dove sings her name "tortorella" in Italian, before a hail storm flattens the fields. "Autumn" brings eager hunters dashing out in pursuit of their prey. The "Winter" concerto begins with teeth chattering in the cold before one takes refuge by a crackling fire. Then it's back out into the storm where there'll be slips and falls on the ice. In these first weeks of winter, the old year is coming to a close, and so does Vivaldi's musical exploration of the seasons. Not until the early 19th century would such expressive instrumental program music, as it was known, become popular. By then, larger, more varied ensembles were the rule with woodwinds, brass, and percussion to help tell the tale. But Vivaldi pulled it off with just one violin, strings, and a harpsichord. Unlike his contemporary Bach, Vivaldi wasn't much interested in complicated fugues. He preferred to offer readily accessible entertainment to his listeners with melodies that pop back up later in a piece to remind us of where we've been. So the first movement of the "Spring" concerto begins with a theme for spring and ends with it, too, slightly varied from when it was last heard. It was an inspired way to attract listeners, and Vivaldi, considered one of the most electrifying violinists of the early 18th century, understood the value of attracting audiences. Such concerts might feature himself as the star violinist. Others presented the young musicians of the Pietà, a Venetian girls' school where Vivaldi was Director of Music. Most of the students were orphans. Music training was intended not only as social skills suitable for young ladies but also as potential careers for those who might fail to make good marriages. Even in the composer's own time, Vivaldi's music served as diversion for all, not just for the wealthy aristocrats. 300 years later, it's an approach that still works, and Vivaldi's music still sounds like trotting horses on the move.

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翻译人员: G Ko 校对人员: Mingyu Cui轻松、明快、愉悦。这是18世纪早期所有音乐中相当为人熟知的一首。它曾出现在无数电影和电视广告中，但它叫什么？又为人们让人产生这种感受呢？这是《四季》协奏曲中《春》的开头，由意大利作曲家安东尼奥·维瓦尔第创作。《四季》享有盛名一方面因为它美妙悦耳。然而，更值得注意的是它其实在讲述一些故事。1725年《四季》在阿姆斯特丹首次发行时，是配有诗歌的，诗中描绘了维瓦尔第试图用音乐传递的季节景色。为器乐提供对应的情节内容，在这方面，维瓦尔第领先了几个时代。如果你在读这首诗的同时听音乐，你就会发现诗里的场景巧妙地同步于音乐画面。我们读到鸟儿唱着欢快的歌谣迎接春天，音乐表达的正是这一感觉。但是，很快一阵雷雨爆发。音乐里不仅有雷电，还有更多的小鸟，它们湿漉漉的，没精打采，受到了惊吓。在《夏》里，斑鸠用意大利语吟唱自己的名字“tortorella”之后一阵雹暴侵袭田野。《秋》是猎人们热切地追捕猎物。《冬》的协奏曲则以牙齿冻得打颤开头然后人们开始烤火取暖。随后又是一阵暴风雨人们在冰面上滑倒、摔跤。在冬天的头几周，旧年即将结束，维瓦尔第的四季音乐探索之旅也随之结束。直到19世纪早期这类表达丰富的音乐才流行起来。那时，乐团的规模变大，乐器种类增多，木管、铜管和打击乐器一起描述故事。但是维瓦尔第仅用一把小提琴、弦乐器和一架大键琴就完美演奏了整个故事。与同时代的巴赫不同，维瓦尔第对繁杂的赋格曲并不很感兴趣。他更喜欢用平易近人的音乐愉悦听众这些旋律又拼在一起提醒我们身处怎样的音乐场景。所以，《春》的第一章节以春天一景开始又以之结束，与开头略有不同。这是一种极具创意的吸引听众的方式，而维瓦尔第被认为是18世纪早期最令人印象深刻的小提琴家，他知道吸引听众的重要性。他常常在音乐会上亲自当首席小提琴手。有些音乐会的首席小提琴手则由皮耶塔学校的年轻音乐家担任。皮耶塔是一所大多数学生都是孤儿的威尼斯女子学校。维瓦尔第在那做音乐总监。音乐训练不仅是一种适合年轻女子的社交技能，也是一种潜在职业，对于那些可能无法谋得良缘的女生。甚至在维瓦尔第所处的时代，他的音乐就服务于所有人群，而不是专供富有的贵族。300年后，这一方法依然行之有效，维瓦尔第的音乐听起来仍然像欢快的马儿在奔跑。

**P407 2016-10-24 Why do whales sing - Stephanie Sardelis**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=407)

Communicating underwater is challenging. Light and odors don't travel well, so it's hard for animals to see or smell. But sound moves about four times faster in water than in air, so in this dark environment, marine mammals often rely on vocalization to communicate. That's why a chorus of sounds fills the ocean. Clicks, pulses, whistles, groans, boings, cries, and trills, to name a few. But the most famous parts of this underwater symphony are the evocative melodies, or songs, composed by the world's largest mammals, whales. Whale songs are one of the most sophisticated communication systems in the animal kingdom. Only a few species are known to sing. Blue, fin, bowhead minke whales, and of course humpback whales. These are all baleen whales which use hairy baleen plates instead of teeth to trap their prey. Meanwhile, toothed whales do use echolocation, and they and other species of baleen whales make social sounds, such as cries and whistles, to communicate. But those vocalizations lack the complexity of songs. So how do they do it? Land mammals like us generate sound by moving air over our vocal cords when we exhale, causing them to vibrate. Baleen whales have a U-shaped fold of tissue between their lungs and their large inflatable organs called laryngeal sacs. We don't know this for sure because it's essentially impossible to observe the internal organs of a living, singing whale, but we think that when a whale sings, muscular contractions in the throat and chest move air from the lungs across the U-fold and into the laryngeal sacs, causing the U-fold to vibrate. The resulting sound resonates in the sacs like a choir singing in a cathedral making songs loud enough to propagate up to thousands of kilometers away. Whales don't have to exhale to sing. Instead, the air is recycled back into the lungs, creating sound once more. One reason whale songs are so fascinating is their pattern. Units, like moans, cries, and chirps are arranged in phrases. Repeated phrases are assembled into themes. Multiple themes repeated in a predictable pattern create a song. This hierarchical structure is a kind of grammar. Whale songs are extremely variable in duration, and whales can repeat them over and over. In one recorded session, a humpback whale sang for 22 hours. And why do they do it? We don't yet know the exact purpose, but we can speculate. Given that the singers are males and they mostly sing during the mating season, songs might be used to attract females. Or perhaps they're territorial, used to deter other males. Whales return to the same feeding and breeding grounds annually, and each discrete population has a different song. Songs evolve over time as units or phrases are added, changed, or dropped. And when males from different populations are feeding within earshot, phrases are often exchanged, maybe because new songs make them more attractive to breeding females. This is one of the fastest examples of cultural transmission, where learned behaviors are passed between unrelated individuals of the same species. We can eavesdrop on these songs using underwater microphones called hydrophones. These help us track species when sightings or genetic samples are rare. For example, scientists have been able to differentiate the elusive blue whale's populations worldwide based on their songs. But the oceans are getting noisier as a result of human activity. Boating, military sonar, underwater construction, and seismic surveys for oil are occurring more often which may interfere with whale's communication. Some whales will avoid key feeding or breeding grounds if human noise is too loud. And humpback whales have been observed to reduce their singing in response to noise 200 kilometers away. Limiting human activity along migratory routes and in other critical habitats, and reducing noise pollution throughout the ocean would help ensure whales continued survival. If the whales can keep singing and we can keep listening, maybe one day we'll truly understand what they're saying.

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翻译人员: yan keyang 校对人员: 小布 陈在水下交流不是一件容易的事光线和气味不易在水里传播，因此水下的动物很难看到或闻到东西但是，声音在水中传播的速度是在空气中的四倍因此，在水下这片黑暗的世界中哺乳动物通常依靠声音进行交流海洋中遍布了声音的合唱队卡嗒声砰砰声啸啸声呻吟声啵嘤声（弹簧突然弹开或振动时所发出的声音）哭泣声还有少数颤声如果要说这场水下交响乐里最有名的篇章那一定非世界上最大的哺乳动物鲸鱼莫属，鲸鱼所创作的歌曲旋律优美让人流连忘返在动物王国众多复杂的交流系统中鲸鱼的歌唱也占有一席之地只有少数几个品种的鲸鱼可以吟唱他们是蓝鲸长须鲸弓头鲸小须鲸当然，还有座头鲸它们都属于须鲸亚目用上颚所延伸下来的梳子状的板片而非牙齿来捕获食物与须鲸不同，齿鲸使用回声定位法齿鲸与那些不能吟唱的须鲸品种通过发出哭泣声和啸啸声进行交流但是这些声音都没有鲸鱼的歌唱复杂鲸鱼是如何发声的呢？当人和其它陆生哺乳动物呼气时，气流流过声带引起声带的震动，从而产生声音鲸鱼有一块U型的褶皱组织位于它们的肺和巨大的喉囊间对这块组织我们并不是很了解因为我们无法观察一条正在歌唱的鲸鱼的内部器官因为我们无法观察一条正在歌唱的鲸鱼的内部器官但是，我们猜测当一条鲸鱼吟唱时，它喉部和胸部的肌肉收紧使肺中的空气通过U型褶皱流入喉囊在这一过程中U型褶皱受到空气的作用而震动震动产生的声音在喉囊中共鸣，听起来就像在大教堂中吟唱的唱诗班产生的声波足够大，可以传播到数千公里之外鲸鱼歌唱时不需要呼气空气会流回肺中再度产生声波模式是鲸鱼歌声如此引人入胜的原因之一就像呻吟声、哭声与唧唧声，鲸鱼的歌声被切分成独立的乐句不断重复的乐句组成旋律多种不同的旋律以一种可预测的模式不断重复出现，一首乐曲也因此诞生这种分级结构就好似鲸鱼语言的“语法”鲸鱼的歌声长度各不相同它们会一直不停地重复一项纪录记载了一头座头鲸曾连续歌唱22小时鲸鱼为什么要唱歌呢？我们尚不了解它们这样做的具体原因鉴于鲸鱼歌手多为雄性，并且它们多在发情期一展歌喉所以我们猜测它们歌唱的原因是为了吸引雌性又或许它们是在保卫领地，抵抗其它雄性鲸鱼鲸鱼每年都会回到同一块觅食地和繁殖地每个群体的鲸鱼歌声都是不同的随着乐句数量的增减改变，歌曲也会相应改变当不同群体的鲸鱼在彼此可听见的范围内觅食时它们会交换彼此歌曲的乐句新的歌曲或许会帮助雄性鲸鱼吸引更多处于繁殖期的雌性这是文化传播的一个快速范例学习行为在不同个体间传递这些个体又属于一个相同的群体我们可以使用水下麦克风听到鲸鱼的歌曲这种装置名为水下听音器水下听音器可以帮助我们追踪那些基因样本十分缺乏的品种例如，基于不同群体的歌声科学家已经能区分出世界范围内的蓝鲸群体但是，人类活动使海洋世界变的更加嘈杂船舶航行军用声纳水下施工因勘探石油而引发的地震更加频繁这些都会干扰到鲸鱼的交流一些鲸鱼会躲开一些关键的觅食和繁殖场所因为那里的人类活动噪音实在太大人们观察到当噪音距离座头鲸200公里时它们就会停止歌唱在鲸鱼的迁徙线路和重要栖息地减少人类活动降低整个海洋的噪音污染这一切都将确保鲸鱼这一物种的延续鲸鱼继续唱歌，人类继续听歌也许有一天我们会理解鲸鱼歌曲的意思

**P408 2016-11-08 Do we really need pesticides - Fernan Pérez-Gálvez**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=408)

In 1845, Ireland's vast potato fields were struck by an invasive fungal disease that rapidly infested this staple crop. The effect was devastating. One million people died of famine, and over a million more were forced to leave Ireland. Nowadays, we avoid such agricultural catastrophes with the help of pesticides. Those are a range of manmade chemicals that control insects, unwanted weeds, funguses, rodents, and bacteria that may threaten our food supply. They've become an essential part of our food system. As populations have grown, monoculture, single crop farming, has helped us feed people efficiently. But it's also left our food vulnerable to extensive attack by pests. In turn, we've become more dependent on pesticides. Today, we annually shower over 5 billion pounds of pesticides across the Earth to control these unwanted visitors. The battle against pests, especially insects, has marked agriculture's long history. Records from thousands of years ago suggest that humans actively burned some of their crops after harvest to rid them of pests. There's even evidence from ancient times that we recruited other insects to help. In 300 A.D., Chinese farmers specially bred ferocious predatory ants in orange orchards to protect the trees from other bugs. Later, as large-scale farming spread, we began sprinkling arsenic, lead, and copper treatments on crops. But these were incredibly toxic to humans as well. As our demand for more, safer produce increased, so did the need for effective chemicals that could control pests on a grander scale. This ushered in the era of chemical pesticides. In 1948, a Swiss chemist named Paul Hermann Müller was awarded a Nobel Prize for his discovery of dichlorodiphenyltrichloroethane, also known as DDT. This new molecule had unparalleled power to control many insect species until the 1950s, when insects became resistant to it. Worse, the chemical actually drove dramatic declines in bird populations, poisoned water sources, and was eventually found to cause long-term health problems in humans. By 1972, DDT had been banned in the United States, and yet traces still linger in the environment today. Since then, chemists have been searching for alternatives. With each new wave of inventions, they've encountered the same obstacle - rapid species evolution. As pesticides destroy pest populations, they leave behind only the most resistant individuals. They then pass on their pesticide-resisting genes to the next generation. That's lead to the rise of super bugs, such as the Colorado potato beetle, which is resistant to over 50 different insecticides. Another downside is that other bugs get caught in the crossfire. Some of these are helpful predators of plant pests or vital pollinators, so erasing them from agriculture wipes out their benefits, too. Pesticides have improved over time and are currently regulated by strict safety standards, but they still have the potential to pollute soil and water, impact wildlife, and even harm us. So considering all these risks, why do we continue using pesticides? Although they're imperfect, they currently may be our best bet against major agricultural disasters, not to mention mosquito-born diseases. Today, scientists are on a quest for alternative pest control strategies that balance the demands of food production with environmental concerns. Nature has become a major source of inspiration, from natural plant and fungal chemicals that can repel or attract insects, to recruiting other insects as crop bodyguards. We're also turning to high-tech solutions, like drones. Programmed to fly over crops, these machines can use their sensors and GPS to carry out more targeted sprays that limit a pesticide's wider environmental impact. With a combination of biological understanding, environmental awareness, and improved technologies, we have a better chance of finding a holistic solution to pests. Chemical pesticides may never shake their controversial reputation, but with their help, we can ensure that agricultural catastrophes stay firmly in our past.

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翻译人员: Yuyang Zhao 校对人员: Jenny Yang在1845年，爱尔兰大量土豆受到一种入侵真菌疾病的侵袭。并迅速影响了这个主要作物。后果是灾难性的。100万人死于饥饿，并且超过100完万人被迫离开爱尔兰。今天，农药的使用避免了这种农业灾难。农药是各种人造化学品，用来控制昆虫，杂草，真菌植物，田鼠，以及细菌等威胁我们食物供应的东西。农药已经称为我们食物链中的一个重要组成部分。随着人口增长，单作、单种作物农业，有助于高效地供应食物。可是，也是我们的食物很脆弱，易于受到害虫的威胁。反过来，我们也更加依赖农药。今天，全球每年喷洒农药50亿磅来控制对农业的威胁。对害虫的防治，特别是昆虫，已经有很长的历史。几千年前的记录记载收获后焚烧庄稼来杀死害虫。甚至古代证据表明，我们可以利用昆虫天敌。公元300年，中国农民养殖一种食肉蚂蚁来保护桔园中的果树免受害虫威胁。以后，随着农业的规模化，我们开始对农作物喷洒砷、铅和铜等化学品。可是，这也不可避免地使人类受到毒害。随着需求的增加，安全性也在提高，于是，对有效化学品的需求大规模地控制了害虫。农业进入了化学农药时代。在1948年，一位名叫Paul Hermann Müller的瑞士化学家获得了诺贝尔奖因发现二氯二苯三氯乙烷，也叫滴滴涕。这种新的分子具有前所唯有的功能，可以杀死各种昆虫至到20世纪50年代，昆虫才开始对它产生抗体。糟糕的是，农药显著地减少了鸟类，污染了水源，而且最终发现引起了人类的长期健康问题。到1972年， DDT在美国被禁止使用，然而在今天的环境中仍能找到它的残留。从那开始，化学家在不断地寻找替代化学品。每一波新的发明，总能遇到同样的问题-物种的迅速进化。随着农药摧毁了害虫，有抗体的昆虫得以存活。他们遗传他们的抗基因给后代。这导致了超级害虫的出现，诸如科罗拉多土豆甲虫，他们对50多种不同的农药有抗体。另一个问题是，和其它的害虫互相影响。一些对植物有益的昆虫或重要的传授花粉的昆虫，也被农药清除了。农药在不断改进并且目前有着严格的安全标准，可是他们仍然对土壤和水有着潜在的污染，影响野生动物，甚至危害人类。可是考虑到这些风险，我们为什么仍然使用农药呢？虽然他们不是十全十美，但是它是目前防治主要农业灾害的最好产品，不包括与蚊子相关的疾病。今天，科学家仍在寻找控制害虫的替代方案来平衡食物供应与环境的关系。自然已经称为主要的灵感来源，从抵制或吸引昆虫的天然植物和真菌化学，到利用害虫的天敌保护农作物。我们正在转向高科技的解决途径，比如无人机。程序控制在作物上空飞行，这些设备用他们的传感器和GPS来执行多目标喷洒来限制农药对环境的广泛影响。通过对生物理解，环境意识，以及技术改进的组合，我们又更好的机会来找到控制害虫的重要方案。化学农药备受争议的名声从来没有动摇，可是在他们的帮助下，我们能确保农业灾害不再出现。

**P409 2016-11-10 How do US Supreme Court justices get appointed - Peter Paccone**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=409)

There's a job out there with a great deal of power, pay, prestige, and near-perfect job security. And there's only one way to be hired: get appointed to the US Supreme Court. If you want to become a justice on the Supreme Court, the highest federal court in the United States, three things have to happen. You have to be nominated by the president of the United States, your nomination needs to be approved by the Senate, and finally, the president must formally appoint you to the court. Because the Constitution doesn't specify any qualifications, in other words, that there's no age, education, profession, or even native-born citizenship requirement, a president can nominate any individual to serve. So far, six justices have been foreign-born, at least one never graduated from high school, and another was only 32 years old when he joined the bench. Most presidents nominate individuals who broadly share their ideological view, so a president with a liberal ideology will tend to appoint liberals to the court. Of course, a justice's leanings are not always so predictable. For example, when President Eisenhower, a Republican, nominated Earl Warren for Chief Justice, Eisenhower expected him to make conservative decisions. Instead, Warren's judgements have gone down as some of the most liberal in the Court's history. Eisenhower later remarked on that appointment as "the biggest damned-fool mistake" he ever made. Many other factors come up for consideration, as well, including experience, personal loyalties, ethnicity, and gender. The candidates are then thoroughly vetted down to their tax records and payments to domestic help. Once the president interviews the candidate and makes a formal nomination announcement, the Senate leadership traditionally turns the nomination over to hearings by the Senate Judiciary Committee. Depending on the contentiousness of the choice, that can stretch over many days. Since the Nixon administration, these hearings have averaged 60 days. The nominee is interviewed about their law record, if applicable, and where they stand on key issues to discern how they might vote. And especially in more recent history, the committee tries to unearth any dark secrets or past indiscretions. The Judiciary Committee votes to send the nomination to the full Senate with a positive or negative recommendation, often reflective of political leanings, or no recommendation at all. Most rejections have happened when the Senate majority has been a different political party than the president. When the Senate does approve, it's by a simple majority vote, with ties broken by the vice president. With the Senate's consent, the president issues a written appointment, allowing the nominee to complete the final steps to take the constitutional and judicial oaths. In doing so, they solemnly swear to administer justice without respect to persons and do equal right to the poor and the rich and faithfully and impartially discharge and perform all the duties incumbent upon a US Supreme Court justice. This job is for life, barring resignation, retirement, or removal from the court by impeachment. And of the 112 justices who have held the position, not one has yet been removed from office as a result of an impeachment. One of their roles is to protect the fundamental rights of all Americans, even as different parties take power. With the tremendous impact of this responsibility, it's no wonder that a US Supreme Court justice is expected to be, in the words of Irving R. Kaufman, "a paragon of virtue, an intellectual Titan, and an administrative wizard." Of course, not every member of the Court turns out to be an exemplar of justice. Each leaves behind a legacy of decisions and opinions to be debated and dissected by the ultimate judges, time and history.

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翻译人员: Haibing Luo 校对人员: Nova Upinel Altesse有这么一份工作，它位高权重，薪水可观，工作保障几近完美。获得这种工作的方式只有一个：成为美国最高法院的法官。如果你想成为美国最高法院——美国联邦政府最高法院的法官，必须满足三个条件：得到美国总统的提名，参议院通过提名，最后，总统的正式任命。因为美国宪法没有对法官的资格有特定的要求，就是说，没有年龄，教育，专业要求，甚至不必出生在美国本土，所以总统可以提名任何人。目前为止，有六位法官出生在国外，至少一位没有高中毕业，还有一位成为法官时年仅32岁。大多数总统会提名与自己持相同政见的人，所以，如果总统是自由派的，他会提名自由派人士为法官。当然，法官上任以后的做派也并不总是可以预测的。例如，艾森豪威尔总统，一个共和党人士，任命了厄尔·沃伦为大法官。艾森豪威尔总统期待他作风保守，然而，沃伦却成为美国最高法院有史以来作风最自由的法官之一。后来，艾森豪威尔评价那次人事任命为他曾经犯过的“最大最愚蠢的错误”。提名最高法院法官时也会考虑其他因素，例如经验，个人的忠诚度，种族以及性别。然后候选人要经过全面审查，从报税纪录，到给家政人员的薪水都要审查。总统与候选人面谈之后，会正式宣布提名他为候选人。按照传统，参议院领导会组织参议院司法委员会为候选人举行听证会。根据参议院对这项提名的争议度，听证会可能会持续很长时间。自尼克松政府以来，听证会平均需要60天。如果有司法经验的，参议员会根据候选人的司法经验，以及候选人在关键问题上的立场，进行投票。尤其是在近几十年，委员会会尽可能挖掘候选人的污点或过去不检点的行为。司法委员会常基于其政治倾向，向参议院做出支持或反对的推荐，或者根本不做任何推荐。多数做出反对推荐的，是因为多数参议员和现任总统党派不同。如果副总统打破平衡，多数参议员投票赞成，参议院会通过这些提名。参议院同意后，总统发表书面任命书，让候选人完成最后一步——宪法和司法宣誓。宣誓时，候选人庄严宣誓无私执法，无论贫富，公平对待所有人的权利，忠诚公正得执行美国最高法院一个法官所应尽的职责。这份工作是终身制的，除非自愿辞职，退休或者被法院弹劾。在112个历任法官中，还没出现过被单核出局的。法官职责之一是无论执政党是哪个，都要维护所有美国人的基本权利。因为该权利影响巨大，难怪欧文·考夫曼说，美国最高法院的法官应该是“道德典范，智慧巨人，管理奇才。”当然，也不是所有法官都会成为模范法官。每个法官都会留下丰富遗产，做出无数决定和意见，供后来的法官，时间和历史来争论剖析。

**P410 2016-11-15 How to recognize a dystopia - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=410)

Have you ever tried to picture an ideal world? One without war, poverty, or crime? If so, you're not alone. Plato imagined an enlightened republic ruled by philosopher kings, many religions promise bliss in the afterlife, and throughout history, various groups have tried to build paradise on Earth. Thomas More's 1516 book "Utopia" gave this concept a name, Greek for "no place." Though the name suggested impossibility, modern scientific and political progress raised hopes of these dreams finally becoming reality. But time and time again, they instead turned into nightmares of war, famine, and oppression. And as artists began to question utopian thinking, the genre of dystopia, the not good place, was born. One of the earliest dystopian works is Jonathan Swift's "Gulliver's Travels." Throughout his journey, Gulliver encounters fictional societies, some of which at first seem impressive, but turn out to be seriously flawed. On the flying island of Laputa, scientists and social planners pursue extravagant and useless schemes while neglecting the practical needs of the people below. And the Houyhnhnm who live in perfectly logical harmony have no tolerance for the imperfections of actual human beings. With his novel, Swift established a blueprint for dystopia, imagining a world where certain trends in contemporary society are taken to extremes, exposing their underlying flaws. And the next few centuries would provide plenty of material. Industrial technology that promised to free laborers imprisoned them in slums and factories, instead, while tycoons grew richer than kings. By the late 1800's, many feared where such conditions might lead. H. G. Wells's "The Time Machine" imagined upper classes and workers evolving into separate species, while Jack London's "The Iron Heel" portrayed a tyrannical oligarchy ruling over impoverished masses. The new century brought more exciting and terrifying changes. Medical advances made it possible to transcend biological limits while mass media allowed instant communication between leaders and the public. In Aldous Huxley's "Brave New World", citizens are genetically engineered and conditioned to perform their social roles. While propaganda and drugs keep the society happy, it's clear some crucial human element is lost. But the best known dystopias were not imaginary at all. As Europe suffered unprecedented industrial warfare, new political movements took power. Some promised to erase all social distinctions, while others sought to unite people around a mythical heritage. The results were real-world dystopias where life passed under the watchful eye of the State and death came with ruthless efficiency to any who didn't belong. Many writers of the time didn't just observe these horrors, but lived through them. In his novel "We", Soviet writer Yevgeny Zamyatin described a future where free will and individuality were eliminated. Banned in the U.S.S.R., the book inspired authors like George Orwell who fought on the front lines against both fascism and communism. While his novel "Animal Farm" directly mocked the Soviet regime, the classic "1984" was a broader critique of totalitarianism, media, and language. And in the U.S.A., Sinclair Lewis's "It Can't Happen Here" envisioned how easily democracy gave way to fascism. In the decades after World War II, writers wondered what new technologies like atomic energy, artificial intelligence, and space travel meant for humanity's future. Contrasting with popular visions of shining progress, dystopian science fiction expanded to films, comics, and games. Robots turned against their creators while TV screens broadcast deadly mass entertainment. Workers toiled in space colonies above an Earth of depleted resources and overpopulated, crime-plagued cities. Yet politics was never far away. Works like "Dr. Strangelove" and "Watchmen" explored the real threat of nuclear war, while "V for Vendetta" and "The Handmaid's Tale" warned how easily our rights could disappear in a crisis. And today's dystopian fiction continues to reflect modern anxieties about inequality, climate change, government power, and global epidemics. So why bother with all this pessimism? Because at their heart, dystopias are cautionary tales, not about some particular government or technology, but the very idea that humanity can be molded into an ideal shape. Think back to the perfect world you imagined. Did you also imagine what it would take to achieve? How would you make people cooperate? And how would you make sure it lasted? Now take another look. Does that world still seem perfect?

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翻译人员: Silas Lee 校对人员: Kai Ma你曾尝试想象过一个理想的世界吗？一个没有战争，贫穷，和犯罪的世界？如果有，那你并不是一个人柏拉图想象了一个由顶尖哲学家统治的开化的共和国许多宗教都期望来世的极乐并且纵观整个历史，许多群体都曾尝试在地球上创建天堂托马斯·莫尔在1516年出版的书《乌托邦》 给了这个概念一个名字希腊语指”没有地方“虽然这个名字暗指了不可能性但现代科学和政治的进步使实现这些梦想的希望最终变得现实但是一次又一次，它们相反地变成了战争，饥荒和压迫的噩梦并且当艺术家们开始质疑乌托邦的想法时反乌托邦题材--“不好的地方”应运而生乔纳森·斯威夫特的《格列佛游记》 是最早的反乌托邦题材作品之一在他的整个旅行过程中，格列佛偶遇了一些虚构的社会其中有一些起初看起来是使人敬畏的， 但结果却是有严重缺陷的社会在格列佛游记中科学家和社会规划师追寻夸张和无用的计划而忽视下层人的实际需要同时生活在完全合理的和谐中的Houyhnhnm人一点也不能忍受人类的缺陷在他的小说中，斯威夫特为反乌托邦构建了一个蓝图他想象了一个世界，在这个世界中存在在当代社会的某些趋势走向了极端暴露出了它们潜在的问题并且接下来的几个世纪里将会生产大量物资工业技术的进步预示着体力劳动者的解放取而代之的却是被关押在贫民窟和工厂而与此同时巨头们变得比国王更富有到了19世纪末期 许多人开始担忧这种状况可能成为现实赫伯特·乔治·威尔斯在《时间机器》中 想象上层社会和工人逐步进化成不同的人种同时杰克·伦敦的《铁蹄》 描绘了一个残暴的寡头政治统治着贫穷的劳动阶层新的世纪带来了更多令人既兴奋又恐惧的变化医疗的进步使跨越生物界限成为可能同时大众传媒使领导者和公众之间的及时交流成为可能在阿道司·赫胥黎的《美丽新世界》 每个公民的基因都是被设计过的并根据社会角色接受相应的训练政府宣传和药品让他们保持愉悦显而易见的是 这些人被剥夺了人类最基本的特征但是众所周知的反乌托邦并不是虚幻的就像欧洲经历了空前的工业革命新的政治运动取得了统治权一些承诺要消除所有的社会差别另一些则试图用一些虚构的事物 将人们团结起来导致的结果就是真实世界的反乌托邦人们一生都活在监视下不遵守规则的人将会被无情地处死在那个时代，作家们不仅仅是发现了这些恐惧还经历了它们苏联作家叶夫根尼·萨米尔钦在他的小说《我们》中描述了一个自由意志和个体特征都被消灭了的未来尽管苏联将它列为禁书 它仍鼓舞了一些作家比如奋斗在共产主义 和反法西斯主义前线的乔治·奥威尔他的小说《动物农场》直接嘲讽了苏维埃政权经典的《1984》则是对 集权主义、媒体、和语言更广泛的批判并且在美国，辛克莱·刘易斯的《不会发生在这里》想象了民主政体被法西斯取代是多么容易在二战后的几十年里作家们想知道新科技比如原子能，人工智能，太空旅行将对人类的未来产生怎样的影响与广为流传的、赞美科学进步的观点相比反乌托邦科学小说拓展到了电影，喜剧，和游戏机器人们转向反抗他们的制造者与此同时电视上播放着乏味的大众娱乐工人们在太空殖民地辛勤工作它在资源耗尽，人口过多， 犯罪侵扰城市的地球上空然而政治从未消失像《奇爱博士》和《守望者》这样的作品 探究了核战争带来的真正威胁同时《V字仇杀队》和《女仆的故事》告诫了在危机中我们的权利多么容易丧失现今的反乌托邦小说继续反映着当代的焦虑关于不平等气候变化政府权力和全球性的流行病那么他们为什么会想象出如此悲观的世界呢？因为在他们心中，反乌托邦的作品都是警示故事不是关于一些特定的政府，或技术而是人类可以被塑造成一个理想的模型这个观点回忆一下你想象中的完美世界你思考过要怎么样才能实现吗？你怎样让人们合作？还有你将如何确保它延续下去现在再想想那个世界依旧看起来完美吗？

**P411 2016-11-16 Can you solve the airplane riddle - Judd A. Schorr**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=411)

Professor Fukanō, the famous eccentric scientist and adventurer, has embarked on a new challenge: flying around the world nonstop in a plane of his own design. Able to travel consistently at the incredible speed of one degree longitude around the equator per minute, the plane would take six hours to circle the world. There's just one problem: the plane can only hold 180 kiloliters of fuel, only enough for exactly half the journey. Let's be honest. The professor probably could have designed the plane to hold more fuel, but where's the fun in that? Instead, he's devised a slightly more elaborate solution: building three identical planes for the mission. In addition to their speed, the professor's equipped them with a few other incredible features. Each of the planes can turn on a dime and instantly transfer any amount of its fuel to any of the others in midair without slowing down, provided they're next to each other. The professor will pilot the first plane, while his two assistants Fugōri and Orokana will pilot each of the others. However, only one airport, located on the equator, has granted permission for the experiment, making it the starting point, the finish line, and the only spot where the planes can land, takeoff, or refuel on the ground. How should the three planes coordinate so the professor can fly continuously for the whole trip and achieve his dream without anyone running out of fuel and crashing? Pause here if you want to figure it out for yourself. Answer in: 3 Answer in: 2 Answer in: 1 According to the professor's calculations, they should be able to pull it off by a hair. The key is to maximize the support each assistant provides, not wasting a single kiloliter of fuel. It also helps us to think symmetrically so they can make shorter trips in either direction while setting the professor up for a long unsupported stretch in the middle. Here's his solution. All three planes take off at noon flying west, each fully loaded with 180 kiloliters. After 45 minutes, or one-eighth of the way around, each plane has 135 kiloliters left. Orokana gives 45 to the professor and 45 to Fugōri, fully refueling them both. With her remaining 45, Orokana returns to the airport and heads to the lounge for a well-deserved break. 45 minutes later, with one-quarter of the trip complete, the professor and Fugōri are both at 135 kiloliters again. Fugōri transfers 45 into the professor's tank, leaving himself with the 90 he needs to return. Professor Fukanō stretches and puts on his favorite album. He'll be alone for a while. In the meantime, Orokana has been anxiously awaiting Fugōri's return, her plane fully refueled and ready to go. As soon as his plane touches the ground, she takes off, this time flying east. At this point, exactly 180 minutes have passed and the professor is at the halfway point of his journey with 90 kiloliters of fuel left. For the next 90 minutes, the professor and Orokana's planes fly towards each other, meeting at the three-quarter mark. Just as the professor's fuel is about the run out, he sees Orokana's plane. She gives him 45 kiloliters of her remaining 90, leaving them with 45 each. But that's just half of what they need to make it to the airport. Fortunately, this is exactly when Fugōri, having refueled, takes off. 45 minutes later, just as the other two planes are about to run empty, he meets them at the 315 degree point and transfers 45 kiloliters of fuel to each, leaving 45 for himself. All three planes land at the airport just as their fuel gauges reach zero. As the reporters and photographers cheer, the professor promises his planes will soon be available for commercial flights, just as soon as they figure out how to keep their inflight meals from spilling everywhere.

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翻译人员: Sunny Wu 校对人员: Yulin Li著名的古怪科学家和探险家Fukanō教授开始了一项新的挑战用他自己设计的飞机进行一次环绕世界的无停靠飞行这架飞机能够持续以每分钟飞过每一经度的高速沿着赤道飞行只需要6小时就可以环绕世界一周只有一个问题需要克服：飞机只能携带18万升的燃料这个量只够完成一半旅程所以还是现实点吧教授或许可以设计一种能携带更多燃料的飞机但那就没意思了相反，他想出了一种更烧脑的解决方案为这项任务建造三架一模一样的飞机除了高速之外，教授还给它们装备了其他绝妙的功能每一个飞机能够在很小的空间里转弯并立刻把任意量的燃料 转移到在空中的其它飞机内且不需要减速只要他们相邻而飞教授驾驶第一架飞机他的两个助手Fugōri和Orokana分别驾驶另外两架飞机然而，只有一个赤道上的机场许可了这项实验以机场为起点终点以及飞机降落起飞和地面加油的唯一地点这三架飞机应该如何配合才能使教授在每一架飞机 都不会耗尽燃料或坠毁的情况下持续飞行完全程以实现他的梦想呢？如果您需要浏览本页，请暂停答案：3答案：2答案：1根据教授的计算他们应该可以勉强完成这个任务关键就在于把每个助手的助力最大化不浪费每一升燃料对称地思考这段旅程可以帮助我们理解他们可以从起点的两个方向进行短途飞行同时让教授从中途开始进行无供给的长途飞行解决方案是这样的三架飞机都在正午起飞向西飞行每架飞机装载18万升燃料45分钟后，也就是1/8的行程后每架飞机剩13.5万升燃料Orokana给教授和Fugōri分别输送了4.5万升使他们的飞机加满油Orokana用她余下的4.5万升返回机场并到休息室好好休息一番45分钟后，1/4的行程飞完教授和Fugōri的燃料又都剩下13.5万升Fugōri给教授传输了4.5万升给自己留下9万升用来返回机场Fukanō教授可以伸伸懒腰听听音乐了他要自己度过接下来的一段时间与此同时， Orokana正焦急地等Fugōri回来她的飞机已经加满油并准备出发了Fugōri的飞机降落的同时，她立刻起飞，这次向东飞行到目前为止，已经过去了180分钟教授正好完成了一半的旅程还剩下9万升燃料来完成接下来90分钟的飞行教授和Orokana的飞机相对而飞在行程的四分之三处相遇就在教授的燃料将要耗尽时他看到了Orokana的飞机Orokana从余下的9万升燃料中给了教授4.5千升让两架飞机都有4.5万升但这只够完成接下来的半程幸运的是，这时Fugōri已经加好油起飞了45分钟后，就在另两架飞机燃料要耗尽时Fugōri在315度处遇见了他们并给他们分别传输了4.5万升，给自己留下4.5万升三架飞机在机场降落时，燃料正好耗尽记者们和摄影师们开始欢呼教授承诺他的飞机很快会作为商用航班投入使用只需等他们研究出怎么样在飞机上用餐 才不会撒得到处都是就是时候了！

**P412 2016-11-22 How smudge-proof lipstick was invented \_ Moments of Vision 6 - Jessic**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=412)

In a Moment of Vision... It's the 1940's. The world is at war, and for the first time in American history, women are joining the full-time work force in droves. An organic chemist by the name of Hazel Bishop is in the midst of designing aircraft fuel for different oil companies. But her true interests lie elsewhere. The influx of women in the workforce hasn't changed the superficial expectations of society, and working women are expected to look well-groomed no matter their trade. Bishop is sick of having to take time to powder her nose and reapply her lipstick. Although the FDA has already begun regulating cosmetics, various ingredients in lipsticks can be detrimental to lip health. The bromo acid stains used to maintain color in most lipsticks are terribly drying. Bishop spends her spare time working with stains and dyes, mixing oils, and experimenting with molten wax. In a moment of vision and after years of hard work, Bishop introduces one of the first smudge-proof, long-lasting, working woman's lipsticks that doesn't just tint the lips, but also keeps them healthy and moisturized. Marketed as the only kissable lipstick, Bishop's product takes off and it isn't long before rival companies are not just replicating the lipstick but creating other, more practical cosmetics. Today, lip cosmetics are a billion dollar industry.

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翻译人员: Qiushuang Xu 校对人员: Wanling Wang在这一视觉的瞬间……这是40年代。世界正处于战争，而在美国历史的上第一次，女人陆陆续续加入了全职劳动力。一位名叫哈塞尔·毕晓普的有机化学家为不同的石油公司设计航空燃料。但是她真正的兴趣是在别处。加入劳动力的女性大军并没有改变社会对她们的肤浅期望，工作的女性被期望梳洗整洁，无论她们从事的是什么行业。毕晓普受够了花时间给她的鼻子擦粉和补擦口红。尽管已经食品药物管理局开始监管化妆品，口红中的各种原料可能会对嘴唇健康不利。过去大多数口红中用于保持颜色的溴酸非常干燥。毕晓普在空闲时间研究染色剂和染料，与油混合，并用熔化的蜡做实验。经过多年努力，毕晓普发明了第一支防晕染、持久的工作女性的口红。它不止给嘴唇上色，还会保持嘴唇健康湿润。定位为唯一可亲吻的口红，毕晓普的产品很成功。竞争企业很快就复制了这款口红，甚至还创造了其他更实用的化妆品。如今，口红产业是价值亿万元的产业。

**P413 2016-11-22 The secrets of Mozart’s “Magic Flute” - Joshua Borths**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=413)

A boy named Prince Tamino runs through a dark wood pursued by a dragon. Just as it rears up to devour him, three mysterious ladies appear and slay the dragon with their fierce battle cry. So begins Wolfgang Amadeus Mozart's "Die Zauberflöte," or "The Magic Flute." This fantasy singspiel, a type of folk opera with music and dialogue, premiered in 1791 in Vienna. Though it may seem like a childish fairytale, this intricate opera is full of subversive symbolism, and it's now regarded as one of the most influential operas in history. Tamino's run in with the dragon is only the start of his journey. The three women summon their leader, the Queen of the Night. She, in turn, sends Tamino on a quest to rescue her daughter Pamina from the evil sorcerer, Sarastro. And to help him on his journey, she gives him the titular magic flute. Tamino eventually finds Pamina at Sarastro's temple, but behind enemy lines, Tamino and Pamina learn that they're on the wrong side. The Queen of Night actually wants to plunge the world into darkness. Everything Tamino thought he knew was wrong, filling him with doubt and confusion. So, a new quest begins for Tamino and Pamina. They must pass three trials of wisdom, and only then can the day vanquish the night. Helped by the flute's magic power, the two youths overcome these trials and the Queen's attempts to sabotage them. They're finally initiated into the temple having restored balance to the kingdom. Many elements in this peculiar fairytale were inspired by Mozart's involvement in Freemasonry, a network of fraternal organizations throughout Europe. Much of their history, symbolism, and ritual came from the Middle Ages. But the Freemasons of Mozart's time were also influenced by 18th century European ideals - rationalism, humanism, and skepticism towards traditional authorities, like monarchy and the church. The symbols of Freemasonry and these ideals of the Enlightenment are found throughout the opera. If this sounds like a conspiracy theory, that's because it sort of was at the time, but it's now taken quite seriously and has been the subject of considerable scholarly publication. For example, some Mozart scholars believe the Queen of the Night symbolizes Maria Theresa, the Empress of the Holy Roman Empire who opposed Freemasonry and banned it in Austria. While there continues to be debate as to the specific meaning, interpretation, and location of these masonic references, scholars agree that they're there and are fully intentional. One of these symbols is the number three, which represented balance and order to Freemasons. Now the number three is, of course, easy to find in any work of storytelling, but it's particularly prominent in "The Magic Flute": three trials, three ladies, three spirits, and three doors, much of the music is written in E-flat major, which has three flats in its key signature, and historically, masonic rituals began with three knocks. The opera references them by opening with three majestic chords complete with dramatic pauses. Those chords, which reoccur throughout the opera, serve another purpose. They capture the dramatic arc of the opera in miniature. The first chord, E-flat major, is in its most natural root position, simple and unadorned. It echoes the child-like Prince Tamino, who, in his naiveté, accepts everything the Queen and her ladies say without question. The second chord is C minor, a sour sonority that mirrors Tamino's sadness and doubt in the middle of the opera. That's when his world and notions of good and evil get turned on their heads. And good and evil are just two of the opera's extreme opposites. It features some of the highest and lowest notes in opera, day and night, simple hummable melodies and complicated forward-looking music. The opera's central theme concerns balancing these extremes to achieve perfect harmony. To reflect this, the final chord in the opening restores musical order. It returns to the triumphant E-flat major, the same chord it started with but inverted, meaning Mozart moved the bottom note to the top. Although it retains its original harmony, the chord sounds higher, pointing towards enlightenment. That's similar to Tamino, who in passing his trials restores balance to the kingdom while growing stronger, wiser, and more complete.

**P413 2016-11-22 The secrets of Mozart’s “Magic Flute” - Joshua Borths**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=413)

翻译人员: Mengya Cai 校对人员: Ellen Tung一个叫做塔米诺的王子因为被一只大妖龙追赶而跑入一个漆黑的森林正当这只大妖龙即将从后面吞噬他的时候三为神秘的女人出现了在激烈的 战斗口号搏斗之中将这只大妖龙斩杀此时沃尔夫冈·阿马德乌斯·莫扎特的音乐“Die Zauberflöte"开始响起也就是《魔笛》这部奇幻的歌唱剧是集音乐与对白为一体的一种民族歌剧它首演于1791年维也纳虽然也许它看起来像一部稚气未脱的神话故事但这部复杂精细的歌剧充满了颠覆性象征如今它被认作为历史上最具影响力的歌剧之一塔米诺与大妖龙斗争之时仅仅是他旅程的开始这三位女人召唤出她们的领导者：夜之女王相应地，夜之女王委托塔米诺解救出她困在恶魔萨拉斯妥的女儿，帕蜜娜为助他一臂之力，夜之女王赠与他了一支魔笛塔米诺最终在萨拉斯妥的神殿中找到帕蜜娜但是在敌人的防线之外塔米诺和帕蜜娜意识到他们的错误形势原来夜之女王是想要将整个世界陷于黑暗之中塔米诺意识到他之前知道的一切都是错误的这将他陷入怀疑和混淆之中因此，一个新的任务向塔米诺和帕蜜娜开启他们必须通过名为“理性“，”自然“，"智慧“这三个考验只有在通过之后光明才能征服黑暗在具有神奇魔力的笛子帮助之下两位青年过关斩将通过层层考验，可是女王企图徒摧毁他们他们最终进入那座神殿，恢复了王国的平衡这个独特的童话里有这许多元素其灵感来自于莫扎特所参与的共济会共济会是遍布整个欧洲的兄弟会组织他们的历史、象征符号、和仪式大多来自于中世纪但莫扎特时期的共济会还同时受到了18世纪欧洲思想的影响例如理性主义、人文主义、以及对传统权威的批判怀疑主义比如君主政体和教堂共济会的象征符号和这些启蒙运动的思想都能够在整部歌剧里找到影子假如这听起来像一个阴谋论，那是因为从某种程度上来看那个时期确实如此但是如今大家对此持十分严谨地态度这也成为大量的学术研究对象举一个例子，有些研究莫扎特的学者们认为这部歌剧里的夜之女王象征着圣罗马帝国的皇后玛利亚特瑞莎，这位皇后反对共济会并在下令禁止出现在奥地利即使这些具体含义，阐释以及音乐中象征共济会的地方都有待商榷学者们都一致认为这些确实存在于《魔笛》中，而且是有意为之其标志之一是数字”三“这个数字对于共济会来说意味着平衡和秩序当然了，如今任何故事作品中都很容易找到数字”三“然而这在《魔笛》中尤为突出三个考验三位侍女三种精神和三个门其中许多音乐都是降E大调这个调有三个降号从历史角度来看，共济会的新人入会仪式通常开始于三次敲门声这部歌剧的开场始于三个宏伟的和弦止于戏剧性的停顿而这三个和弦在整部歌剧中反复出现它们另有目的这些和弦是歌剧的缩影，抓住了其戏剧性第一个和弦降是E大调，是最自然的根音和弦简单且朴素它就像少年塔米诺王子因为他的天真而轻信了夜之女王和侍女所说的一切第二个和弦是C小调这一个酸涩的音响效果仿佛映照了歌剧中部塔米诺的悲伤和疑虑那个时候正是善与恶的世界和意识在他的脑海中轮番出现善与恶正是这部歌剧中两个极端他们分别在歌剧中以最高音和最低音的形式表现出来歌剧中的白天与黑夜分别通过简单人性化的旋律和复杂前卫的音乐对比表现出来这部歌剧的中心主题正是为了平衡这些极端因素从而达到最佳和谐状态为了反映出这个目的歌剧序曲的最后一个和弦恢复了音乐秩序：回到了令人欢欣鼓舞的降E大调与开篇的和弦相同，不过是降E大调的转位和弦转位和弦的意思是莫扎特将本身位于和弦最底部的音移到了最上面它既保留了原位和弦的和谐，且听起来音高更高了带有启蒙主义的指向性这和塔米诺有些相似：当他成功通过层层考验后恢复王国的平衡之时此时的塔米诺，更加强壮、聪明和完整

**P414 2016-11-23 How does your body know what time it is - Marco A. Sotomayor**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=414)

In 1962, a cave explorer named Michel Siffre started a series of experiments where he isolated himself underground for months without light or clocks. He attached himself to electrodes that monitored his vital signs and kept track of when he slept and ate. When Siffre finally emerged, the results of his pioneering experiments revealed that his body had kept to a regular sleeping-waking cycle. Despite having no external cues, he fell asleep, woke up, and ate at fixed intervals. This became known as a circadian rhythm from the Latin for "about a day." Scientists later found these rhythms affect our hormone secretion, how our bodies process food, and even the effects of drugs on our bodies. The field of sciences studying these changes is called chronobiology. Being able to sense time helps us do everything from waking and sleeping to knowing precisely when to catch a ball that's hurtling towards us. We owe all these abilities to an interconnected system of timekeepers in our brains. It contains the equivalent of a stopwatch telling us how many seconds elapsed, a clock counting the hours of the day, and a calendar notifying us of the seasons. Each one is located in a different brain region. Siffre, stuck in his dark cave, relied on the most primitive clock in the suprachiasmatic nucleus, or SCN of the hypothalamus. Here's the basics of how we think it works based on fruitfly and mouse studies. Proteins known as CLK, or clock, accumulate in the SCN throughout the day. In addition to activating genes that tell us to stay awake, they make another protein called PER. When enough PER accumulates, it deactivates the gene that makes CLK, eventually making us fall asleep. Then, clock falls low, so PER concentrations also drop again, allowing CLK to rise, starting the cycle over. There are other proteins involved, but our day and night cycle may be driven in part by this seesaw effect between CLK by day and PER by night. For more precision, our SCNs also rely on external cues like light, food, noise, and temperature. We called these zeitgebers, German for "givers of time." Siffre lacked many of these cues underground, but in normal life, they fine tune our daily behavior. For instance, as natural morning light filters into our eyes, it helps wake us up. Traveling through the optic nerve to the SCN, it communicates what's happening in the outside world. The hypothalamus then halts the production of melatonin, a hormone that triggers sleep. At the same time, it increases the production of vasopressin and noradrenaline throughout the brain, which help control our sleep cycles. At about 10 am, the body's rising temperature drives up our energy and alertness, and later in the afternoon, it also improves our muscle activity and coordination. Bright screens at night can confuse these signals, which is why binging on TV before bed makes it harder to sleep. But sometimes we need to be even more precise when telling the time, which is where the brain's internal stopwatch chimes in. One theory for how this works involves the fact that communication between a given pair of neurons always takes roughly the same amount of time. So neurons in our cortex and other brain areas may communicate in scheduled, predictable loops that the cortex uses to judge with precision how much time has passed. That creates our perception of time. In his cave, Siffre made a fascinating additional discovery about this. Every day, he challenged himself to count up to 120 at the rate of one digit per second. Over time, instead of taking two minutes, it began taking him as long as five. Life in the lonely, dark cave had warped Siffre's own perception of time despite his brain's best efforts to keep him on track. This makes us wonder what else influences our sense of time. And if time isn't objective, what does that mean? Could each of us be experiencing it differently? Only time will tell.

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翻译人员: Yulin Li 校对人员: Xu Junqing1962年， Michel Siffre, 一名岩洞探险者，把自己封闭在地下数月 并开始了一系列的试验，那里没有光也没有表。他通过连接的电极片 来监测自己的生命体征，并记录下何时吃饭，睡觉。当Siffre最终出关时这一系列实验结果表明他的身体保持了 规律的作息周期。尽管没有外界的线索，他入睡,起床，和吃饭都在特定的时间段。这就是昼夜节律， 源于拉丁文，意思是‘一日’。科学家后来发现 这个节律会影响激素分泌，对食物的消化，甚至是药物对身体的药效。研究这一领域的学科 叫做时间生物学。我们做任何事都离不开 对时间的感知能力。比如起床和入睡以及判断， 何时接住呼啸而来的球。这些能力都归于 我们脑中互联的计时系统。它集合了记秒的秒表,报时的时钟，播报季节的日历于一身。每个计时器都处在大脑不同的区域。困在黑暗的洞穴里， Siffre依靠最原始的计时器它们位于下丘脑的 视交叉上核(SCN)中。基于果蝇和老鼠实验， 我们认为其原理是这样的被称为CLK的蛋白，也读作「表」， 在一天中都在SCN中积累在激活那些让我们保持清醒的基因的同时，产生另一种被称为PER的蛋白质。当PER积累到足够的量，它会给制造CLK蛋白的基因一个负反馈，最终使我们进入梦乡。之后，「表」的浓度降低，PER的浓度也随之降低，使得CLK的浓度回升，开始了新一个轮回。这一过程不乏其他蛋白质的参与，但我们的昼夜循环受到这样一个在白天的CLK和夜晚的PER之间 跷跷板效应的驱使。为了变得更精确，我们的SCN也会依赖外界的线索，比如光，食物，噪音，还有温度。我们把这些称作「zeitgebers」，德语中的意思是“时间之源”Siffre在地下时缺乏这些线索但在日常生活中，他们对我们的行为进行微调。比如说，一束晨光射到我们眼睛里唤醒了我们，穿过视神经传到了SCN传达着外界正在发生的事情，下丘脑于是不再产生褪黑素。（褪黑素：一种触发睡眠的荷尔蒙）同时，在大脑中，下丘脑增加对抗利尿激素和去甲肾上腺素的分泌，如此帮助我们管控睡眠周期。早上10点左右，逐渐升高的体温 促使我们的能量和警觉性提升；傍晚，我们的肌肉活力和协调性也得到提升。夜间的亮光会扰乱这些生物信号，这就是为什么 在睡前长时间看电视会导致失眠。然而有些时候我们需要更准确的知道时间这就是脑内秒表发挥作用的时候关于它的工作原理，一种臆测认为任意一对神经元间的信号传递大致总是一个特定的时长。所以我们大脑皮层和其他区域的神经元，在一个设定的，可预测的环路传递信息。大脑皮层就从这一机制来精确判断过去了多少时间，我们的时间概念由此产生。在洞里时，Siffre还有另一个有趣的发现：每天，他都会挑战自己以每秒一个数字的速度数到120。随着时间的推移，从开始的用时2分钟， 到后来用时可以长达5分钟在孤寂，黑暗的洞穴中的生活， 使得Siffre的时间概念也扭曲了。尽管他的大脑很努力的使他保持正轨这就使得我们怀疑 还有什么会影响到我们对时间的感知。如果时间不是客观的， 这又意味着什么？可不可能我们每个人 对时间的感受都不同？只有时间会给出答案。

**P415 2016-11-26 Is there a reproducibility crisis in science - Matt Anticole**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=415)

In 2011, a team of physicists reported a startling discovery: neutrinos traveled faster than the speed of light by 60 billionths of a second in their 730 kilometer trip from Geneva to a detector in Italy. Despite six months of double checking, the bizarre discovery refused to yield. But rather than celebrating a physics revolution, the researchers published a cautious paper arguing for continued research in an effort to explain the observed anomaly. In time, the error was tracked to a single incorrectly connected fiber optic cable. This example reminds us that real science is more than static textbooks. Instead, researchers around the world are continuously publishing their latest discoveries with each paper adding to the scientific conversation. Published studies can motivate future research, inspire new products, and inform government policy. So it's important that we have confidence in the published results. If their conclusions are wrong, we risk time, resources, and even our health in the pursuit of false leads. When findings are significant, they are frequently double-checked by other researchers, either by reanalyzing the data or by redoing the entire experiment. For example, it took repeated investigation of the CERN data before the timing error was tracked down. Unfortunately, there are currently neither the resources nor professional incentives to double check the more than 1 million scientific papers published annually. Even when papers are challenged, the results are not reassuring. Recent studies that examined dozens of published pharmaceutical papers managed to replicate the results of less than 25% of them. And similar results have been found in other scientific disciplines. There are a variety of sources for irreproducible results. Errors could hide in their original design, execution, or analysis of the data. Unknown factors, such as patients' undisclosed condition in a medical study, can produce results that are not repeatable in new test subjects. And sometimes, the second research group can't reproduce the original results simply because they don't know exactly what the original group did. However, some problems might stem from systematic decisions in how we do science. Researchers, the institutions that employ them, and the scientific journals that publish findings are expected to produce big results frequently. Important papers can advance careers, generate media interest, and secure essential funding, so there's slim motivation for researchers to challenge their own exciting results. In addition, little incentive exists to publish results unsupportive of the expected hypothesis. That results in a deluge of agreement between what was expected and what was found. In rare occasions, this can even lead to deliberate fabrication, such as in 2013, when a researcher spiked rabbit blood with human blood to give false evidence that his HIV vaccine was working. The publish or perish mindset can also compromise academic journals' traditional peer-review processes which are safety checks where experts examine submitted papers for potential shortcomings. The current system, which might involve only one or two reviewers, can be woefully ineffective. That was demonstrated in a 1998 study where eight weaknesses were deliberately inserted into papers, but only around 25% were caught upon review. Many scientists are working toward improving reproducibility in their fields. There's a push to make researchers raw data, experimental procedures, and analytical techniques more openly available in order to ease replication efforts. The peer review process can also be strengthened to more efficiently weed out weak papers prior to publication. And we could temper the pressure to find big results by publishing more papers that fail to confirm the original hypothesis, an event that happens far more than current scientific literature suggests. Science always has, and always will, encounter some false starts as part of the collective acquisition of new knowledge. Finding ways to improve the reproducibility of our results can help us weed out those false starts more effectively, keeping us moving steadily toward exciting new discoveries.

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翻译人员: Cissy Yun 校对人员: Lin Ye在2011年，一支物理学家团队发表了一项新发现：中微子的传播速度大于光速中微子走完经日内瓦到意大利探测站 全长730千米的路途大约快了600亿分之一秒尽管用了六个月的时间再三确认，这一奇异的发现依旧如此研究人员并没有庆祝这一物理大发现他们反而在报纸上刊登了一篇警示性的文章主张继续研究，从而解释观察到的异常现象与此同时，有人指出，造成此异象的原因是 研究者追踪了一条错误连接的纤维光缆这个例子告诉我们，真正的科学远不止不变的教科书全世界的研究者仍持续不断地发表着他们的最新研究成果每篇新文章都参与到科学交流中发表的研究成果可以促进未来的研究启发新产品的制造并提示政府政策上的革新所以我们对于结果发表的正确性拥有信心是很重要的如果它们的结论是错误的我们就冒着浪费时间资源甚至是健康的风险去跟随错误的引导当有重大发现时这些成果通常都会被其他研究者再三确认或者重新分析数据或者将整个实验重新再做一遍比如，欧洲核子研究委员会对实验数据 进行了重复性调查才追踪到计时误差不幸的是，当下既没有资源也没有专业设备去重新检验每年超过一百万的新发表成果即使论文受到质疑，这样的结果也无法让人安心最近一项研究检验了很多已发表的药学论文论文中的结果可被复制的不到百分之二十五其他科学验证中也出现了相同的问题论文中的结果无法被重现的原因有许多实验的原设计、执行、或是关于数据的分析 都有可能藏有错误还有未知因素譬如说在药物研究中，患者的未公开隐疾就会使得实验的结果无法被复制而且有时，第二实验小组不能复制先前实验结果只是因为他们不知道先前的实验小组做了什么然而，一些问题可能源于人类研究科学的体系研究者研究学院和发表研究成果的科学期刊都被要求迅速地产生新的重要成果一篇重要的论文可以帮助事业的发展聚集媒体目光和保证重要的研究资金所以，研究者一般不会自己质疑自己的研究成果而且，很少会有鼓励研究者发表不支持预计假设的研究成果 的情况这造成了如今泛滥的与期望的一样的研究结果在极端情况下，这还可造成捏造成果的现象在2013年，一位研究者把兔子的血液 加入人的血液中从而给出错误的证据表明他的艾滋疫苗是有用的这种不是“发表“就是”消亡“的心态还危及到了学术期刊传统的同行评审过程这是一种安全检查专家会检测上交的论文中出现的潜在漏洞如今的系统只会有一到两个评审这可以被看做是无效的这被1998年的一场研究给证实人们把八项漏洞放在了论文中然而只有四分之一的漏洞在评审过程中被找出很多科学正在努力提高其研究领域的可重复性人们正在促进研究者的原始数据实验过程和分析方法更加开放、共有这样可以减少重证结果的难度评审过程也可以被加强在论文发表之前更有效地找出他们的漏洞我们还可以通过发表更多与预计假设不符的研究成果来缓解寻找重大研究成果的压力而结果和预计假设不符的情况 远远比现在被发表的结果所展示的多科学，永远有，也永远会遇到一些错误的开始这是获取新知识的过程的一部分找到一种可以提高我们研究成果可重现性的方法可以帮助我们更有效地揪出那些错误的开始让我们更顺利地去找寻新的发现

**P416 2016-11-28 Can machines read your emotions - Kostas Karpouzis**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=416)

With every year, machines surpass humans in more and more activities we once thought only we were capable of. Today's computers can beat us in complex board games, transcribe speech in dozens of languages, and instantly identify almost any object. But the robots of tomorrow may go futher by learning to figure out what we're feeling. And why does that matter? Because if machines and the people who run them can accurately read our emotional states, they may be able to assist us or manipulate us at unprecedented scales. But before we get there, how can something so complex as emotion be converted into mere numbers, the only language machines understand? Essentially the same way our own brains interpret emotions, by learning how to spot them. American psychologist Paul Ekman identified certain universal emotions whose visual cues are understood the same way across cultures. For example, an image of a smile signals joy to modern urban dwellers and aboriginal tribesmen alike. And according to Ekman, anger, disgust, fear, joy, sadness, and surprise are equally recognizable. As it turns out, computers are rapidly getting better at image recognition thanks to machine learning algorithms, such as neural networks. These consist of artificial nodes that mimic our biological neurons by forming connections and exchanging information. To train the network, sample inputs pre-classified into different categories, such as photos marked happy or sad, are fed into the system. The network then learns to classify those samples by adjusting the relative weights assigned to particular features. The more training data it's given, the better the algorithm becomes at correctly identifying new images. This is similar to our own brains, which learn from previous experiences to shape how new stimuli are processed. Recognition algorithms aren't just limited to facial expressions. Our emotions manifest in many ways. There's body language and vocal tone, changes in heart rate, complexion, and skin temperature, or even word frequency and sentence structure in our writing. You might think that training neural networks to recognize these would be a long and complicated task until you realize just how much data is out there, and how quickly modern computers can process it. From social media posts, uploaded photos and videos, and phone recordings, to heat-sensitive security cameras and wearables that monitor physiological signs, the big question is not how to collect enough data, but what we're going to do with it. There are plenty of beneficial uses for computerized emotion recognition. Robots using algorithms to identify facial expressions can help children learn or provide lonely people with a sense of companionship. Social media companies are considering using algorithms to help prevent suicides by flagging posts that contain specific words or phrases. And emotion recognition software can help treat mental disorders or even provide people with low-cost automated psychotherapy. Despite the potential benefits, the prospect of a massive network automatically scanning our photos, communications, and physiological signs is also quite disturbing. What are the implications for our privacy when such impersonal systems are used by corporations to exploit our emotions through advertising? And what becomes of our rights if authorities think they can identify the people likely to commit crimes before they even make a conscious decision to act? Robots currently have a long way to go in distinguishing emotional nuances, like irony, and scales of emotions, just how happy or sad someone is. Nonetheless, they may eventually be able to accurately read our emotions and respond to them. Whether they can empathize with our fear of unwanted intrusion, however, that's another story.

**P416 2016-11-28 Can machines read your emotions - Kostas Karpouzis**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=416)

翻译人员: Yulin Li 校对人员: Di SUN每年，机器逐渐在一些我们以前认为只有人类可以做的事情中超越人类如今，电脑可以在复杂的桌面游戏中打败我们能够转录各种语言并能迅速识别几乎所有物体而未来的机器人或许能在感知我们的情绪方面取得突破为什么这很重要？因为如果机器和操作他们的人可以准确地感知到我们的情绪他们可以前所未有地帮助我们甚至是操纵我们但是在这之前我们先来探讨一下 为什么像情绪这么复杂的东西可以被转化为数字， 这种计算机唯一能够理解的语言呢？本质上，机器理解感情的方式与我们大脑一样，通过情绪识别。美国心理学家保罗·艾克曼 定义了几种全球通用的情绪这些情绪的视觉信号在不同文化中是相同的。例如，微笑的画面对于现代城市人而言意味着愉悦对于土著原始人而言也是如此。根据艾克曼的理论，愤怒，厌恶，恐惧，愉悦悲伤和惊喜都一样容易被识别。事实证明，电脑的图像识别能力正在迅速提高这归功于神经网络这样的机器学习算法。这些人工节点通过建成关联和交换信息，模仿人们的生物神经元。为了训练这样的网络， 输入的样例被预分类到不同类别，譬如被标记成快乐或伤心的图片，被输入到这个系统里。然后，这个系统网络通过改变不同特征的比重来辨别不同的样例。这样的训练越多，算法就能更准确地识别新的图像。这一原理正与我们的大脑相像，我们的大脑依据过往的经历来处理新的刺激。识别算法并不只限于面部表情。我们的情感通过许多不同的方式被表露。比如肢体语言，语音语调心跳的改变，面色和皮肤温度，甚至写作的用词频率和句型结构。你也许会认为通过训练神经网络来识别这些特征会是一个漫长而复杂的过程考虑到当下巨大的数据量，以及现代电脑的数据处理速度。从社交网络的更新，上传的图片和视频，电话录音，到热敏感安全摄像机和可穿戴的生理信号监视器，关键问题并不是如何获得足够的数据，而是我们应该如何运用这些数据。电子情感识别的用途是多方面的。比如，用算法识别面部表情的机器人可以用于帮助儿童学习或者为孤独的人作伴。许多社交网络公司正在考虑使用算法来标记帖子里的特殊字词以防范自杀行为。情感识别软件可以帮助治疗精神疾病或者提供低价的自动化心理治疗。尽管情感识别有这些好处，通过一个巨大的网络自动扫描我们的照片，通信，和生理信号也让人感到不安。当我们的隐私信息被这个没有人情味的系统收集， 进而被公司利用到广告中来欺骗我们的感情这意味着什么？我们的权利又是什么如果任何的权力机构认为 他们可以在人们决定做任何事情之前，就能辨别有可能作案的人？当前的机器人在辨别情感的微妙变化上还需要提升，比如辨识讽刺以及识别情绪的程度， 分辨一个人有多么的开心或者难过。无论如何， 它们或许终究能够正确识别我们的情绪并且做出回应。至于他们能否体会到我们不想被过度入侵的恐惧，这就是另外一回事了。

**P417 2016-11-29 The neuroscience of imagination - Andrey Vyshedskiy**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=417)

Imagine, for a second, a duck teaching a French class, a ping-pong match in orbit around a black hole, a dolphin balancing a pineapple. You probably haven't actually seen any of these things, but you could imagine them instantly. How does your brain produce an image of something you've never seen? That may not seem hard, but that's only because we're so used to doing it. It turns out that this is actually a complex problem that requires sophisticated coordination inside your brain. That's because to create these new, weird images, your brain takes familiar pieces and assembles them in new ways, like a collage made from fragments of photos. The brain has to juggle a sea of thousands of electrical signals getting them all to their destination at precisely the right time. When you look at an object, thousands of neurons in your posterior cortex fire. These neurons encode various characteristics of the object: spiky, fruit, brown, green, and yellow. This synchronous firing strengthens the connections between that set of neurons, linking them together into what's known as a neuronal ensemble, in this case the one for pineapple. In neuroscience, this is called the Hebbian principle, neurons that fire together wire together. If you try to imagine a pineapple later, the whole ensemble will light up, assembling a complete mental image. Dolphins are encoded by a different neuronal ensemble. In fact, every object that you've seen is encoded by a neuronal ensemble associated with it, the neurons wired together by that synchronized firing. But this principle doesn't explain the infinite number of objects that we can conjure up in our imaginations without ever seeing them. The neuronal ensemble for a dolphin balancing a pineapple doesn't exist. So how come you can imagine it anyway? One hypothesis, called the Mental Synthesis Theory, says that, again, timing is key. If the neuronal ensembles for the dolphin and pineapple are activated at the same time, we can perceive the two separate objects as a single image. But something in your brain has to coordinate that firing. One plausible candidate is the prefrontal cortex, which is involved in all complex cognitive functions. Prefrontal cortex neurons are connected to the posterior cortex by long, spindly cell extensions called neural fibers. The mental synthesis theory proposes that like a puppeteer pulling the strings, the prefrontal cortex neurons send electrical signals down these neural fibers to multiple ensembles in the posterior cortex. This activates them in unison. If the neuronal ensembles are turned on at the same time, you experience the composite image just as if you'd actually seen it. This conscious purposeful synchronization of different neuronal ensembles by the prefrontal cortex is called mental synthesis. In order for mental sythesis to work, signals would have to arrive at both neuronal ensembles at the same time. The problem is that some neurons are much farther away from the prefrontal cortex than others. If the signals travel down both fibers at the same rate, they'd arrive out of sync. You can't change the length of the connections, but your brain, especially as it develops in childhood, does have a way to change the conduction velocity. Neural fibers are wrapped in a fatty substance called myelin. Myelin is an insulator and speeds up the electrical signals zipping down the nerve fiber. Some neural fibers have as many as 100 layers of myelin. Others only have a few. And fibers with thicker layers of myelin can conduct signals 100 times faster or more than those with thinner ones. Some scientists now think that this difference in myelination could be the key to uniform conduction time in the brain, and consequently, to our mental synthesis ability. A lot of this myelination happens in childhood, so from an early age, our vibrant imaginations may have a lot to do with building up brains whose carefully myelinated connections can craft creative symphonies throughout our lives.

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翻译人员: Rosie Ning 校对人员: Xu Junqing请想象一下，一只鸭子教法语课。在环绕黑洞的轨道上，举行的一场乒乓球竞赛。平衡菠萝的一只海豚。也许你从没有见过以上任何画面，但是你能立马想象出来。你的大脑如何产生一个你从没见过的画面呢？这个过程也许看起来并不困难，那只是因为我们习惯了“想象”这一过程。实际上，这个过程很复杂，它需要大脑内复杂的配合，为了“创造”这些新奇诡异的图片，你的大脑需要取出相近的片段，并重新组合，就像用部分图片做成拼贴画一样。大脑需要发送上千的电信号，将它们在准确的时间内传送到目的地。当你看到一个物体，后额皮质内上千的神经元会受到刺激，这些神经能将物体的特点编码：带刺，水果，棕色，绿色，黄色。这一同步的刺激会加强那一组神经元中的联系，将神经元连起来，成为神经元集群。也就是，“菠萝”的神经元集群。在神经系统科学中，这便是“赫布理论”——同时被刺激的神经元会连接在一起。当你过一会想象“菠萝”时，这一神经元集群便会“亮起”， 在大脑中组合成一完整的图片。“海豚”的想象会是另一组神经元集群。事实上，你见过的每一物体，都会有一专门的神经元集群为其编码，它们，由同时被刺激的神经元组合而成。但这一理论并不能解释很多我们没见过，也能想象出来的场景。为“平衡菠萝的海豚”编码的这一神经元集群并不存在，那是怎么想象出来的呢？一个假设，叫做“心理合成理论”，强调了（神经元被刺激）时间的重要性如果为“海豚”和“菠萝”解码的神经元集群同时被刺激，我们就能在一个画面中，感知到两个不同物体。但是，大脑中必须有东西来协调这一“刺激”，一个可能的角色，是前额皮质，它参与了所有“认知”方面的工作。前额皮质、后额皮质的神经元是连接在一起的，其连接物是细长的细胞延伸物——“神经纤维”.这一理论认为：像操纵木偶的人一样，前额皮质的神经元发送电信号沿着“神经纤维”，到达后额皮质，这能同时刺激所需的神经元集群。如果多组神经元集群同时被“刺激”，你就能够体验到如同亲眼见过的“合成”场景了。前额皮质所实施的，这一带有目的性，能够“刺激”多组神经元集群的同步，叫做“心理合成”。为了能够同步，电信号需要同时到达两种神经元集群。但问题是，有的神经元集群距离前额皮质比其他的集群更远。如果电信号以同一速度通过“神经纤维”，那么就无法同时到达。你不能改变这一距离，但是你的大脑，尤其是小时候发展时，能够改变电信号传输的速度。“神经纤维”被多脂肪的物质“髓鞘层”包裹。“髓鞘层”是一种绝缘体，它能够加快电信号通过“神经纤维”的速度。一些神经纤维有100多“髓鞘层”，其它神经纤维只有一些。这些有着较厚“髓鞘层”的神经纤维，能够以100倍速传输信号，远超有着较薄“髓鞘层”的神经纤维。一些科学家认为，“髓鞘层”的区别是这一“同步”的关键。从而也是“心理合成”能力的关键。很多“髓鞘层”在小时候生长，所以，从小开始，活跃的想象力就与大脑的建构有很大关系——只有拥有“髓鞘层”更好的连结，才能够奏出富有想象力的人生乐章！

**P418 2016-12-07 Why doesn’t anything stick to Teflon - Ashwini Bharathula**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=418)

Nothing stuck to Mafia boss John Gotti who evaded justice for years by bribing and threatening jurors and witnesses. That earned him the name the Teflon Don after one of the slipperiest materials on Earth. Teflon was in the spacesuits the Apollo crew wore for the moon landing, in pipes and valves used in the Manhattan Project, and maybe in your kitchen as the nonstick coating on frying pans and cookie sheets. So what is this slippery solid, and why doesn't anything stick to it? Teflon is a brand name for polytetrafluoroethylene, or PTFE. It was stumbled upon accidentally in 1938 by a 27-year-old American chemist named Roy Plunkett while he was trying to develop a non-toxic refrigerant fluid for DuPont, a chemicals company. The strange, white substance that formed inside his lab canister was chemically inert, meaning it wouldn't react with other substances. It also had an extremely low coefficient of friction, making other materials slide right off it. Teflon's properties make it perfect when you need something slippery, chemical resistant, or waterproof, which means it has a lot of applications. It can be found all over the place, as a coating on raincoats, industrial ball bearings, artificial joints, circuit boards, and even the Rocky Mountains-themed roof of the Denver International Airport. The incredible properties of PTFE come from its molecular structure. It's a polymer, meaning it's made of long chains of repeating units of atoms strung together. A PTFE chain has a backbone of carbon atoms, each of which is attached to two fluorines. The fluorine atoms surround the carbon like armor, spiraling around the chain, and the bond between carbon and fluorine is incredibly tight. Like a couple that ignores everyone except each other, carbon and fluorine interact so strongly that the normal, intermolecular forces that help substances stick to each other don't stand a chance. Even the famously adhesive feet of geckos usually can't get a grip. But wait! If PTFE doesn't stick to anything, how can it be so firmly attached to something like a pan? One method involves sandblasting the pan or etching it with chemicals to make it rough. Then, a special primer is applied, which acts like glue. Its exact composition is a trade secret guarded by each manufacturer. The pan is sprayed with liquid PTFE and heated to around 800 degrees Fahrenheit. The layers then solidify into a smooth, slick coating. When you later cook eggs in this PTFE-coated pan, the extra tight carbon-fluorine bonds just ignore the water and fat and protein molecules in the eggs. Without those interactions, the food just slides around without sticking. You might wonder if it's safe to cook in a PTFE-coated pan. The answer is yes, if you're careful. PTFE is stable at moderate temperatures, like you'd use to cook eggs or fish, but above 500 degrees Fahrenheit, it starts to degrade, and heating it further releases fumes that can make you feel sick. An empty pan can reach 500 degrees fast over high heat, but most kitchens are ventilated well enough to dissipate the fumes. People used to also think that accidentally consuming PTFE that flaked off a scratched pan was bad for you, but the current consensus is that it's harmless. Because PTFE doesn't interact with other chemicals very well, it isn't thought to break down inside your body. Whether it's safe to manufacture Teflon is another story. DuPont and its spin-off company Chemours now face lawsuits worth millions of dollars. They've been accused of polluting the environment for decades and exposing employees and local communities to health risks associated with a toxic chemical called PFOA. That chemical was involved in manufacturing Teflon. As for John Gotti, in 1992, the Mob boss was finally convicted of five counts of murder, among other charges. That prompted the head of the FBI office in New York City to announce, "The Teflon is gone. The don is covered in Velcro, and all the charges stuck."

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翻译人员: Cissy Yun 校对人员: Junkai Fu黑手党老大John Gotti可以做到 与什么犯罪事件都沾不上边多年，他靠威胁听审团和目击者 来逃离法网这还使他多了个外号 特氟龙先生这个外号来源于世界上最滑的物质特氟龙本用于阿波罗号的宇航员登月穿的宇航服用于曼哈顿计划（原子弹制造）的管道中还存在于你厨房中的不粘锅和饼干纸上所以这种滑滑的固体到底是什么呢？ 而为什么其他东西都粘不上去呢？特氟龙的另一个名字是 聚四氟乙烯或称PTFE它的出现全因为发生在1938年 27岁的美国化学家造成的一场意外他的名字叫做 Roy Plunkett当时他正在为杜邦公司 开发一种无毒制冷剂那是一家化学公司这种奇怪的，白色的物质 在他的实验室罐中出现是惰性的化学物质就是它不会与其他物质产生反应它还有一个非常低的摩擦系数，让其他物质都从它旁边滑走特氟龙的特质帮助了 当人们需要滑滑的东西耐化学性或是防水性这代表了它有许多可用之地可以在很多地方找到它的身影雨衣上的防水层工业球支座人工关节电线板甚至是丹佛国际机场的 落基山脉主题屋顶上PTFE的特质是因为 它的分子结构它是一个聚合物说明它是由一串相同的原子聚集一个PTFE链有碳原子的主链每一个碳原子还连接两个氟原子围绕着碳原子的氟原子就像是盔甲一样在链边旋绕碳原子和氟原子之间的纽带很紧就像一对无视他人的情侣碳原子和氟原子强烈地相互作用造成正常的，作用于分子间的力 来帮助物质黏在一起根本不起作用就连以有着胶脚的壁虎 都粘不上去但，等等！如果PTFE粘不上任何东西它们是怎么粘到铁锅上形成不粘锅的呢？一种方式是把铁锅喷砂或用化学物质腐蚀使之粗糙而后， 一种特殊的底漆会被涂上 作用为一种胶水它的主要成分是每个制造商保存的商业机密铁锅会被喷上液体的PTFE并在800华氏温度下加热然后这层会固化成光滑的涂层当而后你在PTFE层上面煎鸡蛋时其中的紧密的碳氟链会无视鸡蛋中的 水，脂肪和蛋白质分子没有了这些反应食物就不会黏在锅子上你也许会担心是否用有PTFE层的锅 烧饭会不会不安全答案是，如果你当心的话，是非常安全的PTFE在中等温度下是稳定的 就像你在炒鸡蛋或是做鱼时但是，达到500华氏温度以上 PTFE会开始降解而过度得加热 会发出令人不适的烟味一个空锅能在高温下快速达到500度但是大多的厨房 都有通风渠道来驱散烟雾人们过去也认为意外摄入PTFE从锅中剥落的PTFE层但目前的共识是，它是无害的因为PTFE并不会与其他化学物质 产生反应它不会在你身体中分解然而，特氟龙的生产是否安全就是另当别论了杜邦和它的附属公司Chemourus现在面临价值数百万美元的诉讼他们被起诉几十年来污染环境并将员工和当地社区暴露在与PFOA一种有毒的化学物质接触 健康危险中在生产特氟龙是 这种化学物质会被用到再说到John Gotti在1992年，这位黑手党老大 最终被判有五项谋杀罪和其他的一些指控所以FBI在纽约的主任说“特氟龙先生已经捉拿归案”“这位先生全身都有魔术贴， 所有的指控都会黏上去。”

**P419 2016-12-13 How to master your sense of smell - Alexandra Horowitz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=419)

Perfumers can learn to distinguish individual odors in a fragrance made of hundreds of scents. Tea experts have been known to sniff out not just the location where a tea was from, but the season of harvest and whether it was planted by a plum tree. And the New York City Transit Authority once had an employee responsible only for sniffing out gas leaks in the subway system. Can just anyone learn to smell with the sensitivity of those experts? For most of us, what we smell is largely involuntary, whether it's garbage behind a restaurant, the shampoo of the woman leaving an elevator as you enter, or a bakery's fresh-made bread. With a few million olfactory receptors in our noses, we clearly don't lack the ability to smell well. We just might not always pay close enough attention. That's a shame because we may be missing opportunities to make strong emotional connections. Smells are powerfully linked to emotions and can awaken memories of places we've long ago left and people we've loved. But fortunately, it is possible to train our brains to smell better. For example, Helen Keller was able to recognize a person's work, and in her words, distinguish the carpenter from the iron worker, the artist from the mason or the chemist, by a simple inhale. Follow these steps and you too can change the way the world smells to you. First, stick your nose in it. Some animals that are known to be great smellers, like dogs who can sniff out explosives and pigs who can find truffles underground, put their noses right at the place they want to smell. Human noses, meanwhile, are casting around in the middle of the air, giving us an anatomical disadvantage. So bring your nose close to the world around you. The ground, surfaces, objects, the food in your hand. Get close to your dog, your partner, the book you're reading. Not only will your nose be closer to the odor source, but the warmth of your breath will make odors easier to smell. Second, sniff like you mean it. Smelling actually happens way up near the bridge of our noses in a postage stamp-sized square of tissue called the olfactory epithelium. When we sniff, odor molecules are sucked up into our nostrils until they hit this tissue where they combine to our olfactory, or scent, receptors. When we inhale normally, only a little air makes it there. But one or two solid sharp sniffs will ensure that more air gets to your smell receptors. After just a few more sniffs, the receptors, which are best at noticing new smells, turn off temporarily. So you can give your nose a rest and sniff again later. Finally, dwell on the smell. Most smells pass by us with little attention, but simply noticing what you're smelling and by trying to describe it, name it, and locate its source, you can expand your vocabulary of smells. When an odor molecule binds to a scent receptor, it sends an electrical signal from the sensory neurons to our brain's olfactory bulbs. The signal then continues to other areas of the brain, where it's integrated with taste, memory, or emotional information before registering to us as a smell. FMRI research shows that the extra time spent focusing on scent changes the brain of experienced smellers. For them, perceiving and imagining odors becomes more automatic than for non-experts. To get started yourself, take ingredients from your kitchen: spices, vanilla, or fruit, but never anything toxic. Close your eyes and have someone bring them under your nose. Sniff and try to name the source. Over time, you'll begin to appreciate nuances in familiar odors and recognize characteristics of new and unusual smells. The perfumer has practiced these steps enough to become an artist of odor, but even if you never pursue smelling to that degree, the spectacular result of an unspectacular action will change how you sense and experience your days.

**P419 2016-12-13 How to master your sense of smell - Alexandra Horowitz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=419)

翻译人员: Huixin Wang 校对人员: Cissy Yun调香师可以从百种气味构成的香味中辨别单种味道。茶叶专家不仅可以辨别茶叶的来源，还有收获季节和它周围的树种。纽约城市运输当局在地铁系统中， 曾经有一名员工唯一的职责就是找出哪里有泄露管道。任何人经过训练都能达到 这些专家一样的嗅觉灵敏度吗？我们中的大多数人 都是被动闻到气味的，不论这味道来自餐馆后面的垃圾，当你进入电梯与离开的女士 擦肩而过时飘来的发香，还是烘焙店新鲜出炉的面包。在我们的鼻子里， 存在着几百万个气味感受器，我们很明显并不缺少嗅觉灵敏的能力。我们只是不能集中足够的注意力。有点可惜，因为我们可能一直在错失机会去建立强大的情感连接。气味与情感是紧密相连的，它可以削弱我们对于离开很久的地方，和我们爱过的人的记忆。所幸，我们可以训练 我们的大脑更好的识别气味。比如说，盲女海伦凯勒 可以识别一个人的工作，用她的话讲就是，区别木工和铁匠，石匠艺术家还是化学家，只需要简单的吸一口气。跟着以下的步骤，你也可以 改变世界呈现气味给你的方式。第一步：凑近你的鼻子。一些动物拥有很好的嗅觉，像狗可以寻找爆炸物，猪可以找到埋在地下的松露。只需要把它们的鼻子 放在想要闻的地方。而与此同时，人类的鼻子被至于半空中，成为了我们生理剖析学上的一个劣势。所以带着你的鼻子去接近周围的世界吧。土地，各种表层，物体，手中的食物。还有你的小狗，你的爱人，你在读的书。你的鼻子不仅仅会离这些气味源更近，呼气时的温度也会使得气味更容易识别。第二点：把嗅识当成你的需要。事实上嗅的过程发生在我们的鼻梁附近，位于一个邮票大小的 方形组织，叫做嗅上皮。当我们嗅的时候，香味分子 被吸入到我们的鼻孔，直到撞击到这个组织，在这里它们与我们的嗅觉， 或者叫气味接收器结合。当我们正常的吸气时， 仅仅有很少的空气到达这里。但是一至两个深呼吸，将确保更多的空气 进入你的气味接收器。在几次嗅的动作后，发现新气味能力极佳的接收器会暂时的关闭。这时候你可以让你的鼻子休息， 之后再继续进行嗅识。最后一点：停留并专注于气味。我们在经过大多数的气味时 只付出一点点注意力，但是试着仅仅注意你闻到的气味，试着去描述它，命名它， 并且定位它的来源。这样就可以扩大你的气味词汇。当一个气味分子与气味感受器结合时，它从感觉神经元发射一个电信号到我们的大脑嗅球部位上。信号继续到达其他的大脑区域，这些区域与味觉，记忆，或者情感的信息相结合，这些都发生在我们 得到嗅觉的反馈之前。FMRI成像显示专注于气味而 额外花费的时间改变了大脑的嗅觉经验。对于专家，接受和想象气味 与非专家相比，变得更加自主化。进行自学培训的时候， 从你的厨房找些原料：香料，香草精华，或者水果，但是千万不要试任何有毒的东西。闭上你的眼睛，让别人拿起 其中一样放到你的鼻子下面。闻一闻，并且试着命名来源。一段时间后，你将能够鉴别 一些熟悉气味间的细小差别，并且识别一些新的和特殊的气味特征。调香师都会反复练习这些步骤 直到变成气味艺术家，但是即使你从来不会 追求嗅觉达到那样的程度，无意识的动作所引发的惊人效果将改变你如何感知和经历你的时光。

**P420 2016-12-13 Is there a limit to technological progress - Clément Vidal**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=420)

Many generations have felt they've reached the pinnacle of technological advancement, yet look back 100 years, and the technologies we take for granted today would seem like impossible magic. So will there be a point where we reach an actual limit of technological progress? And if so, are we anywhere near that limit now? Half a century ago, Russian astronomer Nikolai Kardashev was asking similar questions when he came up with a way to measure technological progress, even when we have no idea exactly what it might look like. Anything we do in the future will require energy, so Kardashev's scale classifies potential civilizations, whether alien civilizations out there in the universe or our own, into three levels based on energy consumption. The tiny amount of energy we currently consume pales next to what we leave untapped. A Type I, or planetary civilization, can access all the energy resources of its home planet. In our case, this is the 174,000 terawatts Earth receives from the Sun. We currently only harness about 15 terawatts of it, mostly by burning solar energy stored in fossil fuels. To approach becoming a Type I civilization, we would need to capture solar energy more directly and efficiently by covering the planet with solar panels. Based on the most optimistic models, we might get there within just four centuries. What would be next? Well, the Earth only gets a sliver of the Sun's energy, while the rest of its 400 yottawatts is wasted in dead space. But a Type II, or stellar civilization, would make the most of its home star's energy. Instead of installing solar panels around a planet, a Type II civilization would install them directly orbiting its star, forming a theoretical structure called a Dyson sphere. And the third step? A Type III civilization would harness all the energy of its home galaxy. But we can also think of progress in the opposite way. How small can we go? To that end, British cosmologist John Barrow classified civilizations by the size of objects they control. That ranges from mechanical structures at our own scale, to the building blocks of our own biology, down to unlocking atoms themselves. We've currently touched the atomic level, though our control remains limited. But we potentially could go much smaller in the future. To get a sense of the extent to which that's true, the observable universe is 26 orders of magnitude larger than a human body. That means if you zoomed out by a factor of ten 26 times, you'd be at the scale of the universe. But to reach the minimum length scale, known as the Planck length, you would need to zoom in 35 times. As physicist Richard Feynman once said, "There's plenty of room at the bottom." Instead of one or the other, it's likely that our civilization will continue to develop along both Kardashev and Barrow scales. Precision on a smaller scale lets us use energy more efficiently and unlocks new energy sources, like nuclear fusion, or even antimatter. And this increased energy lets us expand and build on a larger scale. A truly advanced civilization, then, would harness both stellar energy and subatomic technologies. But these predictions weren't made just for us humans. They double as a possible means of detecting intelligent life in the universe. If we find a Dyson sphere around a distant star, that's a pretty compelling sign of life. Or, what if, instead of a structure that passively soaked up all the star's energy, like a plant, an alien civilization built one that actively sucked the energy out of the star like a hummingbird. Frighteningly enough, we've observed super dense celestial bodies about the size of a planet that drain energy out of a much bigger star. It would be much too premature to conclude that this is evidence of life in the universe. There are also explanations for these observations that don't involve alien life forms. But that doesn't stop us from asking, "What if?"

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翻译人员: Lin Ye 校对人员: Yolanda Zhang许多代的人都曾觉得他们的科技发展已达到顶端，但放在100年前，我们现在拥有的日常科技简直就是不可思议的魔法。那么，科技发展的极限真的存在吗？如果存在，现在的我们 离它又有多远呢？半个世纪前，俄罗斯宇航员尼古拉·卡尔达肖夫 问过同样的问题，他创造出了衡量技术进度的办法，虽然当时我们对它没有任何概念。我们未来所有的活动都需要能量，所以科尔达肖夫指数把潜在的文明，不管是宇宙中的外星文明 还是我们自己的文明，都按照能源消耗分成了三类。比起未使用的能源，我们已消耗的能量其实微不足道。第一类，又名行星系文明，可以充分使用母行星的所有能源。对人类来说，就是地球从太阳 吸收到的17.4万太瓦的能量。我们目前用燃烧化石燃料的 方法采集到的太阳能，只消耗了其中的15太瓦。想要更接近第一类文明，我们需要通过安装太阳能板来更直接有效地吸收太阳能。根据最乐观的数据模型，这个目标我们四个世纪内就可以达到。那接下来呢？事实上，地球只得到了其中极少的能量， 剩下的400尧它瓦（10的24次方瓦特）太阳能都浪费在了虚空的宇宙中。但是第二类，恒星系文明，可以把母恒星的能量利用到极致。我们可以把太阳能板 安装到能量源星球周围，而不是在围绕它的行星上， 这样就可以形成一个名叫戴森球的理论结构。那第三步呢？第三类文明可以采集 整个母星系的能量。但我们也可以用 相反的方式来拟构发展。我们如何可以到达最小的维度？英国宇宙学家约翰·巴洛利用文明所控制的物质的大小 来对其进行分类。从人类尺度内的机械结构，到人类生物学维度的细胞，再到原子的结构解析。虽然我们接触到了原子层级， 但我们对其的控制仍然有限。但是我们将来可能会 接触到更小的层级。一个更真实的比较是，能观测到的宇宙是人体体积的 10的26次方倍。意思是，如果把你 每次放大10倍，放大26次，你的体积就跟宇宙一样大了。但为了达到最小长度，即普朗克长度，你需要缩小35次。就如物理学家理查德·费曼所言： “微观世界仍有很多空间。”我们未来的文明发展并不会局限于其一，而是依照卡尔达舍夫与巴洛指数共同发展。在小层级的精确控制 可以让我们更有效地利用能源，并开发新的能源，比如核聚变，或者，甚至是反物质。而更多的能源将会允许 更大规模的发展与建设。一个真正先进的文明可以同时采集恒星能量和亚原子能。但这些预言并不只适用于人类。它们同时也可能成为探测宇宙中智慧生命的方法。如果我们在远处的某颗 恒星周围找到了戴森球，那很有可能标志着着生命的存在。或者，外星人可能没有建造一个 像一棵植物那样被动吸取能量的结构体，而是建造了一个主动 从恒星吸取能量的结构体，像一只蜂鸟。可怕的是，我们曾观测过 超高密度的天体，大小如一个行星，却从一个大得多的恒星 攫取了所有的能量。但这还不足够证明宇宙里还有其他生命。对这种现象也有一些其他解释，它们并不涉及外星生命形式。但这并不会阻止我们 提出疑问：“假如真的有呢？“

**P421 2016-12-13 Why are we so attached to our things - Christian Jarrett**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=421)

After witnessing the violent rage shown by babies whenever deprived of an item they considered their own, Jean Piaget, a founding father of child psychology, observed something profound about human nature. Our sense of ownership emerges incredibly early. Why are we so clingy? There's a well-established phenomenon in psychology known as the endowment effect where we value items much more highly just as soon as we own them. In one famous demonstration, students were given a choice between a coffee mug or a Swiss chocolate bar as a reward for helping out with research. Half chose the mug, and half chose the chocolate. That is, they seemed to value the two rewards similarly. Other students were given a mug first and then a surprise chance to swap it for a chocolate bar, but only 11% wanted to. Yet another group started out with chocolate, and most preferred to keep it rather than swap. In other words, the students nearly always put greater value on whichever reward they started out with. Part of this has to do with how quickly we form connections between our sense of self and the things we consider ours. That can even be seen at the neural level. In one experiment, neuroscientists scanned participants' brains while they allocated various objects either to a basket labeled "mine," or another labeled, "Alex's." When participants subsequently looked at their new things, their brains showed more activity in a region that usually flickers into life whenever we think about ourselves. Another reason we're so fond of our possessions is that from a young age we believe they have a unique essence. Psychologists showed us this by using an illusion to convince three to six-year-olds they built a copying machine, a device that could create perfect replicas of any item. When offered a choice between their favorite toy or an apparently exact copy, the majority of the children favored the original. In fact, they were often horrified at the prospect of taking home a copy. This magical thinking about objects isn't something we grow out of. Rather it persists into adulthood while becoming ever more elaborate. For example, consider the huge value placed on items that have been owned by celebrities. It's as if the buyers believed the objects they'd purchased were somehow imbued with the essence of their former celebrity owners. For similar reasons, many of us are reluctant to part with family heirlooms which help us feel connected to lost loved ones. These beliefs can even alter our perception of the physical world and change our athletic abilities. Participants in a recent study were told they were using a golf putter once owned by the champion Ben Curtis. During the experiment, they perceived the hole as being about a centimeter larger than controlled participants using a standard putter and they sank slightly more putts. Although feelings of ownership emerge early in life, culture also plays a part. For example, it was recently discovered that Hadza people of northern Tanzania who are isolated from modern culture don't exhibit the endowment effect. That's possibly because they live in an egalitarian society where almost everything is shared. At the other extreme, sometimes our attachment to our things can go too far. Part of the cause of hoarding disorder is an exaggerated sense of responsibility and protectiveness toward one's belongings. That's why people with this condition find it so difficult to throw anything away. What remains to be seen today is how the nature of our relationship with our possessions will change with the rise of digital technologies. Many have forecast the demise of physical books and music, but for now, at least, this seems premature. Perhaps there will always be something uniquely satisfying about holding an object in our hands and calling it our own.

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翻译人员: Cissy Yun 校对人员: Chen Zou在见证了一场小婴儿的 歇斯底里般地愤怒每当他们认为是自己的东西 被剥夺之后让·皮亚杰，儿童心理学之父观察到了人性的奥妙之处我们的所有权的意识 出现得十分早为什么我们的依赖性如此强呢？在心理学中有一种公认的现象称为“禀赋效应”就是人们会更重视一件物品 就在我们拥有那件物品的那一刻在一个著名的演示中学生们可以在一个马克杯或一块瑞士巧克力棒中作选择作为帮助研究的奖励一半的人选了马克杯 另一半则选了巧克力他们似乎给这两个奖励 同等的价值其他学生首先被给予马克杯然后意外地被告知有机会 将马克杯换成巧克力棒但是只有11%的学生愿意这样做然而当另一组首先得到巧克力的 学生得到同样的机会时大部分人也倾向于保留之前获取的巧克力也就是说，首先收获的奖励会更容易被这些学生看重这部分取决于有多快我们可以将自我意识和 我们认为属于自己的事物建立起联系这甚至可以在神经层面上观察到在一个实验中 神经学家对参与者的大脑进行扫描同时他们将各种物品要么分配在 一个篮子里，标记“我的”或者另一个篮子里，标记“亚力克斯的”当参与者看到那些标记 属于他们的新物品他们的大脑显示出更高的活跃度在一个通常闪现生活片段的区域每当我们想起自己的时候另一个我们如此喜爱 我们所有物品的原因是从儿时起我们便相信 自己的物品有独特的意义心理学家利用一个 假象来解释这种现象他们告诉一群三到六岁的儿童 他们造了一个复制机可以完美复制世界上任何一件物品当让这些儿童在 自己原来的玩具和一个一模一样的复制品 中作出选择大多数孩子会选择原来的玩具事实上，将复制品带回家的想法 让很多孩子感到恐惧这种对物品的特殊感情 并不会随着我们的成长消失相反，成年后这种感情变得更加复杂比如，名人拥有过的物品会被赋以天价就好像买家相信这些 他们买下的物品蕴藏着前任名人拥有者的精髓出于同样的原因，我们中的许多人 不愿与传家宝分离因为它们让我们感到自己 与故去的亲人仍联结在一起这些信念甚至还可以改变 人们对现实世界的感知而且还会改变我们的体能最近一项研究中 参与者被告知他们所使用的高尔夫球杆曾属于高尔夫冠军本·柯蒂斯在这个试验中他们认为高尔夫球洞相比 控制组的球洞大约要大1厘米 那些控制组使用普通的球杆而且他们进球的次数也会稍多尽管所有权意识出现得很早 文化对其也有影响比如说，人们最近发现 坦桑尼亚北部的哈扎人他们与现代社会隔绝没有显示出禀赋效应这也许是因为他们生活 在一个平等主义的社会中在那里每一件物品都是共享的在另一个极端，有时我们 对自己的物品过度依恋囤积癖的形成的部分原因是 一种夸张的责任感和保护欲 对自己所拥有的物品这是为什么囤积狂对于 丢弃任何东西都感到非常困难当今世界中有待观察的是我们与我们的所有物之间的关系如何随着数码科技的发展而变化很多人预见实体书和音乐的消亡但至少现在 这似乎为时过早也许这总会有一种特殊的满足感关于将一件物品把持在我们手上 然后将它称之为我们自己的

**P422 2016-12-14 How high can you count on your fingers (Spoiler - much higher than 10**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=422)

How high can you count on your fingers? It seems like a question with an obvious answer. After all, most of us have ten fingers, or to be more precise, eight fingers and two thumbs. This gives us a total of ten digits on our two hands, which we use to count to ten. It's no coincidence that the ten symbols we use in our modern numbering system are called digits as well. But that's not the only way to count. In some places, it's customary to go up to twelve on just one hand. How? Well, each finger is divided into three sections, and we have a natural pointer to indicate each one, the thumb. That gives us an easy to way to count to twelve on one hand. And if we want to count higher, we can use the digits on our other hand to keep track of each time we get to twelve, up to five groups of twelve, or 60. Better yet, let's use the sections on the second hand to count twelve groups of twelve, up to 144. That's a pretty big improvement, but we can go higher by finding more countable parts on each hand. For example, each finger has three sections and three creases for a total of six things to count. Now we're up to 24 on each hand, and using our other hand to mark groups of 24 gets us all the way to 576. Can we go any higher? It looks like we've reached the limit of how many different finger parts we can count with any precision. So let's think of something different. One of our greatest mathematical inventions is the system of positional notation, where the placement of symbols allows for different magnitudes of value, as in the number 999. Even though the same symbol is used three times, each position indicates a different order of magnitude. So we can use positional value on our fingers to beat our previous record. Let's forget about finger sections for a moment and look at the simplest case of having just two options per finger, up and down. This won't allow us to represent powers of ten, but it's perfect for the counting system that uses powers of two, otherwise known as binary. In binary, each position has double the value of the previous one, so we can assign our fingers values of one, two, four, eight, all the way up to 512. And any positive integer, up to a certain limit, can be expressed as a sum of these numbers. For example, the number seven is 4+2+1. so we can represent it by having just these three fingers raised. Meanwhile, 250 is 128+64+32+16+8+2. How high an we go now? That would be the number with all ten fingers raised, or 1,023. Is it possible to go even higher? It depends on how dexterous you feel. If you can bend each finger just halfway, that gives us three different states - down, half bent, and raised. Now, we can count using a base-three positional system, up to 59,048. And if you can bend your fingers into four different states or more, you can get even higher. That limit is up to you, and your own flexibility and ingenuity. Even with our fingers in just two possible states, we're already working pretty efficiently. In fact, our computers are based on the same principle. Each microchip consists of tiny electrical switches that can be either on or off, meaning that base-two is the default way they represent numbers. And just as we can use this system to count past 1,000 using only our fingers, computers can perform billions of operations just by counting off 1's and 0's.

**P422 2016-12-14 How high can you count on your fingers (Spoiler - much higher than 10**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=422)

翻译人员: Cissy Yun 校对人员: Roger NI你用手指最高能数到多少？这个问题答案好像很明显毕竟，大多数的我们都有十根手指或者更精确的说八根手指和两个大拇指这是我们两只手一共有的十位数我们用来数到十我们在现代编号系统使用十个符号并不是巧合这称为十进制但是这不是唯一的计数方法有些地方，他们有种方法，可以用一只手数到12怎么做？每根手指分为3节我们有个可以指示每一个的天然指针，拇指这让我们很容易用一只手数到12而且如果我们想数到更高我们可以用另一只手来帮助我们记录数到12的次数提高到5组12 也就是60更厉害的是，我们可以在第二只手上用同样的方法得到12组个12 可以数到144这是个很大的进步但我们可以在每只手上找到更多计数部分来提高数字例如 每根手指有3节和3条折痕一共6个部分可用于计数现在我们把每只手提高到了24再用另一只手记录多少组24这样我们把数字提高到576我们还能数到更高吗？看来我们已经达到手指分区的极限得到计数最大的精度所以让我们换个方式思考我们最伟大的数学发明之一位值制计数法在不同的位置表示不同的值例如数字999尽管同样的数字用了三次但每个位置表示不同的数量级所以我们可以给手指的位置赋值去打破我们之前的记录让我们先忘了手指分节来看最简单的情况 每根手指有两个选项伸开和收起这就不适用以十为进率但非常符合以二为进率的计数系统称为二进制二进制中，每个位置都是前一个值的两倍所以我们可以给手指赋值为1248一直到512在一定范围内的任何正整数都可以表示为这些数字之和例如 数字7为 4+2+1所以我们伸出这三根手指表示它同理 250为 128+64+32+16+8+2现在我们能数到多少了？伸出全部十根手指来表示 1,023还有没有可能更高了？这取决于你有多灵巧如果你每根手指都能做到弯曲一半 我们就有了三种不同的状态收起一半伸出现在 我们基于这三种状态系统计数可以达到 59,048如果你的手指可以弯曲四种或者更多不同状态你还可以达到更高这个极限取决于你 和你的灵活性和创造性即使我们手指只有两种状态我们也已经做的很棒了事实上 我们的电脑正是基于同样的原则每个芯片都由微小的电子开关组成它们的打开或关闭是默认基于二的表示数字的方式刚刚我们用这种方法 仅用手指就数超过1,000计算机可以执行数十亿的操作只是通过计算1和0

**P423 2016-12-14 How the stethoscope was invented \_ Moments of Vision 7 - Jessica Orec**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=423)

In a Moment of Vision... It's 1816. A 35-year-old doctor by the name of René Laennec is walking through Paris. He pauses to watch as two children signal to each other across a long piece of wooden board. One child holds the board to her ear. The other scratches the opposite end sending the amplified sound down the length of wood. Later, Laennec is called to assess a young woman with a heart condition. The patient is purportedly quite well developed and Laennec expresses some hesitation in pressing his ear directly against her chest. Remembering the children with the board, Laennec, in a moment of vision and dignity, tightly rolls a sheet of paper and places one end to his ear and one end over the young woman's heaving bosom. He is delighted by the clarity of the sound. Laennec spends the next three years developing and testing various materials and mechanisms before settling on a hollow wooden tube with detachable plug. His device becomes the forerunner to the metal, plastic, and rubber stethoscope we still use today.

**P423 2016-12-14 How the stethoscope was invented \_ Moments of Vision 7 - Jessica Orec**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=423)

翻译人员: Alex Li 校对人员: Shelly 莹嫣 Yao 姚由于一瞬间的想象力……1816年35岁的医生雷内·兰尼克在巴黎城内散步他看到两个小孩用一条长木板互相发送信号一个小孩把木板的一端放在耳边另一个小孩则刮擦木板的另外一端被放大了声音便通过木板传导了过来随后，兰尼克医生被叫去医院，为一名少女检查心脏问题据说这位病人身材发育得非常良好对于直接把耳朵贴在她胸口上兰尼克医生表示有点犹豫这时，他想起了那两个拿着木板的小孩这时，出于一瞬间的想象力，也为了维护自己的尊严他将一张纸紧紧卷起来将一端贴在耳边而将另一端抵在少女饱满的胸前他高兴地发现，声音十分清晰在接下来的三年，兰尼克医生都在尝试使用不同的材料和构造最终决定使用空心的木管和可拆卸的塞子他发明的这种仪器成为如今使用的金属、塑料和橡胶制听诊器的前身

**P424 2016-12-14 What does this symbol actually mean - Adrian Treharne**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=424)

Some of the world's most recognizable symbols exist to sell products, others to steer traffic or advance political causes. But there's one whose main purpose is to help people. You may know it as the wheelchair symbol, or a sign for people with disabilities, but its formal title as maintained by the ISO is the International Symbol of Access. But despite its familiarity, many people are unclear as to what the symbol actually means, which has a lot to do with the symbol itself and the way it came about. In 1968, the International Commission on Technology and Accessibility held a design contest. They were looking for a symbol that would be readily identifiable from a reasonable distance, self-descriptive, simple, practical, and couldn't be confused with existing signage. The winning design, which didn't have a head, was created by a Danish designer named Susanne Koefed. The addition of a head a year later gave it a more human form, and within ten years, it was endorsed by both the United Nations and the ISO. With minimal cost and minimal fuss, a global icon was born. There have been a few tweaks over the decades. The Graphic Artists Guild added more rounded, human-like features, and in 2012, the Accessible Icon Project produced a more dynamic version. But what does it really represent? What's its purpose? Put simply, it's a sign to identify where there are accessible facilities. The strength of such an internationally recognized image is that wherever you travel, you don't need to speak the language or have in-depth cultural knowledge. If you require an accessible toilet, the sign shows the way. But the confusion comes from the term accessibility and what that actually means. Many people assume that because the symbol depicts a wheelchair, that accessible facilities are meant only for people who use wheelchairs, or those, at the very least, who have a visible physical condition. But accessibility is a broad concept that applies to many, many different conditions. That includes people with autism, visual impairments, and autoimmune diseases, like lupus, which can cause pain and fatigue, along with many other conditions. In fact, the World Health Organization estimates that there are approximately 1 billion people who experience some form of disability, which means that this group is very likely to include yourself, or a family member, a classmate, a friend, or a work colleague. And people who use wheelchairs only make up about 65 million, or 15% of the total. The vast majority have non-visible disabilities. Accessible parking spaces, facilities, and entrances are designed with that entire group in mind. So it's easy to see why in recent years people have begun to raise questions about whether the symbol is really appropriate for what it's meant to do. And it's not just about accuracy. It's common for people to become indignant, sometimes abusive, when they see people without visible disabilities using accessible facilities. The symbol is unfortunately creating widespread issues for the very people and families it's meant to help. The recent redesigns have attempted with some success to acknowledge concerns over the current symbol. But some think that a complete redesign is in order. It's a difficult task, though. How do you replace a symbol that's familiar the world over? And what do you replace it with?

**P424 2016-12-14 What does this symbol actually mean - Adrian Treharne**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=424)

翻译人员: Lin Ye 校对人员: Rain Ji世界上最具有辨识度的标志， 一些是为了销售产品而存在另一些是为了引导交通还有一些是为了推进政治不过，有这样一个标志， 它的主要目的是为了帮助人们你或许认为它是轮椅标志， 或是残疾人标志不过，它被ISO（国际标准化组织）确认的正式名称是“国际无障碍标志”尽管人们对它很熟悉大部分人其实并不了解这个标志的真实含义而这个标志的含义与这个标志本身和它的由来有密切的关系1968年，国际技术与可及性委员会举办了一个设计大赛他们在寻找一个标志——一个在合理距离内易于识别的，自我描述性强的，简单的实用的不会和现存标志混淆的标志丹麦设计师Susanne Koefed的设计获得了大奖而这个标志起初并没有脑袋一年后这个标志被加上了脑袋， 使得它更加类似人类的形态在十年内，它被联合国和国际标准化组织认可了在最小成本和最少争论的情况下， 一个国际标志就这样诞生了几十年间，这个标志也曾经历过一些变动图形艺术家协会给它加上了更加圆润的、拟人的特征而在2012年，“无障碍标志项目”制作了一个 更加生动、富有动态的版本但它到底代表着什么呢？它的目的到底是什么呢？简单来说，这是一个指示无障碍设施位置的标志这个国际认可的标志的好处在于不论你在哪里旅行你都不需要会说当地语言或懂得深厚的文化知识如果你需要一个无障碍厕所， 这个标志就会将你指引到那里去但是令人困惑的地方，就在于这个“无障碍”和它到底意味着什么许多人认为，因为这个标志有一个轮椅那么无障碍设施就是为使用轮椅的人群专门准备的或者至少，是为了那些 具有显而易见的残疾的人准备的但是“无障碍”其实是一个非常广的概念它能够被应用到很多很多不同的情况下包括自闭症人群视力障碍人群自身免疫性疾病人群例如狼疮，一种会引起疼痛和疲劳的疾病还有很多其他的情况事实上，根据世界卫生组织的估算世界上有近十亿的人有着某种形式的“残疾”或者“障碍”也就是说，这一人群中很有可能也包括了你或者是你的家人你的同学你的朋友你的同事而使用轮椅的人群只占其中的6500万或者说，总数的15%所以10亿人中绝大多数人的“残疾”和“障碍”是看不到的无障碍停车位、公共设施和入口其实是为了这一群体所有的10亿人而设计的所以显而易见，为什么近年来有人开始质疑这个标志是否真的与它代表的意义相符合这不仅仅是关于精确性的问题对人们来说，看到没有显而易见的残疾的人使用无障碍设施的时候会感到非常愤慨，甚至会因此骂人很不幸的是，这个标志正在 为那些它本应服务的人群和家庭制造各种各样的麻烦最近一些对这个标志的重新设计已经引起了对现行标志的思考和担忧不过，有些人认为这个标志进行彻底的改头换面是必要的尽管这会是一个非常艰巨的任务——你要怎样替换掉一个已经被全世界所熟知的标志呢？以及，你应该用什么来替换它呢？

**P425 2016-12-15 How super glue was invented \_ Moments of Vision 8 - Jessica Oreck**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=425)

In a Moment of Vision... It's the 1940s, the height of World War II, Rochester, New York. A chemist by the name of Harry Coover is conducting research for Eastman Kodak. He and his team are looking for a clear plastic to produce precision gunsights for the military. They begin working with a family of chemicals called cyanoacrylates, but find, to their extreme annoyance, that the chemicals stick to everything permanently. The cyanoacrylates are discarded. After the war, Coover is working at Kodak's chemical plant in Tennessee. This time, he and his team are researching heat-resistant polymers for jet airplane canopies. They try cyanoacrylates, but find, to their great frustration, that the chemicals stick to everything permanently. Again, the cyanoacrylates are discarded. Coover, however, in a moment of vision, realizes that the quality that makes these chemicals so infuriating to work with is exactly what makes them valuable. He takes out a patent and begins marketing a super glue. Years later during the Vietnam War, field medics find that using super glue on an open wound instantly stops the bleeding, saving countless lives. Today, medical grade super glue is still used in surgery, but it's also a nearly indispensable household item.

**P425 2016-12-15 How super glue was invented \_ Moments of Vision 8 - Jessica Oreck**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=425)

翻译人员: Tong Tong 校对人员: Feiting Long茅塞顿开的一瞬间1940s的纽约洲洛彻斯特 此时正值第二次世界大战化学家哈里·库弗正为柯达公司开展一项研究他和他的团队正在寻找一种透明塑料用来制造军用的精密瞄准仪他们开始着手研究氰基丙烯酸酯类化合物却发现一件令他们特别恼火的事这种化学物质会和任何东西永久地粘在一起于是便不再使用该类化合物战后 库弗就职于田纳西州的柯达化学工厂这一次 他和他的团队为喷气式飞机座舱研发一种耐热高分子聚合物他们尝试用氰基丙烯酸酯类化合物 但结果仍然令他们感到失望这类化合物还是会和任何东西永久粘在一起于是再一次放弃使用它但是库弗却茅塞顿开意识到正是该类化合物这一让人懊恼的特性使得它们变得有价值于是他申请了专利并对强力胶进行市场推广多年以后 在越南战争期间现场医护人员发现 使用强力胶敷在伤口上有止血的效果这一发现拯救了无数条生命如今 医用强力胶仍使用于各类手术中同时也成为一个必不可少的生活用品

**P426 2016-12-22 A brief history of numerical systems - Alessandra King**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=426)

One, two, three, four, five, six, seven, eight, nine, and zero. With just these ten symbols, we can write any rational number imaginable. But why these particular symbols? Why ten of them? And why do we arrange them the way we do? Numbers have been a fact of life throughout recorded history. Early humans likely counted animals in a flock or members in a tribe using body parts or tally marks. But as the complexity of life increased, along with the number of things to count, these methods were no longer sufficient. So as they developed, different civilizations came up with ways of recording higher numbers. Many of these systems, like Greek, Hebrew, and Egyptian numerals, were just extensions of tally marks with new symbols added to represent larger magnitudes of value. Each symbol was repeated as many times as necessary and all were added together. Roman numerals added another twist. If a numeral appeared before one with a higher value, it would be subtracted rather than added. But even with this innovation, it was still a cumbersome method for writing large numbers. The way to a more useful and elegant system lay in something called positional notation. Previous number systems needed to draw many symbols repeatedly and invent a new symbol for each larger magnitude. But a positional system could reuse the same symbols, assigning them different values based on their position in the sequence. Several civilizations developed positional notation independently, including the Babylonians, the Ancient Chinese, and the Aztecs. By the 8th century, Indian mathematicians had perfected such a system and over the next several centuries, Arab merchants, scholars, and conquerors began to spread it into Europe. This was a decimal, or base ten, system, which could represent any number using only ten unique glyphs. The positions of these symbols indicate different powers of ten, starting on the right and increasing as we move left. For example, the number 316 reads as 6x10^0 plus 1x10^1 plus 3x10^2. A key breakthrough of this system, which was also independently developed by the Mayans, was the number zero. Older positional notation systems that lacked this symbol would leave a blank in its place, making it hard to distinguish between 63 and 603, or 12 and 120. The understanding of zero as both a value and a placeholder made for reliable and consistent notation. Of course, it's possible to use any ten symbols to represent the numerals zero through nine. For a long time, the glyphs varied regionally. Most scholars agree that our current digits evolved from those used in the North African Maghreb region of the Arab Empire. And by the 15th century, what we now know as the Hindu-Arabic numeral system had replaced Roman numerals in everyday life to become the most commonly used number system in the world. So why did the Hindu-Arabic system, along with so many others, use base ten? The most likely answer is the simplest. That also explains why the Aztecs used a base 20, or vigesimal system. But other bases are possible, too. Babylonian numerals were sexigesimal, or base 60. Any many people think that a base 12, or duodecimal system, would be a good idea. Like 60, 12 is a highly composite number that can be divided by two, three, four, and six, making it much better for representing common fractions. In fact, both systems appear in our everyday lives, from how we measure degrees and time, to common measurements, like a dozen or a gross. And, of course, the base two, or binary system, is used in all of our digital devices, though programmers also use base eight and base 16 for more compact notation. So the next time you use a large number, think of the massive quantity captured in just these few symbols, and see if you can come up with a different way to represent it.

**P426 2016-12-22 A brief history of numerical systems - Alessandra King**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=426)

翻译人员: Ruilin Yao 校对人员: Cissy Yun1,2,3,4,5,6,7,8,9,0只用这十个符号， 我们可以写出任何有理数但是为什么是这几个符号呢？为什么有十个？而为什么人们会按照这样的方式排列它们呢？有史以来，数字一直是生活中必不可少的最早人们通常用身体的某部分或计数标记来表示一群动物或部落的人的数量但是随着生活越来越复杂 需要数的数量也不断增加这些方法不再够用了随着不同文明的发展，人们想出了很多用了记录更多数量的办法。很多数字系统，比如希腊数字希伯来数字以及埃及数字只是原来计数标记的加强版加入了用来代表更高数量级的新符号每个符号都尽可能多次重复使用再把它们加起来罗马数字添加了另一种方式如果1前面有一个值更大的数字它们会被相减，而不会被相加但尽管有了这种创新对较大的数字来说 这依旧是种累赘的方法有一种更有用更优雅的方式称为定位数系之前的数字系统需要不断重复地画很多符号而且每一个更大的数量级都需要引入新的符号但是定位数系可以重复使用同样的符号，根据它们的位置赋予它们不同的值一些社会文明发展了自己的定位数系其中包括巴比伦人古中国人还有阿芝特克人到了第八世纪，印度数学家完善了一种记数制它在接下来的几个世纪中被阿拉伯商人，学者和征服者传到了欧洲这就是十进制一种可以只用十个独特的图像字符 就能表示出任何数字的方法这些字符的位置表明了10的不同次方，从右开始，次方数向左不断递增。比如数字316，读成 6乘以10的0次方加上 1乘以10的1次方加上 3乘以10的2次方。这个方法的一个巨大突破是同时也被玛雅人发明了的数字0.旧的定位数系没有这个符号，便会在那个位置留一个空格，这让63和603，12和120难以区分0这既是一个值又是一个占位符的特质让它成为一个可靠，一致的符号当然，也可以用任何十个符号来代替数字0到9.很长一段时间 图像字符在各地区不断变化发展着大多数学者认为我们如今的数字是从北非阿拉伯王国马格里布地区曾用过的符号进化而来的到十五世纪 我们现在日常所熟悉的阿拉伯数字体系已经取代了罗马数字变成了世界上最常用的数字系统。那为什么阿拉伯数字系统和其他的一些都用十进制呢？最可能的答案是因为它是最简单的。这也解释了阿芝特克人使用二十进制的原因但是其他进制也是可以用的巴比伦数字是六十进制很多人认为十二进制也挺好的12和60都是因数很多的合数，它们可以被2，被3，被4，被6整除，用这些数来表示共同因数更好一些事实上，我们日常生活中存在很多数字系统，从测量角度和时间，到日常的计量单位，比如一打。 （a dozen意为12个，a gross意为144个）当然，二进制也被使用于所有的电子设备。尽管程序员也将八进制和十六进制用于更精简的表达。所以下一次你使用一个很大的数字时，想想你仅用了这几个符号就获得了一个如此大的量，也试试看你是否能用不同的方式把它表达出来。

**P427 2016-12-22 How do animals experience pain - Robyn J. Crook**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=427)

Humans know the surprising prick of a needle, the searing pain of a stubbed toe, and the throbbing of a toothache. We can identify many types of pain and have multiple ways of treating it. But what about other species? How do the animals all around us experience pain? It's important that we find out. We keep animals as pets, they enrich our environment, we farm many species for food, and we use them in experiments to advance science and human health. Animals are clearly important to us, so it's equally important that we avoid causing them unnecessary pain. For animals that are similar to us, like mammals, it's often obvious when they're hurting. But there's a lot that isn't obvious, like whether pain relievers that work on us also help them. And the more different an animal is from us, the harder it is to understand their experience. How do you tell whether a shrimp is in pain? A snake? A snail? In vertebrates, including humans, pain can be split into two distinct processes. In first, nerves and the skin sense something harmful and communicate that information to the spinal cord. There, motor neurons activate movements that make us rapidly jerk away from the threat. This is the physical recognition of harm called nociception, and nearly all animals, even those with very simple nervous systems, experience it. Without this ability, animals would be unable to avoid harm and their survival would be threatened. The second part is the conscious recognition of harm. In humans, this occurs when the sensory neurons in our skin make a second round of connections via the spinal cord to the brain. There, millions of neurons in multiple regions create the sensations of pain. For us, this is a very complex experience associated with emotions like fear, panic, and stress, which we can communicate to others. But it's harder to know exactly how animals experience this part of the process because most them can't show us what they feel. However, we get clues from observing how animals behave. Wild, hurt animals are known to nurse their wounds, make noises to show their distress, and become reclusive. In the lab, scientists have discovered that animals like chickens and rats will self-administer pain-reducing drugs if they're hurting. Animals also avoid situations where they've been hurt before, which suggests awareness of threats. We've reached the point that research has made us so sure that vertebrates recognize pain that it's illegal in many countries to needlessly harm these animals. But what about other types of animals like invertebrates? These animals aren't legally protected, partly because their behaviors are harder to read. We can make good guesses about some of them, like oysters, worms, and jellyfish. These are examples of animals that either lack a brain or have a very simple one. So an oyster may recoil when squirted with lemon juice, for instance, because of nociception. But with such a simple nervous system, it's unlikely to experience the conscious part of pain. Other invertebrate animals are more complicated, though, like the octopus, which has a sophisticated brain and is thought to be one of the most intelligent invertebrate animals. Yet, in many countries, people continue the practice of eating live octopus. We also boil live crawfish, shrimp, and crabs even though we don't really know how they're affected either. This poses an ethical problem because we may be causing these animals unnecessary suffering. Scientific experimentation, though controversial, gives us some clues. Tests on hermit crabs show that they'll leave an undesirable shell if they're zapped with electricity but stay if it's a good shell. And octopi that may originally curl up an injured arm to protect it will risk using it to catch prey. That suggests that these animals make value judgements around sensory input instead of just reacting reflexively to harm. Meanwhile, crabs have been known to repeatedly rub a spot on their bodies where they've received an electric shock. And even sea slugs flinch when they know they're about to receive a noxious stimulus. That means they have some memory of physical sensations. We still have a lot to learn about animal pain. As our knowledge grows, it may one day allow us to live in a world where we don't cause pain needlessly.

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翻译人员: LaiNi Chu 校对人员: Di SUN人类知道被针扎、不小心踢到脚趾的剧痛，还有一阵阵牙痛。我们可以分辨多种疼痛, 也有很多种解决的办法。那么其他物种呢？我们身边的动物如何感知疼痛？了解这些非常重要。我们把动物当作宠物，它们丰富了我们生活的环境。我们饲养动物作为食物.我们用动物做实验 去探究科学和人类健康。显然，动物对我们很重要。那么同样重要的是 避免让它们感到不必要的疼痛。像那些和我们相似的动物， 比如哺乳类动物它们感受到痛苦往往显而易见。但也有很多并不易察觉，就像我们并不知道 我们的止痛药能否帮助动物？当动物与我们的区别越大,我们会更难明白它们的感受。你怎么知道一只虾正感到疼痛？那么，一条蛇呢？一只蜗牛呢？对于包括人类在内的脊椎动物，痛觉可以分为两个截然不同的过程。首先，神经和皮肤感受到伤害，并把这个信息传递给脊髓。于是，运动神经元激发让我们快速远离危险的动作。这种身体上的伤害识别， 被称为“伤害感受”，几乎所有动物，即使是神经系统非常简单的动物，都有伤害感受。如果没有伤害感受， 动物则不能避免伤害，同时它们的生存也会受威胁。第二部分是有意识的伤害识别。对于人类， 这涉及皮肤里的感觉神经元经过脊髓第二次连接到脑部。百万个神经元分布于不同的区域 产生疼痛的感觉。这其中的情绪体验非常复杂， 包含害怕、慌张，和压抑，我们可以与其他人交流这些感受。但是我们很难知道动物如何体验这一部分过程，因为大部分动物 不能向我们表露它们的感受。但我们可以从观察 动物行为中找到线索。我们知道野生动物 会护理它们的伤口，发出声音表达它们的悲痛，以及离群独处。科学家通过实验发现 像鸡和老鼠这些动物，如果受伤， 它们会给自己服用止痛药。动物也会避免曾经受伤的环境，这证明了动物能意识到危险。研究也向我们证实脊椎动物能识别疼痛。因此在很多国家伤害动物是违法的。但其他种类的动物，比如无脊椎动物， 又会如何呢？这些动物不被法律保护，一部分是因为它们的行为 更难读懂。我们可以猜测一些 无脊椎动物的行为，例如牡蛎、蠕虫和水母。这些都是没有大脑的动物，或是脑部结构很简单。牡蛎在被柠檬汁喷射后快速畏缩，因为它有“伤害感受”。但由于它们神经系统很简单，它们不太可能有意识地感受疼痛。其他无脊椎动物则更加复杂，例如章鱼，它有一个复杂的脑部,它被认为是无脊椎动物中 智力最高的物种之一。然而在很多国家中， 人们依旧生吃章鱼。我们也会煮活的小龙虾、海虾和螃蟹,尽管我们并不知道它们的感受。这就引申出了一个道德问题，因为我们可能会对这些动物 造成不必要的伤痛。科学实验虽有争议， 但给了我们很多线索。寄生蟹在试验中被电击之后，会离开损坏的外壳，但如果是一个完好的壳， 它们会继续待在里面。章鱼会卷起受伤的触手 来保护自己。也会在捕猎时 冒险使用受伤的触手。这说明这些动物 能在感官接受之后做出判断，而不只是对伤害做出反应。同时，螃蟹在受到电击后会反复摩擦身体受电击的部位。即便是海参也会在受到有害刺激后蜷缩。这说明它们对生理感觉有记忆。关于动物的痛觉， 我们还有很多需要学习。随着我们知识的增长，或许将来我们可以生活在 一个没有不必要伤痛的世界。

**P428 2017-01-05 Would you sacrifice one person to save five - Eleanor Nelsen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=428)

Imagine you're watching a runaway trolley barreling down the tracks straight towards five workers who can't escape. You happen to be standing next to a switch that will divert the trolley onto a second track. Here's the problem. That track has a worker on it, too, but just one. What do you do? Do you sacrifice one person to save five? This is the trolley problem, a version of an ethical dilemma that philosopher Philippa Foot devised in 1967. It's popular because it forces us to think about how to choose when there are no good choices. Do we pick the action with the best outcome or stick to a moral code that prohibits causing someone's death? In one survey, about 90% of respondents said that it's okay to flip the switch, letting one worker die to save five, and other studies, including a virtual reality simulation of the dilemma, have found similar results. These judgments are consistent with the philosophical principle of utilitarianism which argues that the morally correct decision is the one that maximizes well-being for the greatest number of people. The five lives outweigh one, even if achieving that outcome requires condemning someone to death. But people don't always take the utilitarian view, which we can see by changing the trolley problem a bit. This time, you're standing on a bridge over the track as the runaway trolley approaches. Now there's no second track, but there is a very large man on the bridge next to you. If you push him over, his body will stop the trolley, saving the five workers, but he'll die. To utilitarians, the decision is exactly the same, lose one life to save five. But in this case, only about 10% of people say that it's OK to throw the man onto the tracks. Our instincts tell us that deliberately causing someone's death is different than allowing them to die as collateral damage. It just feels wrong for reasons that are hard to explain. This intersection between ethics and psychology is what's so interesting about the trolley problem. The dilemma in its many variations reveal that what we think is right or wrong depends on factors other than a logical weighing of the pros and cons. For example, men are more likely than women to say it's okay to push the man over the bridge. So are people who watch a comedy clip before doing the thought experiment. And in one virtual reality study, people were more willing to sacrifice men than women. Researchers have studied the brain activity of people thinking through the classic and bridge versions. Both scenarios activate areas of the brain involved in conscious decision-making and emotional responses. But in the bridge version, the emotional response is much stronger. So is activity in an area of the brain associated with processing internal conflict. Why the difference? One explanation is that pushing someone to their death feels more personal, activating an emotional aversion to killing another person, but we feel conflicted because we know it's still the logical choice. "Trolleyology" has been criticized by some philosophers and psychologists. They argue that it doesn't reveal anything because its premise is so unrealistic that study participants don't take it seriously. But new technology is making this kind of ethical analysis more important than ever. For example, driver-less cars may have to handle choices like causing a small accident to prevent a larger one. Meanwhile, governments are researching autonomous military drones that could wind up making decisions of whether they'll risk civilian casualties to attack a high-value target. If we want these actions to be ethical, we have to decide in advance how to value human life and judge the greater good. So researchers who study autonomous systems are collaborating with philosophers to address the complex problem of programming ethics into machines, which goes to show that even hypothetical dilemmas can wind up on a collision course with the real world.

**P428 2017-01-05 Would you sacrifice one person to save five - Eleanor Nelsen**

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翻译人员: Di SUN 校对人员: Yulin Li想象你眼前有一辆失控的电车， 飞速冲下轨道，轨道前方有5个工人，难逃此劫。而你正巧站在道岔旁边,可以将电车引向另一条轨道上。那么，问题来了,另一条轨道上面也有工人， 但是只有一个。这时候，你会怎么办？你会选择牺牲一个人来挽救五个人吗？这就是我们所说的电车难题，是由哲学家菲利帕福特 在1967年提出的道德困境问题。这个问题能引起大家的兴趣 是因为它促使我们思考如何在困境之中做出抉择。我们应该选择一个最好的结果，还是坚守不做出任何伤害 他人生命的行为道德准则？一项调查显示， 大约90%的参与者选择搬动道岔，牺牲一人来拯救五个人的生命，其他试验，包括一个虚拟现实模拟研究也得出了相似的结果。这与功利主义的观点相吻合，即认为道德上正确的决定是依据为最多的人提供最大的利益 这一原则做出的。五个人的生命总归大于一个人的生命，即便是以牺牲一个人的生命为代价。然而人们并不都遵循功利主义的思想，我们从电车难题的变式中就可以发现。这一次，你站在天桥上，一辆失控的电车正朝你驶来。此时并没有第二条轨道，但是你的旁边站着 一位体型庞大的男人。如果你把他推下天桥， 他的身体能够让电车停下来，拯救五个人的性命。但是，那个男人会牺牲。对于功利主义者而言， 这一次选择与上一次相同，牺牲一个人来拯救另五个人。但是在这次试验中， 只有大约10%的参与者认为可以把那个男人推落到轨道上。直觉告诉我们， 故意造成他人死亡的行为不同于间接伤害造成死亡。这属于人之常情， 其背后的原因很难解释清楚。正是道德伦理与心理学产生的交集让电车难题变得非常有意思。电车难题及其多种变式 揭示了我们在做出道德判断时依赖于多种因素， 而非仅仅通过合乎逻辑的利弊权衡。比如说， 男性比女性更有可能选择把那个男人推下天桥。参加试验之前看了喜剧片的人， 也更可能做出同样的选择。一项虚拟现实研究发现，相较女性，人们更愿意选择牺牲男性。研究人员在探究原始电车难题及其变式情形下 人们的脑部活动时发现，两种情景都激发了 脑部负责有意识决策和情绪反应的部位。但是在变式情况中， 参与者的情绪反应更加激烈。脑部负责处理内部冲突的部位也更加活跃。为什么会产生这些变化？一种解释是，把人推下桥致死 对个人的冲击更大，激发了对于杀人行为的厌恶之情，但是我们又很矛盾， 因为我们知道这是符合逻辑的选择。一些哲学家和心理学家 对电车难题持批评态度。他们认为这并没有揭示任何东西， 因为问题发生的前提非常不现实，以致于试验参与者并不会认真对待。然而，新科技正让这种道德分析变得比以往更加重要。比如说， 无人驾驶的汽车可能会面临造成小事故来避免大事故的选择。同时，政府在研发军用无人机最终能够做出牺牲平民生命以攻击高价值目标的决定。如果我们希望这样的行为 变得合乎道德，那么我们必须首先决定 如何衡量人类生命的价值，并评判什么是符合多数人利益的。那么，独立系统的研究人员应该和哲学家一起处理机器编程过程中遇到的道德难题，而这正恰恰说明了假设中的困境，最终也会与现实世界发生碰撞。

**P429 2017-01-09 What’s so great about the Great Lakes - Cheri Dobbs and Jennifer Gabr**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=429)

What's so great about the Great Lakes? They're known as America's inland seas. The North American Great Lakes Huron, Ontario, Michigan, Erie, and Superior are so massive that they border eight states and contain 23 quadrillion liters of water. That's enough to cover the land area of the contiguous United States three meters deep. These vast bodies of water span forest, grassland, and wetland habitats, supporting a region that's home to over 3,500 species. But how did such a vast and unique geological feature come to be? The story begins near the end of the last ice age over 10,000 years ago, a time when the climate was warming and the glaciers that cloaked the Earth's surface began their slow retreat. These immense ice sheets carved out a series of basins. Those basins filled with water as the ice began to melt, creating the world's largest area of freshwater lakes. Over time, channels developed between these basins, and water began to flow in an ongoing exchange that persists to this day. In fact, today, the interconnected Great Lakes contain almost 20% of the world's supply of fresh surface water. The water's journey begins in the far north of Lake Superior, which is the deepest, coldest, and clearest of the lakes, containing half the system's water. Lake Superior sinks to depths of 406 meters, creating a unique and diverse ecosystem that includes more that 80 fish species. A given drop of water spends on average 200 years in this lake before flowing into Lake Michigan or Lake Huron. Linked by the Straits of Mackinac, these two lakes are technically one. To the west lies Lake Michigan, the third largest of the lakes by surface area. Water slowly moves through its cul-de-sac shape and encounters the world's largest freshwater dunes, many wildlife species, and unique fossilized coral. To the east is Lake Huron, which has the longest shoreline. It's sparsely populated, but heavily forested, including 7,000-year-old petrified trees. Below them, water continues to flow southeastwards from Lake Huron into Lake Erie. This lake's status as the warmest and shallowest of the five has ensured an abundance of animal life, including millions of migrating birds. Finally, the water reaches its last stop by dramatically plunging more than 50 meters down the thundering Niagara Falls into Lake Ontario, the smallest lake by surface area. From there, some of this well-traveled water enters the St. Lawrence River, eventually reaching the Atlantic Ocean. In addition to being a natural wonder, the perpetually flowing Great Lakes bring us multiple benefits. They provide natural water filtration, flood control, and nutrients cycling. By moving water across more than 3,200 kilometers, the Great Lakes also provide drinking water for upward of 40 million people and 212 billion liters a day for the industries and farms that line their banks. But our dependence on the system is having a range of negative impacts, too. The Great Lakes coastal habitats are being degraded and increasingly populated, exposing the once pristine waters to industrial, urban, and agricultural pollutants. Because less than 1% of the water leaves the Lake's system annually, decades-old pollutants still lurk in its waters. Humans have also inadvertently introduced more than 100 non-native and invasive species into the lakes, such as zebra and quagga mussels, and sea lampreys that have decimated some indigenous fish populations. On a larger scale, climate change is causing the waters to warm, thus reducing water levels and changing the distribution of aquatic life. Luckily, in recent years, governments have started to recognize the immense value of this natural resource. Partnerships between the United States and Canada are underway to reduce pollution, protect coastal habitats, and halt the spread of invasive species. Protecting something as massive as the Great Lakes system will require the collaboration of many organizations, but the effort is critical if we can preserve the wonder of this flowing inland sea.

**P429 2017-01-09 What’s so great about the Great Lakes - Cheri Dobbs and Jennifer Gabr**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=429)

翻译人员: Meihan Zhao 校对人员: Guanguan Ke是什么让五大湖如此伟大？它也被称作美国的内海北美五大湖休伦湖，安大略湖，密歇根湖伊利湖以及苏必利尔湖，它们非常宏大，构成八个州的边界，包含23千万亿公升水，即使将美国国土全部覆盖，水位仍可达三米深。这片广阔的水域跨越森林，草原，和湿地生态系统，供养着超过3500种生物。但是，这片广阔而独特的地质特征 是如何形成的呢？故事要从上个冰河世纪的末期说起， 也就是超过1万年以前，气候转暖，地球表面的冰川缓缓融化，无垠冰川曾雕刻出形态各异的盆地，冰雪融化后，雪水流入盆地，创造出了世界上最大的淡水湖。不久，盆地间的河道凸显，湖水流入并相互交融一直到今日。事实上，今天，这些相互交融的五大湖，包含了几乎世界上20%的淡水供应。水的旅程起始于最北部的苏必利尔湖，也是最深、最冷、最干净的湖，包含了整个五大湖系统一半的水。苏必利尔湖最深处可达406米，创造了独一无二的多样的生态系统， 包含80多种鱼，一滴水平均需要200年才能从这里流入密歇根湖或休伦湖在麦基诺海峡的连接下，这两大湖实际是一体的西边是密歇根湖，水域面积世界第三，水沿着“死胡同”缓缓流回，沿途经过世界最大的淡水滩数不清的野生物种和独特的珊瑚化石东边是享有最长海岸线的休伦湖，那里人口稀少，植被丰富7000年的石化树也长于此地，植被下，湖水沿东南继续流淌流出休伦湖便进入伊利湖作为五大湖中最温暖、也是最浅的地方，这里物种丰富，上百万候鸟迁徙来此最后，水流至最后一站来到振聋发聩的尼亚加拉瀑布， 经过超过50米的猛烈下冲，进入安大略湖——表面积最小的湖。至此，这滴水经历漫长旅程，流入圣劳伦斯河，并最终汇入大西洋。除了作为自然景观，五大湖日复一日流动着，为人类带来不少福利。它提供了天然水过滤、洪水控制、以及营养循环。随着湖水超过3200千米的移动，五大湖也给上游4千万居民提供了饮用水，给沿岸的工厂和农庄每天带来2120亿公升水。但是，我们对五大湖的依赖 也造成了一系列负面效果五大湖沿岸生态栖息地逐渐退化， 被越来越多的人口侵蚀，曾经原生态的水域，暴露给工厂、城市和农业的污染物。由于每年仅有1%的水能离开这个系统，数十年的旧物染污仍然会逗留在水域中。人类也无意间向湖中引进了超过100种非原生的入侵物种，例如两种斑纹贝（Zebra and quagga mussels）和七鳃鳗它们已经使一些土著鱼类灭绝。更大程度上讲，气候的变化让这里的水越来越温暖使水位下降，造成水生物分布的改变幸运的是，近几年，政府部门开始意识到这项自然资源的巨大价值美国和加拿大开始联手治理污染、保护生态栖息地，并阻止入侵物种的扩散。保护像五大湖这么大的生态系统，需要许多组织的合作参与。但是要想保住这个流动着的内陆奇迹，这项工作势在必行。

**P430 2017-01-12 What is bipolar disorder - Helen M. Farrell**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=430)

What is bipolar disorder? The word bipolar means two extremes. For the many millions experiencing bipolar disorder around the world, life is split between two different realities - elation and depression. Although there are many variations of bipolar disorder, let's consider a couple. Type 1 has extreme highs alongside the lows, while Type 2 involves briefer, less extreme periods of elation interspersed with long periods of depression. For someone seesawing between emotional states, it can feel impossible to find the balance necessary to lead a healthy life. Type 1's extreme highs are known as manic episodes, and they can make a person range from feeling irritable to invincible. But these euphoric episodes exceed ordinary feelings of joy, causing troubling symptoms like racing thoughts, sleeplessness, rapid speech, impuslive actions, and risky behaviors. Without treatment, these episodes become more frequent, intense, and take longer to subside. The depressed phase of bipolar disorder manifests in many ways - a low mood, dwindling interest in hobbies, changes in appetite, feeling worthless or excessively guilty, sleeping either too much or too little, restlessness or slowness, or persistent thoughts of suicide. Worldwide, about one to three percent of adults experience the broad range of symptoms that indicate bipolar disorder. Most of those people are functional, contributing members of society, and their lives, choices, and relationships aren't defined by the disorder, but still, for many, the consequences are serious. The illness can undermine educational and professional performance, relationships, financial security, and personal safety. So what causes bipolar disorder? Researchers think a key player is the brain's intricate wiring. Healthy brains maintain strong connections between neurons thanks to the brain's continuous efforts to prune itself and remove unused or faulty neural connections. This process is important because our neural pathways serve as a map for everything we do. Using functional magnetic resonance imaging, scientists have discovered that the brain's pruning ability is disrupted in people with bipolar disorder. That means their neurons go haywire and create a network that's impossible to navigate. With only confusing signals as a guide, people with bipolar disorder develop abnormal thoughts and behaviors. Also, psychotic symptoms, like disorganized speech and behavior, delusional thoughts, paranoia, and hallucinations can emerge during extreme phases of bipolar disorder. This is attributed to the overabundance of a neurotransmitter called dopamine. But despite these insights, we can't pin bipolar disorder down to a single cause. In reality, it's a complex problem. For example, the brain's amygdala is involved in thinking, long-term memory, and emotional processing. In this brain region, factors as varied as genetics and social trauma may create abnormalities and trigger the symptoms of bipolar disorder. The condition tends to run in families, so we do know that genetics have a lot to do with it. But that doesn't mean there's a single bipolar gene. In fact, the likelihood of developing bipolar disorder is driven by the interactions between many genes in a complicated recipe we're still trying to understand. The causes are complex, and consequently, diagnosing and living with bipolar disorder is a challenge. Despite this, the disorder is controllable. Certain medications like lithium can help manage risky thoughts and behaviors by stabilizing moods. These mood stabilizing medications work by decreasing abnormal activity in the brain, thereby strengthening the viable neural connections. Other frequently used medications include antipsychotics, which alter the effects of dopamine, and electroconvulsive therapy, which works like a carefully controlled seizure in the brain, is sometimes used as an emergency treatment. Some bipolar patients reject treatment because they're afraid it will dim their emotions and destroy their creativity. But modern psychiatry is actively trying to avoid that. Today, doctors work with patients on a case-by-case basis to administer a combination of treatments and therapies that allows them to live to their fullest possible potential. And beyond treatment, people with bipolar disorder can benefit from even simpler changes. Those include regular exercise, good sleep habits, and sobriety from drugs and alcohol, not to mention the acceptance and empathy of family and friends. Remember, bipolar disorder is a medical condition, not a person's fault, or their whole identity, and it's something that can be controlled through a combination of medical treatments doing their work internally, friends and family fostering acceptance and understanding on the outside, and people with bipolar disorder empowering themselves to find balance in their lives.

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翻译人员: Di SUN 校对人员: Jiawei Ni什么是双向情感障碍？ （躁郁症，bipolar disorder）“bipolar”这个单词意思是两个极端。对于世界上数百万躁郁症患者来说，生活被分裂成 两个截然不同的部分，兴高采烈的愉快期 和郁郁寡欢的抑郁期。躁郁症有多种类型。我们来看其中两种。第一种包含极端的情绪高潮 伴随情绪低谷，第二种包含更温和的情绪高潮，穿插在长期的抑郁期中。情感起伏很大的人会觉得找到健康生活的平衡点 是不可能的。第一种类型中的精神愉快期， 被称为躁狂发作，患者可能感到狂躁易怒， 或是觉得自己无所不能。但这种精神愉快 超过一般的喜悦感，会引发其他症状， 比如思绪翻腾，失眠，言语急促，做出冲动行为以及危险行为。若未接受治疗，异常的精神愉快期 会更频繁出现，程度加重，同时需要花更久的时间平息。躁郁症的精神沮丧期 有以下表现形式：情绪低落，兴趣减弱，食欲不正，感到自己没有价值 或者极端内疚，睡太多或者太少，精力充沛或者行动缓慢，或者常有自杀的想法。全世界大约1-3%的成年人表现出躁郁症的不同症状。其中大多数是对社会有贡献的人，他们的生活，选择以及人际关系并不受躁郁症限制。即便如此，对于很多人来说， 躁郁症带来了严重的后果。躁郁症会影响人们 在学习和工作上的表现，人际关系，财务稳定，以及个人安全。那么，是什么原因引起了躁郁症？研究人员认为， 复杂的大脑回路是主因。健康的大脑中 神经元之间强有力地连接在一起，多亏了大脑不断修剪清除无用的或错误的神经连接。这一过程之所以很重要 是因为神经通路的作用就像是地图一样指引我们。通过机能性磁共振成像，科学家发现， 大脑的修剪清理过程，在躁郁症患者身上受到了干扰。这意味着神经元连接失控，形成了一个 无法正确导航的网络。在混乱的信号指导下，躁郁症患者产生异常的想法和行为。同时，精神病症状比如言语混乱、行为失控、妄想、偏执、以及幻觉会在躁郁症的极端阶段出现。这是由于存在过多的神经递质 多巴胺导致的。即便如此，我们不能 把躁郁症的成因归结成一个。实际上，这是个很复杂的问题。比方说，大脑的杏仁核与思考，长期记忆和情绪处理有关。在大脑的这块区域， 遗传因素和社会创伤等因素可能形成异常并引发躁郁症。这种情况往往在家族中发生，我们知道这与遗传基因有很大关系。但是这并不意味着 有一个躁郁症的基因存在。实际上，躁郁症的形成是许多基因共同作用的结果，我们仍然在试图找到答案。由于躁郁症成因复杂，要症断出躁郁症 并与之共处是很有挑战的。尽管如此，躁郁症是能够被控制的。一些药物，比如锂盐 能够控制危险的想法和行为以平稳情绪。这些稳定情绪的药物 通过减少大脑中异常活动来加强有效的神经连接。其他常用的药物 包括抗精神病药通过改变多巴胺的作用以及采用电休克疗法来人为控制大脑的癫痫，这种疗法有时也被称为紧急治疗。一些躁郁症患者拒绝治疗，因为他们担心治疗会让他们情绪低落并扼杀创造力。但是现代精神治疗法 正在努力避免这种情况。如今，医生会根据每个病人的情况制定出混合的治疗方法，让病人的生命发挥充分的潜力。除了治疗以外，躁郁症患者可以从很简单的改变中受益。这包括定期运动，形成良好的睡眠习惯，节制毒品以及酒精饮料，当然还包括 来自家人和朋友的接纳和认同。请注意，躁郁症是一种身体状况，这不是患者个人的错，也不是他整个人身份的问题。这是一个能被控制的症状，可以通过药物治疗 在脑内发挥功效，加上外部来自家人和朋友的 接纳和理解，同时患者自身努力去寻找生活的平衡。

**P431 2017-01-19 The mathematics of sidewalk illusions - Fumiko Futamura**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=431)

If you're ever walking down the street and come across an oddly stretched out image, like this, you'll have an opportunity to see something remarkable, but only if you stand in exactly the right spot. That happens because these works employ a technique called anamorphosis. Anamorphosis is a special case of perspective art, where artists represent realistic three-dimensional views on two-dimensional surfaces. Though it's common today, this kind of perspective drawing has only been around since the Italian Renaissance. Ancient art often showed all figures on the same plane, varying in size by symbolic importance. Classical Greek and Roman artists realized they could make objects seem further by drawing them smaller, but many early attempts at perspective were inconsistent or incorrect. In 15th century Florence, artists realized the illusion of perspective could be achieved with higher degrees of sophistication by applying mathematical principles. In 1485, Leonardo da Vinci manipulated the mathematics to create the first known anamorphic drawing. A number of other artists later picked up the technique, including Hans Holbein in "The Ambassadors." This painting features a distorted shape that forms into a skull as the viewer approaches from the side. In order to understand how artists achieve that effect, we first have to understand how perspective drawings work in general. Imagine looking out a window. Light bounces off objects and into your eye, intersecting the window along the way. Now, imagine you could paint the image you see directly onto the window while standing still and keeping only one eye open. The result would be nearly indistinguishable from the actual view with your brain adding depth to the 2-D picture, but only from that one spot. Standing even just a bit off to the side would make the drawing lose its 3-D effect. Artists understand that a perspective drawing is just a projection onto a 2-D plane. This allows them to use math to come up with basic rules of perspective that allow them to draw without a window. One is that parallel lines, like these, can only be drawn as parallel if they're parallel to the plane of the canvas. Otherwise, they need to be drawn converging to a common point known as the vanishing point. So that's a standard perspective drawing. With an anamorphic drawing, like "The Ambassadors," directly facing the canvas makes the image look stretched and distorted, but put your eye in exactly the right spot way off to the side, and the skull materializes. Going back to the window analogy, it's as if the artist painted onto a window positioned at an angle instead of straight on, though that's not how Renaissance artists actually created anamorphic drawings. Typically, they draw a normal image onto one surface, then use a light, a grid, or even strings to project it onto a canvas at an angle. Now let's say you want to make an anamorphic sidewalk drawing. In this case, you want to create the illusion that a 3-D image has been added seamlessly into an existing scene. You can first put a window in front of the sidewalk and draw what you want to add onto the window. It should be in the same perspective as the rest of the scene, which might require the use of those basic rules of perspective. Once the drawing's complete, you can use a projector placed where your eye was to project your drawing down onto the sidewalk, then chalk over it. The sidewalk drawing and the drawing on the window will be nearly indistinguishable from that point of view, so viewers' brains will again be tricked into believing that the drawing on the ground is three-dimensional. And you don't have to project onto a flat surface to create this illusion. You can project onto multiple surfaces, or assemble a jumble of objects, that from the right point of view, appears to be something else entirely. All over the planet, you can find solid surfaces giving way to strange, wonderful, or terrifying visions. From your sidewalk to your computer screen, these are just some of the ways that math and perspective can open up whole new worlds.

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翻译人员: Cissy Yun 校对人员: yue chen当你走在街上突然看见一个奇怪形状的的图案 像这样的你正见证着一件伟大事件但是你一定要站对位置这个发生的原因就是 画中运用了歪像原理歪像是透视艺术中特殊的一种艺术家会造就三维的效果在的是二维的平面上虽然，如今这十分常见这种透视画法 在意大利文化复兴时代才开始兴起古时的画作中的物品多是平面的以大小的不同来使人们 认识到其重要与否古希腊与古罗马的艺术家觉得 他们可以将一样物品的距离感以把他们画小些来展示但早起对这种透视方法的尝试 多数是不连贯和不正确的十五世纪的弗洛伦萨一些艺术家发觉了透视的假象可以被更好的的方式来达到借助的是数学理论在1485年时，达芬奇就是利用这一原理创作了史上第一幅歪像画而后，很多位艺术家也学会了这种技巧比如说，Hans Holbein的 “大使们”这幅画作中有一个扭曲的骷髅头而从侧面，就可看到正常的头颅为了领会艺术家是如何造就歪像我们必须先理解透视绘画的基本原理试想一下，往窗外望去光线从物体的表面反射透过窗户，射进眼睛中现在想象一下把看到的影像 直接画在窗户上同时要立正不动，并只睁开一只眼结果会和实际景像一模一样你的大脑已经把 加深了这二维图像的维度然而，这种视觉效果只限于从这一点看去当向一旁移动一点点时这种三维效果便会消失艺术家认知到了透视画作就是在二维平面上的投影这让他们运用数学来达到透视的基本原理让他们在没有窗户的情况下 也可以作画原理之一是： 这样的平行线需要和画布的表面平行不然的话，从正面看 就要将它们画成在某点相交这一点被称为“消失点”这就是透视画作的标准之一像“大使们”这幅歪像画作正对画作时 看到的是扭曲的图像但是往旁边移动到一点就可以看到正常的骷髅头像用刚刚窗上作画的例子来解释骷髅头就想是从侧面在窗上作画一般并不正对着窗户而画上去的但是，这并非是文艺复兴时期的艺术家 创作歪像画的手法他们通常会把一个正常的画像画在一个平面上用光来照射和网格甚至是线来将画像在一个角度 投影在画布上假设你在人行道上创作一幅歪像图你想引起别人的错觉让他们以为一幅三维的画作 无缝衔接在了人行道上你可以先将一扇窗户直面人行道把图像先画在窗上应该与后来的图像有着相同的视角这将会运用到透视的基本原理当画作完成后你可用一个投影仪放置在你眼睛的位置来将你的画作投影到路上你可以用粉笔将轮廓描下人行道上的画作和窗上的画作在某一角度上基本上是不可分辨的所以观看者的大脑会再一次被欺骗他们会认为在地上的画作就是三维的这种错觉不单单可以被投射在单一的平面上还可以投射到多个平面上也可以透过堆凑很多物品来形成错觉从合适的视点还可以看到不同的景象世界各地有很多马路被画上各种奇形怪状，栩栩如生的图像无论从人行道上 还是在电脑上观看这些画作都是因为数学原理和透视法则结合后 创造出的无限可能

**P432 2017-01-25 The myth behind the Chinese zodiac - Megan Campisi and Pen-Pen Chen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=432)

What's your sign? In Western astrology, it's a constellation determined by when your birthday falls in the calendar. But according to the Chinese zodiac, or shēngxiào, it's your shǔxiàng, meaning the animal assigned to your birth year. And of the many myths explaining these animal signs and their arrangement, the most enduring one is that of the Great Race. As the story goes, Yù Dì, or Jade Emperor, Ruler of the Heavens, wanted to devise a way to measure time, so he organized a race. The first twelve animals to make it across the river would earn a spot on the zodiac calendar in the order they arrived. The rat rose with the sun to get an early start, but on the way to the river, he met the horse, the tiger, and the ox. Because the rat was small and couldn't swim very well, he asked the bigger animals for help. While the tiger and horse refused, the kind-hearted ox agreed to carry the rat across. Yet, just as they were about to reach the other side, the rat jumped off the ox's head and secured first place. The ox came in second, with the powerful tiger right behind him. The rabbit, too small to battle the current, nimbly hopped across stones and logs to come in fourth. Next came the dragon, who could have flown directly across, but stopped to help some creatures she had encountered on the way. After her came the horse, galloping across the river. But just as she got across, the snake slithered by. The startled horse reared back, letting the snake sneak into sixth place. The Jade Emperor looked out at the river and spotted the sheep, the monkey, and the rooster all atop a raft, working together to push it through the weeds. When they made it across, the trio agreed to give eighth place to the sheep, who had been the most comforting and harmonious of them, followed by the monkey and the rooster. Next came the dog, scrambling onto the shore. He was a great swimmer, but frolicked in the water for so long that he only managed to come in eleventh. The final spot was claimed by the pig, who had gotten hungry and stopped to eat and nap before finally waddling across the finish line. And so, each year is associated with one of the animals in this order, with the cycle starting over every 60 years. Why 60 and not twelve? Well, the traditional Chinese calendar is made up of two overlapping systems. The animals of the zodiac are associated with what's called the Twelve Earthly Branches, or shí'èrzhī. Another system, the Ten Heavenly Stems, or tiāngān, is linked with the five classical elements of metal, xīn, wood, mù, water, shuǐ, fire, huǒ, and earth, tǔ. Each element is assigned yīn or yáng, creating a ten-year cycle. When the twelve animals of the Earthly Branches are matched with the five elements plus the yīn or the yáng of the Heavenly Stems, it creates 60 years of different combinations, known as a sexagenary cycle, or gānzhī. So someone born in 1980 would have the sign of yáng metal monkey, while someone born in 2007 would be yīn fire pig. In fact, you can also have an inner animal based on your birth month, a true animal based on your birth date, and a secret animal based on your birth hour. It was the great race that supposedly determined which animals were enshrined in the Chinese zodiac, but as the system spread through Asia, other cultures made changes to reflect their communities. So if you consult the Vietnamese zodiac, you may discover that you're a cat, not a rabbit, and if you're in Thailand, a mythical snake called a Naga replaces the dragon. So whether or not you place stock in what the zodiac says about you as an individual, it certainly reveals much about the culture it comes from.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=432)

翻译人员: Di SUN 校对人员: Chen Lu你的属相是什么？依据西方的星座学，星座是由出生日期来决定的。但根据中国的黄道十二宫， 或者说“生肖,”即你的属相， 指的是代表你出生年份的动物。在众多解释属相的由来 和排序的传说中，“渡河大赛”的故事流传最广。传说中， 天庭的统治者—玉帝想要发明一种计量时间的方式， 因此他组织了一场比赛最先过河的12个动物可以根据他们到达的顺序 成为农历的纪年。老鼠为此起了个大早，但在过河时他遇到了马，虎和牛因为老鼠很小也不太会游泳，他向体型更大的动物求助。但是老虎和马都拒绝了他，好心的牛同意背老鼠过河。但当他们将要抵达岸边时，老鼠从牛头上蹦到岸上， 拿到了第一名。牛则成了第二名，紧随其后的是强壮的老虎。兔子体型太小， 无法游过湍急的河水但它敏捷地跳过石头和浮木， 成为了第四名。接下来是龙， 她本来可以直接飞过去，但她在途中停下来， 帮助那些她在路上遇到的动物们过河。接着是马，在河中飞奔而来。但正当马快抵达对岸时， 蛇滑到了她的脚边，把马吓得抬起了前蹄， 让蛇拿到了第六名。这时玉帝往河边望去，发现了羊，猴子和鸡 坐在同一个木筏上，一起在水草中划动木筏。当他们一起抵达时，大家同意把第八名给羊，因为他一路上不停鼓舞队友， 使团队配合默契，之后是猴子和鸡。随后是狗爬上了岸。狗本来就很会游泳，但因为在水里嬉戏太久， 他最后只得到了第十一名。最后一名是猪，他在途中肚子饿， 就停下吃东西还打盹。最后才摇摇晃晃地走过终点。由此，这些动物按顺序 分别对应不同的年份，每60年一个循环。为什么是60不是12呢？因为传统的中国历法 由两个计时系统相互搭配。十二生肖对应的纪年系统与被称为十二地支的系统相互关联。另外一套纪年体系，十天干，是由五个传统的元素组成：金、木、水、火、土。每个元素又分阴阳两种，创造出一个十年的循环。当地支的十二生肖和五个元素相匹配，加上天干的阴或阳，创造了60年的不同组合，称为一干支。所以，1980年出生的人是 阳金属猴，而2007年出生的人则是 阴火属猪。事实上，你能按照出生月 算出你的”内在动物，“按照出生日算出”真实动物，“按照你的出生时算出”隐秘动物。“渡河大赛确定了哪些动物 作为中国的十二生肖。但随着生肖系统在亚洲传开，其他国家为适应其民族文化 对生肖系统做了调整。因此，在越南的生肖中，你可能会发现你属猫， 而不是兔。如果你在泰国，神话中的海蛇那伽取代了龙。无论你信不信属相那回事儿与你个人的关联，它显然能反映很多有关其起源的文化。

**P433 2017-01-30 The science of milk - Jonathan J. O'Sullivan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=433)

Why do humans drink so much milk? And given that all mammals lactate, why do we favor certain types of milk over others? Milk is the first thing we drink, and thanks to developments in the production and variety of dairy products, it can take on countless forms for our dietary and sensory well-being. Milk's primary function is as a complete source of nutrition for newborns. In fact, since it has all of the vital nutrients for development and growth, proteins, carbohydrates, fats, vitamins and minerals, and water, milk is the only thing a baby even needs to ingest for the first six months of life. The unique makeup of milk can vary depending on factors like species, diet, and location. Reindeer of the Arctic Circle, for example, make energy-dense milk that's about 20% fat, roughly five times more than human or cow's milk, to help their young survive the harsh, freezing climate. So how is milk made? In the uniquely mammalian process of lactation, a special class of milk-secreting cells known as mammocytes line up in a single layer around pear-shaped alveoli. Those cells absorb all of the building blocks of milk, then synthesize tiny droplets of fat on structures called smooth endoplasmic reticula. The droplets combine with each other and other molecules and are then expelled and stored in spaces between cells. Mammary glands eventually secrete the milk through the breasts, udders, or, in the rare case of the platypus, through ducts in the abdomen. Although this process is typically reserved for females, in some species, like dayak fruit bats, goats, and even cats, males can also lactate. Milk drinkers worldwide consume dairy from buffalo, goats, sheeps, camels, yaks, horses, and cows. Almost all of these species are ruminants, a type of mammal with four-chambered stomachs that yield large quantities of milk. Of these, cows were the most easily domesticated and produce a milk that is both easily separated into cream and liquid and has a similar fat content to human milk. In their natural environment, mammals secrete milk on call for immediate consumption by their young. But with the demands of thirsty consumers, the dairy industry has enlisted methods to step up production, enhance shelf life, and provide a variety of milk products. In the dairy, centrifugation machines spin milk at high speeds, forcing less dense fats to separate from the liquid and float up. After being skimmed off, this fat, known as butterfat, can be used in dairy products like butter, cream, and cheese. Or it can be later added back to the liquid in varying proportions to yield different fat content milks. Full fat milk, sometimes referred to as whole milk, has 3.25% butterfat added compared to 1-2% for low and reduced fat milk, and less than half a percent for skim milk. To stop reseparation of the fat from the water, or creaming, the mixture undergoes the high-energy pressurized process of homogenization. Before milk hits the shelves, it's also typically heat treated to reduce its level of microbes, a government-sanctioned process that raw milk enthusiasts argue may reduce milk's nutritional worth. Milk spoilage is started by microbes, which consume and break down the nutrients in milk. That process causes butterfat to clump together, leading to a visually unpleasant product. And the byproducts of the microbes' consumption are compounds that taste and smell nasty. But there's a bigger problem. Raw milk can carry microbes that are the sources of deadly diseases, so in order to kill as many of those microbes as possible, and keep milk fresh longer, we use a technique called pasteurization. One version of this process involves exposing milk to about 30 seconds of high heat. Another version, called ultra-high temperature processing, or ultra pasteurization, blasts the milk with considerably higher temperatures over just a few seconds. UHT milk boasts a much longer shelf life, up to twelve months unrefrigerated, compared to pasteurized milk's two weeks in the fridge. That's because the higher temperatures of UHT processing inactivate far more microbes. Yet the higher processing temperatures may adversely affect the nutritional and sensory properties of the milk. Ultimately, that choice lies in the consumer's taste and need for convenience. Fortunately, there are many choices available in an industry that produces in excess of 840 million tons of products each year.

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翻译人员: Di SUN 校对人员: Jenny Yang为什么人类喝那么多奶？所有哺乳动物都会泌乳，但我们为什么喜欢某些奶 胜过其他种类？母乳是我们最先喝到的东西。多亏了制造业的发展， 乳制品不断多样化，乳制品可以呈现数不尽的形式 有益于我们的饮食及感官。奶水最主要功能是 为新生儿提供全面的营养。实际上，奶含有生长发育所需 所有的重要营养，包括蛋白质、碳水化合物、脂肪、维他命和矿物质，以及水分。奶水是新生儿6个月大之前唯一需要摄入的。奶水的成分取决于许多因素， 比如物种、饮食习惯，以及地理位置。比如，北极圈的驯鹿拥有能量密集型的奶水， 含有20%的脂肪，大概是母乳或牛奶的5倍多。这些成分能够保证 小驯鹿在严寒中生存。那么，奶水是如何形成的呢？在哺乳动物特有的泌乳过程中，有一类泌乳细胞叫做乳腺细胞。它们沿着梨型肺泡 排成单层的一排。这些细胞吸收所有 用于制乳的成分，然后形成小的脂肪滴，依附在平滑的内质网上。脂肪滴与脂肪滴 以及其他分子结合，然后排出并贮藏于细胞之间的间隙。乳腺最终分泌乳汁， 通过乳房、乳头，或是像鸭嘴兽这中罕见地 通过腹部的导管。泌乳通常被视为是 雌性动物的行为，一些物种，比如棕榈果蝠、山羊，甚至是猫，雄性动物也能泌乳。世界各地的乳制品消费者 享用的乳品来自于水牛、山羊、绵羊、骆驼、牦牛、马，和牛。这些大多是反刍动物，这种哺乳动物有4个胃室，能够形成大量乳汁。这些动物中， 奶牛是最容易被驯化的，其乳汁也很容易分成乳脂和液体两部分，与人类母乳的脂肪含量相似。在自然环境中，哺乳动物分泌乳汁 随时供他们的幼崽食用。但面对饥渴的消费者，乳品业也提升生产速度，延长产品保质期，同时提供多样的乳制品。在乳制品生产厂， 离心机高速旋转牛奶，使密度较低的脂肪成分与 其他液体分离而上浮。脱脂后，这部分脂肪，也被称为乳脂， 可以被用来制成其他产品，比如黄油、奶油，和芝士。乳脂也可以按照不同比例 加回到乳液中，从而形成脂肪含量不同的牛奶。全脂牛奶，也被称为全脂奶， 含有3.25%的乳脂。相较而言， 低脂和减脂牛奶则含1-2%，脱脂奶含有低于0.5%的乳脂。为防止乳脂和水分再次分离， 形成乳状分离物，混合物会经历一个高能量加压的 均质化过程。在被摆上货架之前， 牛奶还经过了热加工，以减少微生物数量。这一过程经过政府批准的，而生乳爱好者则认为 这会降低乳品的营养成分。奶的变质源于微生物，消耗并分解奶中的营养成分。这一过程中， 乳脂凝结成块，形成很不好看的东西。微生物消耗形成的副产品则是味道和气味恶心的化合物。这里还有一个更大的问题。生乳中可能有携带致命疾病的微生物。为了杀死尽可能多的微生物，同时延长奶的保鲜期，我们采用巴氏灭菌法。其中一种方式是把牛奶在高温下加热30秒。另一种方式， 被称为极端高温处理（UHT），或是超高温灭菌法，是让牛奶在超高温下加热几秒。极端高温处理的牛奶 拥有更长的保质期，不放冰箱可以保存12个月。而普通的巴氏灭菌奶 只能在冰箱保存2周。这是因为超高温处理过程使更多微生物失去活性。但是高温处理可能造成营养成分流失 以及口感改变。最终，这种选择在于消费者对于口味和便利程度的偏好。所幸的是，乳品业每年生产超过8.4亿吨产品， 我们有很多的选择。

**P434 2017-02-01 Would winning the lottery make you happier - Raj Raghunathan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=434)

Will winning the lottery make you happier? Imagine winning a multi-million dollar lottery tomorrow. If you're like many of us, you'd be ecstatic, unable to believe your good luck. But would that joy still be there a few years later? Maybe not. A famous study of 22 lottery winners showed that months after winning, their average reported levels of happiness had increased no more than that of a control group who hadn't won the lottery. Some were actually unhappier than they had been before winning. And later studies have confirmed that our emotional well-being, how often and how intensely we feel things like joy, sorrow, anxiety, or anger, don't seem to improve with wealth or status beyond a certain point. This has to do with a phenomenon known as hedonic adaptation, or the hedonic treadmill. It describes our tendency to adapt to new situations to maintain a stable emotional equilibrium. When it comes to feeling happy, most of us seem to have a base level that stays more or less constant throughout our existence. Of course, the novelty of better food, superior vacations, and more beautiful homes can at first make you feel like you're walking on air, but as you get used to those things, you revert to your default emotional state. That might sound pretty gloomy, but hedonic adaptation makes us less emotionally sensitive to any kind of change, including negative ones. The study with the lottery winners also looked at people who had suffered an accident that left them paralyzed. When asked several months after their accidents how happy they were, they reported levels of happiness approaching their original baseline. So while the hedonic treadmill may inhibit our enjoyment of positive changes, it seems to also enable our resilience in recovering from adversity. There are other reasons that winning the lottery may not make us happier in the long run. It can be difficult to manage large sums of money, and some lottery winners wind up spending or losing it all quickly. It can also be socially isolating. Some winners experience a deluge of unwelcome requests for money, so they wind up cutting themselves off from others. And wealth may actually make us meaner. In one study, participants played a rigged game of monopoly where the experimenters made some players rich quickly. The wealthy players started patronizing the poorer players and hogging the snacks they were meant to share. But just because a huge influx of cash isn't guaranteed to bring joy into your life doesn't mean that money can never make us happier. Findings show that we adapt to extrinsic and material things, like a new car or a bigger house, much faster than we do to novel experiences, like visiting a new place or learning a new skill. So by that reasoning, the more you spend money on experiences rather than things, the happier you'd be. And there's another way to turn your money into happiness: spend it on other people. In one study, participants were given some money and were either asked to spend it on themselves or on someone else. Later that evening, researchers called up these participants and asked them how happy they were. The happiness levels of those who had spent the money on others were significantly greater than that of those who had spent it on themselves. And that seems to be true around the world. Another study examined the generosity of over 200,000 people from 136 countries. In over 90% of these countries, people who donated tended to be happier than those who didn't. But this may all be easier said than done. Let's say a million dollars falls into your lap tomorrow. What do you do with it?

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翻译人员: Molly Qian 校对人员: Qinyang Zeng中大奖会让你更快乐吗？想象一下，明天你中了上百万美元的彩票。你可能会和大多数人一样欣喜若狂，不敢相信自己如此好运。然而， 这份喜悦能延续至数年后吗？很难说。一项针对22名彩票获奖者的著名调研显示，这些人在赢得彩票的 数月后的平均幸福指数，相对于未中奖的对照组，并没有显著提升。有些人甚至没有他们中奖之前快乐。后续研究显示，我们的情感健康，也就是我们体验如下情绪的频率与强度，快乐、悲伤、焦虑、或愤怒，在财富或地位提升到某个特定值之后，不再随它们的增加而增加。这与所谓的“享乐适应”或“快乐水车”现象相关。这个现象是指人们倾向于适应新的环境，维持情绪稳定。在感受快乐的方面，大多数人似乎会有一个基础水平。这个水平在一生中保持相对稳定。当然，更美味的食物、更奢华的假期、以及更华美的住所带给人们的新鲜感会让人飘飘欲仙，但是当你对这些习以为常后，你会回归你的基准情绪水平。这也许听起来令人沮丧，但是享乐适应让人们的情绪不易受影响，对任何变化，也包括负面变化。对彩票中奖者的研究也涉及了那些因事故瘫痪的人们。在事故发生后几个月后， 询问他们的快乐水平，他们反馈，与事故发生前的基准值差不多。所以，尽管“快乐水车”会 妨碍我们享受积极变化，但它似乎也能帮助我们 从负面变化中恢复过来。还有其他原因说明，长期看来，中彩票并不会让人们更快乐。管理一大笔金钱很难，有些中奖者很快 就把钱花掉了或是输掉了。一大笔奖金也可能成为社交障碍。有些中奖者会收到大量汹涌而至的 令人厌恶的借钱请求，最终他们可能直接断绝与其他人的往来。另外，财富的确会让人更加刻薄。在某项研究中，玩家们参与了 一场作弊的大富翁游戏。这场游戏中，研究人员让一些玩家迅速致富。有钱的玩家开始趾高气扬地对待较穷的玩家，并且抢占本应该一起分享的零食。虽然一大笔现金收入不能保证使你的生活幸福，但是花钱确实能让人感到愉悦。研究显示，人们适应外在的物质享受，例如一辆新车或是一个大房子，比适应新奇体验，例如参观新景点或者学习新技能， 要快得多。因此，相比于在物质上花钱，在体验上的花费会让人更快乐。另一种能带给人们幸福感的花钱方式就是：为别人花钱。在某项研究中，参与者们获得了一些钱，被要求将其花在自己或其他人身上。当天晚上，研究者们打电话给这些参与者们，询问他们有多快乐。为别人花钱的参与者的幸福程度远高于那些花钱在自己身上的参与者们。这看起来是放之四海而皆准。另一项研究调查了 136个国家20余万人的慷慨程度。在超过90%的国家里，有捐赠行为的人们 比那些不捐赠的要更快乐。但这可能知易行难。我们来假设下，明天你将获得100万美元。你会拿它做什么呢？

**P435 2017-02-06 How small are we in the scale of the universe - Alex Hofeldt**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=435)

In the winter of 1995, scientists pointed the Hubble Telescope at an area of the sky near the Big Dipper, a spot that was dark and out of the way of light pollution from surrounding stars. The location was apparently empty, and the whole endeavor was risky. What, if anything, was going to show up? Over ten consecutive days, the telescope took close to 150 hours of exposure of that same area. And what came back was nothing short of spectacular: an image of over 1,500 distinct galaxies glimmering in a tiny sliver of the universe. Now, let's take a step back to understand the scale of this image. If you were to take a ballpoint pen and hold it at arm's length in front of the night sky, focusing on its very tip, that is what the Hubble Telescope captured in its first Deep Field image. In other words, those 3,000 galaxies were seen in just a tiny speck of the universe, approximately one two-millionth of the night sky. To put all this in perspective, the average human measures about 1.7 meters. With Earth's diameter at 12,700 kilometers, that's nearly 7.5 million humans lined up head to toe. The Apollo 8 astronauts flew a distance of 380,000 kilometers to the moon. And our relatively small Sun has a diameter of about 1.4 million kilometers, or 110 times the Earth's diameter. A step further, the Milky Way holds somewhere between 100 to 400 billion stars, including our Sun. And each glowing dot of a galaxy captured in the Deep Field image contains billions of stars at the very least. Almost a decade after taking the Deep Field image, scientists adjusted the optics on the Hubble Telescope and took another long exposure over a period of about four months. This time, they observed 10,000 galaxies. Half of these galaxies have since been analyzed more clearly in what's known as the eXtreme Deep Field image, or XDF. By combining over ten years of photographs, the XDF shows galaxies so distant that they're only one ten-billionth the brightness that the human eye can perceive. So, what can we learn about the universe from the Deep Field images? In a study of the universe, space and time are inextricably linked. That's because of the finite speed of light. So the Deep Field images are like time machines to the ancient universe. They reach so far into space and time that we can observe galaxies that existed over 13 billion years ago. This means we're looking at the universe as it was less than a billion years after the Big Bang, and it allows scientists to research galaxies in their infancy. The Deep Field images have also shown that the universe is homogeneous. That is, images taken at different spots in the sky look similar. That's incredible when we think about how vast the universe is. Why would we expect it to be the same across such huge distances? On the scale of a galaxy, let alone the universe, we're smaller than we can readily comprehend, but we do have the capacity to wonder, to question, to explore, to investigate, and to imagine. So the next time you stand gazing up at the night sky, take a moment to think about the enormity of what is beyond your vision, out in the dark spaces between the stars.

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翻译人员: Molly Qian 校对人员: Qinyang Zeng1995年的冬天，科学家们将哈勃望远镜 对准了北斗七星附近的一片天空，那是一片漆黑，远离周围恒星的光污染。这个区域似乎空无一物， 所有的努力都有可能白费。但如果那个区域真的有东西，那会是什么呢？在接下来的十天里，哈勃望远镜对这片区域 进行了150小时的持续曝光。而得到的图像令人惊叹：1500多个各不相同的星系，在这宇宙的一角闪耀着。现在，让我们倒回来， 认识下这张图像的真实大小。假设你站在夜空前，将一支圆珠笔举在一臂远的位置，注视它的最远端，这就是哈勃望远镜拍摄到的 第一张哈勃深空视场。换句话说，这3000个星系只是宇宙里的一点尘埃，大约占全部星空的两百万分之一。更直观地来理解，人类平均身高约1.7米。而地球的直径是12700公里，大约是750万人头脚相连的长度。阿波罗8号宇航员需要 飞行38万公里才能到达月球。而我们的太阳， 作为一颗相对较小的恒星，直径也有140万公里， 也就是地球直径的110倍。更进一步，银河系包含约1000到4000亿颗恒星，其中包括我们的太阳。而哈勃深空里拍到的每一个闪耀的星系都包含着至少十亿颗恒星。在拍摄了哈勃深空的大约十年后，科学家们调整了哈勃望远镜的镜片，又进行了长达4个月的长曝光。这一次，他们观测到了一万个星系。这其中一半的星系自此得到了更清楚的分析，而这张照片就是“哈勃极端深空”，即XDF。结合十多年的图片，XDF展示的星系是如此遥远，它们的亮度只有人眼可感知的百亿分之一。所以，从哈勃深空图像里， 我们对宇宙有哪些新认识？在宇宙学研究中， 空间和时间密不可分。这是因为光速是有限的。所以，哈勃深空图像就像是 通往远古宇宙的时光隧道。这些图片深入空间和时间，让我们观测到130多亿年前的星系。这意味着我们看到的宇宙存在于大爆炸后不到10亿年间，而科学家们则有机会研究星系的幼年期。哈勃深空还体现了宇宙是各向同性的。也就是，夜空中不同区域 拍摄到的图像是类似的。考虑到宇宙是多么得浩瀚无垠，这简直难以置信。莫非跨越如此巨大距离的宇宙是一致的？我们比自己想象的更渺小，仅仅是与星系对比，更遑论宇宙。但是我们有能力去思考，去质疑，去探索，去调查，去想象。所以，当你下次仰望星空时，不如花点时间想象一下， 那些在你视线之外、深埋于繁星之间的漆黑，其实是如此的浩瀚深邃。

**P436 2017-02-13 What happens during a heart attack - Krishna Sudhir**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=436)

Approximately 7 million people around the world die from heart attacks every year, and cardiovascular disease, which causes heart attacks and other problems like strokes, is the world's leading killer. So what causes a heart attack? Like all muscles, the heart needs oxygen, and during a heart attack, it can't get enough. Fatty deposits, or plaques, develop on the walls of our coronary arteries. Those are the vessels that supply oxygenated blood to the heart. These plaques grow as we age, sometimes getting chunky, hardened, or enflamed. Eventually, the plaques can turn into blockages. If one of the plaques ruptures or cracks, a blood clot will form around it in minutes, and a partially closed artery can become completely blocked. Blood flow is cut off to the cardiac muscle and the oxygen-starved cells start to die within several minutes. This is a myocardial infarction, or heart attack. Things can rapidly deteriorate in the absence of treatment. The injured muscle may not be able to pump blood as well, and its rhythm might be thrown off. In the worst case scenario, a heart attack can cause sudden death. And how do you know that someone is having a heart attack? The most common symptom is chest pain caused by the oxygen-deprived heart muscle. Patients describe it as crushing or vice-like. It can radiate to the left arm, jaw, back, or abdomen. But it's not always as sudden and dramatic as it is in the movies. Some people experience nausea or shortness of breath. Symptoms may be less prominent in women and the elderly. For them, weakness and tiredness may be the main signal. And surprisingly, in many people, especially those with diabetes, which affects the nerves that carry pain, a heart attack may be silent. If you think that someone might be having a heart attack, the most important thing is to respond quickly. If you have access to emergency medical services, call them. They're the fastest way to get to a hospital. Taking aspirin, which thins the blood, and nitroglycerin, which opens up the artery, can help keep the heart attack from getting worse. In the emergency room, doctors can diagnose a heart attack. They commonly use an electrocardiogram to measure the heart's electrical activity and a blood test to assess heart muscle damage. The patient is then taken to a high-tech cardiac suite where tests are done to locate the blockages. Cardiologists can reopen the blocked artery by inflating it with a balloon in a procedure called an angioplasty. Frequently, they also insert a metal or polymer stent that will hold the artery open. More extensive blockages might require coronary artery bypass surgery. Using a piece of vein or artery from another part of the body, heart surgeons can reroute blood flow around the blockage. These procedures reestablish circulation to the cardiac muscle, restoring heart function. Heart attack treatment is advancing, but prevention is vital. Genetics and lifestyle factors both affect your risk. And the good news is that you can change your lifestyle. Exercise, a healthy diet, and weight loss all lower the risk of heart attacks, whether you've had one before or not. Doctors recommend exercising a few times a week, doing both aerobic activity and strength training. A heart-healthy diet is low in sugar and saturated fats, which are both linked to heart disease. So what should you eat? Lots of fiber from vegetables, chicken and fish instead of red meat, whole grains and nuts like walnuts and almonds all seem to be beneficial. A good diet and exercise plan can also keep your weight in a healthy range, which will lower your heart attack risk as well. And of course, medications can also help prevent heart attacks. Doctors often prescribe low-dose aspirin, for example, particularly for patients who've already had a heart attack and for those known to be at high risk. And drugs that help manage risk factors, like high blood pressure, cholesterol, and diabetes, will make heart attacks less likely, too. Heart attacks may be common, but they don't have to be inevitable. A healthy diet, avoiding tobacco use, staying fit, and enjoying plenty of sleep and lots of laughter all go a long way in making sure your body's most important muscle keeps on beating.

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翻译人员: Guohui He 校对人员: Yolanda Zhang世界上每年有7百万的人 死于心脏病发作而心血管疾病能够导致心脏病发作和 其他问题，比如中风使其成为了世界第一大杀手是什么导致了心脏病发作呢像所有的肌肉一样， 心脏也需要氧气但在心脏病发作的时候，它就会缺氧脂肪堆积，或者斑块会出现在我们的冠状动脉壁上这些血管能够供应含氧血液到心脏这些斑块会随着我们的年纪增长有时候变大变硬或者发炎最终，斑块会变成堵塞物如果有一个斑块断裂或者破损在其附近便会立即形成一个血块本来部分堵塞的动脉就会完全堵塞到心肌的血液供应就会被切断在随后的几分钟之内， 缺氧的细胞就会开始死亡这就是心肌梗塞或者 心脏病发作在得不到治疗的情况下 病情就会迅速恶化病发的心脏不能再供血心跳可能失去节奏最糟糕的情况是， 心脏病发作可以导致猝死那么怎样才能知道 一个人是否心脏病发作了最常见的症状是胸口痛是心肌缺氧导致的患者将其形容为牢牢的压迫感它可以蔓延到左臂下颚背部活着腹部但心脏病发作并不一定 像电影中那么夸张一些人只是感到恶心或呼吸急促女性和长者的症状或许更不明显他们也许只会感到无力和疲倦出人意料的是，在一些人群中特别是糖尿病患者， 由于疼痛神经受到影响心脏病发作时也许并不易察觉如果你觉得某人心脏病正在发作最重要是迅速应对如果有机会获得紧急医疗服务， 就迅速联系他们。这是就医的最快途径阿司匹林可稀释血液硝酸甘油则能扩张动脉服用这些都可以缓解心脏病发作在急救室，医生可以诊断心脏病通常用心电图来测量心电活动而验血可以测量心肌损伤然后患者会使用先进的心脏医疗设备来定位心血管堵塞的位置心内科医生可以用血管成形术 （使用充气气球扩张）来扩张阻塞的动脉。医生通常还会植入金属或聚合物支架它能使心脏动脉保持扩张严重血管堵塞则需要 进行心脏搭桥手术手术使用其他部位的动脉或静脉来改变血液流通路径这些手术恢复了心肌的循环恢复了心脏功能心脏病治疗在进步但预防是关键基因遗传和生活方式影响都会 影响患病风险好消息是你可以通过 改变生活方式降低风险锻炼，健康饮食，控制体重都可以降低心脏病发作的风险无论你以前是否患过心脏病医生建议一周进行多次锻炼包括有氧活动和力量训练健康饮食包括低糖和 低饱和脂肪这些都与心脏病发作有关那你应该吃些什么呢多吃蔬菜纤维，鸡肉和鱼肉来取代红肉全谷物和坚果，如核桃和杏仁这些都是有益的健康的饮食和锻炼 可以令你保持健康的体重能够降低心脏病发作的风险当然，药物也可以防止心脏病发作比如医生通常会开 低剂量的阿司匹林给已经有过心脏病发作的人或那些高风险群体还有能够减低其他风险因素比如高血压，胆固醇和糖尿病的药物也能降低心脏病的发作几率心脏病发作也许很常见， 但并非不可避免健康饮食不抽烟健身锻炼睡眠充足，开怀大笑都可以让你的心脏， 这块人体最重要的肌肉保持健康

**P437 2017-02-14 Can you solve the three gods riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=437)

Created by logician Raymond Smullyan and popularized by his colleague George Boolos, this riddle has been called the hardest logic puzzle ever. You and your team have crash-landed on an ancient planet. The only way off is to appease its three alien overlords, Tee, Eff, and Arr, by giving them the correct artifacts. Unfortunately, you don't know who is who. From an inscription, you learn that you may ask three yes or no questions, each addressed to any one lord. Tee's answers are always true, Eff's are always false, and Arr's answer is random each time. But there's a problem. You've deciphered the language enough to ask any question, but you don't know which of the two words 'ozo' and 'ulu' means yes and which means no. How can you still figure out which alien is which? Pause here if you want to figure it out for yourself! Answer in: 3 2 1 At first, this puzzle seems not just hard, but downright impossible. What good is asking a question if you can neither understand the answer nor know if it's true? But it can be done. The key is to carefully formulate our questions so that any answer yields useful information. First of all, we can get around to not knowing what 'ozo' and 'ulu' mean by including the words themselves in the questions, and secondly, if we load each question with a hypothetical condition, whether an alien is lying or not won't actually matter. To see how that could work, imagine our question is whether two plus two is four. Instead of posing it directly, we say, "If I asked you whether two plus two is four, would you answer 'ozo'?" If 'ozo' means yes and the overlord is Tee, it truthfully replies, "ozo." But what if we ask Eff? Well, it would answer "ulu," or no to the embedded question, so it lies and replies 'ozo' instead. And if 'ozo' actually means no, then the answer to our embedded question is 'ulu,' and both Tee and Eff still reply 'ozo,' each for their own reasons. If you're confused about why this works, the reason involves logical structure. A double positive and a double negative both result in a positive. Now, we can be sure that asking either Tee or Eff a question put this way will yield 'ozo' if the hypothetical question is true and 'ulu' if it's false regardless of what each word actually means. Unfortunately, this doesn't help us with Arr. But don't worry, we can use our first question to identify one alien lord that definitely isn't Arr. Then we can use the second to find out whether its Tee or Eff. And once we know that, we can ask it to identify one of the others. So let's begin. Ask the alien in the middle, "If I asked you whether the overlord on my left is Arr, would you answer 'ozo'?" If the reply is 'ozo,' there are two possibilities. You could already be talking to Arr, in which case the answer is meaningless. But otherwise, you're talking to either Tee or Eff, and as we know, getting 'ozo' from either one means your hypothetical question was correct, and the left overlord is indeed Arr. Either way, you can be sure the alien on the right is not Arr. Similarly, if the answer is 'ulu,' then you know the alien on the left can't be Arr. Now go to the overlord you've determined isn't Arr and ask, "If I asked 'are you Eff?' would you answer 'ozo'?" Since you don't have to worry about the random possibility, either answer will establish its identity. Now that you know whether its answers are true or false, ask the same alien whether the center overlord is Arr. The process of elimination will identify the remaining one. The satisfied overlords help you repair your ship and you prepare for takeoff. Allowed one final question, you ask Tee if it's a long way to Earth, and he answers "ozo." Too bad you still don't know what that means.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=437)

翻译人员: Mingyu Cui 校对人员: Lipeng Chen由逻辑学家雷蒙德·斯穆里安设计，并通过他的同事乔治·布罗斯为人熟知的这道题目，被称为史上最难的逻辑谜题。你和一行人迫降在了一个远古行星上。离开的唯一方法是把正确的工艺品，给三个外星统治者T，F和R，从而取悦他们。不幸的是，你不知道谁是谁。你从铭文上得知你可以问 每个统治者一个是或否问题，T总说真话，F总说假话，R的答案是随机的。但有一个麻烦。你已经掌握了足够的外星语言，可以问任何问题，但你不知道“哦”和“唔”这两个词，哪个是“是”，哪个是“否”。你怎么才能弄清楚谁是谁呢？在这里暂停来思考答案！答案：3答案：2答案：1最开始，你会觉得这个问题不只是难， 简直就是不可能的。问一个问题，却理解不了答案，也不知道答案的真假，意义何在？但这个问题是有解的。关键在于规范问题的问法，从而让每种可能的回答都包含有效信息。首先，我们把“哦”和“唔”放进问题中，就能绕过不知道“哦”和“唔”的意思的麻烦；其次，如果我们在每个问题前面加上假设条件，那么回答者是否说谎就没关系了。举个例子：比如我们问2+2是不是4。我们不直接问，而是问，“如果我问你2+2是不是4，你的答案是不是‘哦’？”如果“哦”是“是”，而回答者是T，他会诚实地说“哦”。但如果回答者是F呢？他本来要回答“唔”（“否”） ，但是他说谎，还是回答了“哦”。如果“哦”的意思是“否”，那么2+2=4问题的答案就本应是“唔”，而T和F仍然都回答“哦”，两人原因不同。如果你对此有疑惑，是因为这涉及到逻辑结构。正正得正，负负也得正。现在，我们可以保证问T或F这样一个问题如果问题为真，那么他们的回答一定是“哦”，如果问题为假，那么他们的回答一定是“唔”，这样就避开了“哦”和“唔”的意思。但不幸的是，这个方法对R无效。别着急，我们可以用我们的第一个问题判断出一个一定不是R的外星人。然后在用第二个问题判断他是T还是F。知道了这些之后，我们就可以问他来判断另两个外星人。咱们开始吧。问中间的外星人，“如果我问你左边的外星人是不是R， 你会回答‘哦’吗？”如果回答是“哦”，那么有两种情况。你可能就在跟R说话， 这样答案就毫无意义。也有可能，你正在和T或F说话，那么可以知道，如果答案是“哦”意味着我们的假设问题是对的，左边的外星人的确是R。无论是哪种情况， 你都能确定右边的外星人不是R。相似地，如果答案是“唔”，你就能知道左边的外星人一定不是R。第二个问题问向确定不是R的外星人，“如果我问‘你是F吗’，你会回答‘哦’吗？”既然对方的答案不会是随机的，从他的回答一定可以判断他的身份。你现在知道他的答案是真是假，最后一个问题问他中间的外星人是不是R。最后用排除法确定最后一个外星统治者。满意的统治者帮你们修好了飞船，你们将要离开了。你被允许多问一个问题。你问T，“从这到地球远吗？” T说，“哦。”你还是不知道从这到地球远不远。

**P438 2017-02-14 TED-Ed Clubs - Celebrating and amplifying student voices around the w**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=438)

There are over 2 billion school-aged individuals living in the world today. That's more young people than any other time in human history. And it's this generation's creativity, their actions, their art, their poetry, their protests, their questions, their code, their dreams. It's this generation's ideas that will define the future of our world. One well articulated idea can reach and inspire millions. That's why TED's youth and education initiative, TED-Ed, has created a program that's dedicated to sparking and celebrating the best ideas of young people around the world. "The essence of TED-Ed was to create more confident individuals." "It was our club; it was run by us and for us." The program is called TED-Ed Clubs. It supports students in identifying their passions, learning public speaking skills, connecting with a global network of classrooms, and sharing student ideas in the form of short, TED-style talks. Here's how it works. Participating students and teachers gain access to a free and flexible curriculum they can use to start a TED-Ed Club at their school. Each suggested meeting uses TED Talks to help students engage in critical thinking exercises and gain invaluable presentation skills. In the final meeting, students are invited to give their own TED Talk, and if they record their Talk, they can upload it to TED-Ed's award-winning platform, where it can be referenced on a résumé, a college application, and shared with participating clubs around the world. Over 2 billion young people empowered and encouraged to share their ideas. Imagine that future and bring TED-Ed Clubs to your community today.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=438)

翻译人员: Carol Wang 校对人员: Yanyan Hong当今世界上生活着 超过二十亿的学龄人，这比人类历史上 任何时间的年轻人都多。这是当代的创造力、他们的行动、他们的艺术、他们的诗歌、他们的抗议、他们的质疑、他们的准则、和他们的梦想。正是这代人的想法， 奠定了我们世界的未来。一个目标清晰的想法， 足以传播并激励数百万人。这就是为什么 TED-Ed， TED的青年和教育倡议项目，创立了一个计划，该计划致力于激励和赞颂 世界各地年轻人的好想法。“TED-Ed 的本质是 打造更多自信的个体”。“这是我们自己的俱乐部； 由我们来运行并为我们服务”。该计划的名称是 TED-Ed 俱乐部，它支持学生识别他们的激情、学习公共演讲技能、对接全世界的教室网络，并以简单的 TED 式演讲 分享学生们的想法。下面是它的运作方式。参加的学生和老师们 可获得免费而灵活的课程，用以在本校创建 TED-Ed 俱乐部。每个被提议的会议都使用 TED 演讲，去帮助学生进行批判性思維练习，并获得宝贵的演讲技巧。在最后的会议上，学生们 应邀做自己的 TED 演讲，如果他们录制演讲的话，可以上传到 TED-Ed 屡获殊荣的网上平台，可在简历中引用、用于大学申请、并与世界各地参与的俱乐部分享。超过 20 亿年轻人受到鼓舞 去分享他们的想法。想象这样的未來，快把 TED-Ed 俱乐部 带到你的社区吧。

**P439 2017-02-14 The exceptional life of Benjamin Banneker - Rose-Margaret Ekeng-Itua**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=439)

Sometime in the early 1750s, a 22-year-old man named Benjamin Banneker sat industriously carving cogs and gears out of wood. He pieced the parts together to create the complex inner working of a striking clock that would, hopefully, chime every hour. All he had to help him was a pocket watch for inspiration and his own calculations. And yet, his careful engineering worked. Striking clocks had already been around for hundreds of years, but Banneker's may have been the first created in America, and it drew fascinated visitors from across the country. In a show of his brilliance, the clock continued to chime for the rest of Banneker's life. Born in 1731 to freed slaves on a farm in Baltimore, Maryland, from his earliest days, the young Banneker was obsessed with math and science. And his appetite for knowledge only grew as he taught himself astronomy, mathematics, engineering, and the study of the natural world. As an adult, he used astronomy to accurately predict lunar and solar events, like the solar eclipse of 1789, and even applied his mathematical skills to land use planning. These talents caught the eye of a local Baltimore businessman, Andrew Ellicott, who was also the Surveyor General of the United States. Recognizing Banneker's skills in 1791, Ellicott appointed him as an assistant to work on a prestigious new project, planning the layout of the nation's capitol. Meanwhile, Banneker turned his brilliant mind to farming. He used his scientific expertise to pioneer new agricultural methods on his family's tobacco farm. His fascination with the natural world also led to a study on the plague life cycle of locusts. Then in 1792, Banneker began publishing almanacs. These provided detailed annual information on moon and sun cycles, weather forecasts, and planting and tidal time tables. Banneker sent a handwritten copy of his first almanac to Virginia's Secretary of State Thomas Jefferson. This was a decade before Jefferson became president. Banneker included a letter imploring Jefferson to "embrace every opportunity to eradicate that train of absurd and false ideas and opinions" that caused prejudice against black people. Jefferson read the almanac and wrote back in praise of Banneker's work. Banneker's correspondence with the future president is now considered to be one of the first documented examples of a civil rights protest letter in America. For the rest of his life, he fought for this cause, sharing his opposition to slavery through his writing. In 1806 at the age of 75, Banneker died after a lifetime of study and activism. On the day of his funeral, his house mysteriously burned down, and the majority of his life's work, including his striking clock, was destroyed. But still, his legacy lives on.

**P439 2017-02-14 The exceptional life of Benjamin Banneker - Rose-Margaret Ekeng-Itua**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=439)

翻译人员: zhengyu chi 校对人员: Yulin Li十八世纪五十年代初的某一天一个名叫本杰明·班纳克的22岁小伙子坐在桌前认真地雕刻木制齿轮他把零部件拼起来想要制成一个内置复杂的报时钟希望它每小时都能鸣响报时那时，他只能依靠一支给他带来启发的怀表以及自己的计算尽管如此，他精巧的设计依然成功了报时钟早在几百年前就已经存在但是班纳克是第一个在美国制造出报时钟的人时钟吸引着整个国家的人前来观看在班纳克的余生中，时钟持续报时这也是班纳克才华的佐证之一班纳克生为一个自由人，于1731年出生在马里兰州巴尔的摩的一个农场之家早年时期小班纳克就痴迷于数学和科学他的求知欲也越来越强，他自学天文学数学工程学和自然世界的知识成年后，他通过天文知识精确预测月球和太阳活动如1789年的日蚀现象甚至运用数学技巧来规划土地使用这些才华吸引了巴尔的摩当地一位名叫安德鲁•埃利科特的商人的眼球他是时任美国测量总署署长发现了班纳克的才能后，埃利科特于1791年任命班纳克为其助理，负责一个名誉世界的新项目规划美国国会的布局同时，班纳克将天资运用到了农耕上他运用科学知识，率先将新的农耕方法运用在自家的烟草农场上他痴迷于自然世界也因此开始研究蝗虫祸患周期1792年，班纳克开始出版年鉴里面详细记载着每年的日月周期信息天气预报以及种植和潮汐时间表班纳克将其第一本年鉴的抄本送给了弗吉尼亚州州长托马斯·杰斐逊在那之后的十年，杰斐逊成为了美国总统班纳克在附信中恳请杰斐逊“迎接每一个机会去根除充满荒唐和谬误想法的列车“正是它们造成了对黑人的偏见杰斐逊阅读了年鉴并回信肯定了班纳克的努力班纳克与未来总统的通信被视为最早一批有记载的美国民权抗议信之一他的余生都在为此抗争通过写作抗议奴隶制度1806年，享年75岁的班纳克离世结束了一生的学习和民权行动在他出殡的那一天，他的房屋神秘地被烧毁了其毕生的作品大部分也都化为灰烬包括那报时木钟但是，他给人类社会留下的财富会一直延续

**P440 2017-02-15 How blue jeans were invented \_ Moments of Vision 10 - Jessica Oreck**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=440)

In a Moment of Vision... It's the height of the Gold Rush, 1850s California. A young tailor named Jacob Davis notices that his gold-mining customers are wearing through pants faster than they can patch them. In a moment of vision, Davis adds reinforcing metal rivets to his pant design, strategically placing them at points of strain, like the corners of pockets and the base of the fly. The enhanced trousers are soon in high demand. In order to take out a patent on the highly successful riveted pant, Davis needs a business partner. He approaches the supplier of his cloth, a dry goods merchant by the name of Levi Strauss. Strauss and Davis begin manufacturing pants out of denim, and continue to modify the design to accommodate their customers. It is rumored that the removal of the crotch rivet was due to a complaint from the miners that squatting too near a campfire in their typical underwear-free fashion could be painful. Jeans continued to be modified and diversified over the years, eventually becoming an everyday fashion item for both work and play by the 1960s. Today, 96% of American consumers own at least one, if not many, pairs of jeans.

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翻译人员: Riley WANG 校对人员: Shichan Huang灵光一现...在19世纪50年代， 美国加利福尼亚涌现淘金热。一个年轻裁缝雅各布·戴维斯 发现他的客户中淘金者的裤子总是太容易磨损了， 都来不及打补丁。他灵光一现，戴维斯在裤子的设计中加入了金属铆钉，巧妙地将其放置在容易磨损的地方，比如口袋角以及裤档拉链处。这种加强版的裤子马上热销。为了给大获成功的铆钉裤获取专利，戴维斯需要一个商业伙伴。他找到自己的布料供应商，一个名叫李维斯·斯塔斯的纺织品商人。他们二人开始用牛仔制作裤子，并且继续改良设计以适应顾客需求。有传言说，去除裆部的铆钉是因为一位矿工抱怨流行不穿内裤的矿工 蹲在篝火旁太久会感到疼痛。牛仔裤的设计一直在持续改进和多样化，最终在1960年代成为了同时适用于工作和休闲日常时尚单品。现在，96%的美国消费者 至少拥有一条以上牛仔裤。

**P441 2017-02-17 Everything you need to know to read 'Frankenstein' - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=441)

In 1815, the eruption of Mount Tambora plunged parts of the world into darkness and marked a gloomy period that came to be known as The Year Without a Summer. So when Mary and Percy Shelley arrived at the House of Lord Byron on Lake Geneva, their vacation was mostly spent indoors. For amusement, Byron proposed a challenge to his literary companions: Who could write the most chilling ghost story? This sparked an idea in 18-year-old Mary. Over the next few months, she would craft the story of Frankenstein. Popular depictions may evoke a green and groaning figure, but that's not Mary Shelley's monster. In fact, in the book, Frankenstein refers to the nameless monster's maker, Dr. Victor Frankenstein. So tense is the struggle between creator and creature that the two have merged in our collective imagination. Before you read or reread the original text, there are several other things that are helpful to know about Frankenstein and how it came to assume its multiple meanings. The book traces Dr. Frankenstein's futile quest to impart and sustain life. He constructs his monster part by part from dead matter and electrifies it into conscious being. Upon completing the experiment, however, he's horrified at the result and flees. But time and space aren't enough to banish the abandoned monster, and the plot turns on a chilling chase between the two. Shelley subtitled her fireside ghost story, "The Modern Prometheus." That's in reference to the Greek myth of the Titan Prometheus who stole fire from the gods and gave it to humanity. This gave humanity knowledge and power, but for tampering with the status quo, Prometheus was chained to a rock and eaten by vultures for eternity. Prometheus enjoyed a resurgence in the literature of the Romantic Period during the 18th century. Mary was a prominent Romantic, and shared the movement's appreciation for nature, emotion, and the purity of art. Two years after Mary released "Frankenstein", Percy reimagined the plight of Prometheus in his lyrical drama, "Prometheus Unbound." The Romantics used these mythical references to signal the purity of the Ancient World in contrast to modernity. They typically regarded science with suspicion, and "Frankenstein" is one of the first cautionary tales about artificial intelligence. For Shelley, the terror was not supernatural, but born in a lab. In addition, gothic devices infuse the text. The gothic genre is characterized by unease, eerie settings, the grotesque, and the fear of oblivion - all elements that can be seen in "Frankenstein." But this horror had roots in personal trauma, as well. The text is filled with references to Shelley's own circumstances. Born in 1797, Mary was the child of William Godwin and Mary Wollstonecraft. Both were radical intellectual figures, and her mother's book, "A Vindication of the Rights of Women," is a key feminist text. Tragically, she died as a result of complications from Mary's birth. Mary was haunted by her mother's death, and later experienced her own problems with childbirth. She became pregnant following her elopement with Percy at 16, but that baby died shortly after birth. Out of four more pregnancies, only one of their children survived. Some critics have linked this tragedy to the themes explored in "Frankenstein." Shelley depicts birth as both creative and destructive, and the monster becomes a disfigured mirror of the natural cycle of life. The monster, therefore, embodies Dr. Frankenstein's corruption of nature in the quest for glory. This constitutes his fatal flaw, or hamartia. His god complex is most clear in the line, "Life and death appear to me ideal bounds which I should first break through and pour a torrent of light onto our dark world." Although he accomplishes something awe-inspiring, he has played with fire at his own ethical expense. And that decision echoes throughout the novel, which is full of references to fire and imagery that contrasts light and dark. These moments suggest not only the spark of Prometheus's fire, but the power of radical ideas to expose darker areas of life.

**P441 2017-02-17 Everything you need to know to read 'Frankenstein' - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=441)

翻译人员: Yulin Li 校对人员: Yolanda Yao在1815年，坦博拉火山的爆发 让世界上的许多地方都陷入了黑暗，也开始了后来被称作 “无夏之年”的昏暗时期。所以当玛丽·雪莱和她的丈夫 珀西·雪莱来到莱蒙湖湖旁的拜伦家时，他们只能主要在室内度假。为了娱乐大家，拜伦给他的 文人好友们提出了一个挑战：谁能写出最让人背后发凉的鬼故事呢？这个挑战给了18岁的玛丽 一个新主意。在接下来的几个月时间里， 她打造出了科学怪人的故事。大部分人也许会把它想成 一个绿色、发出恶心叫声的身影，但是那可不是玛丽·雪莱心中的怪兽。事实上在书中， “科学怪人”指的是一位无名的怪兽制造者，维克多·弗兰肯斯坦博士。创造者和被创造者之间的挣扎 是如此的紧张以至于两者在我们的想象中 已经合二为一了。在你读或者重温原文之前，还有些其他有助于 你了解《科学怪人》的事情，以及它的多重含义是怎么来的。这本书讲述了弗兰肯斯坦博士一次 关于延长生命和长生不老的失败的探索。他用已死物质的不同部分 来组建他的怪兽，然后再把他通电让他成为 一个有意识的存在。然而就在他快要完成这项任务之前， 他被试验的结果惊吓到然后逃走了。但是时间与空间不足以流放 这被抛弃的怪兽，于是故事情节变成了 他们两者之间的惊悚博弈。雪莱给了她这个篝火边的 鬼故事一个副标题——“当代普罗米修斯”。这引用了希腊神话中 宙斯之子众神之一的普罗米修斯从神界偷偷把火种给人类的故事。这给了人类知识和力量，但是因为改变了当时的现状，普罗米修斯被锁在一块巨石上， 永久的供秃鹫吃他的肉。普罗米修斯在18世纪浪漫时期的文学里经历过了一次“重生”。玛丽显然是一个浪漫主义者，深透了浪漫主义运动中 对自然、感情和艺术之纯粹的欣赏。在玛丽发表《科学怪人》的两年后，珀西将普罗米修斯的悲剧 重现在了他的抒情戏剧《被释放的普罗米修斯》中。浪漫主义艺术者们 引用古代神话表现出较之现代社会，古代世界的纯粹。他们通常带着怀疑的角度 看待科学，《科学怪人》是最先关于人工智能的几个发人深省的故事之一。对雪莱来说， 恐惧并不来自于超自然，而来自于一个实验室。并且，哥特式手法贯穿在整部作品。哥特类型以不安、诡异的场景，怪诞，和对被遗忘的恐惧而著名 ——所有的这些元素， 都有体现在《科学怪人》中。但是这部恐怖小说也有作者个人创伤的痕迹。这本书到处都充满了对雪莱 自己的处境的隐喻。出生于1797年，玛丽是威廉·戈德温 和玛丽·沃斯通克拉夫特的孩子。父母两人都是激进的知识分子，她母亲的书 《为女权辩护》是女权主义的关键书籍。但是遗憾的是， 她死于玛丽出生时引起的并发症。母亲的死一直困惑着玛丽，之后她自己也经历了 生育中的问题。她在16岁和珀西私奔后 就怀了孕，可是她的孩子在出生后不久就夭折了。在接下来的四次怀孕经历中， 只有一个孩子存活了下来。有些评论家把这一悲剧 与《科学怪人》的主题联系了起来。雪莱将新生描绘成创新与毁灭，怪兽也变成了一个自然生命循环中 被摧毁的照映。所以怪兽象征了弗兰肯斯坦博士 在追求荣耀的道路上对自然的摧毁。这就造成了他的致命缺陷。他的过度操控欲 在这个句子里被很清楚地体现，“生与死对我来说 是最理想的应该打破的第一个界限，然后把光的激流倒入我们黑暗的世界中。“虽然他完成了令人敬畏的事情，他同时也在他自己的道德方面冒了险。这样的决定在整本小说中呼应，并用了许多火的影像和光与暗的对比。这样子的时刻不仅仅暗示了 普罗米修斯之火的光辉，也揭示了激进想法 在揭开生活黑暗面的力量。

**P442 2017-02-22 Are ghost ships real - Peter B. Campbell**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=442)

One foggy morning in 1884, the British steamer "Rumney" crashed into the French ship "Frigorifique." Seeing their ship filling with water, the French crew climbed aboard the "Rumney." But as they sailed towards the nearest port, a silent form suddenly emerged from the fog: the abandoned "Frigorifique." It was too late to turn, and the impact was enough to sink the "Rumney." As the sailors scrambled into the lifeboats, the empty "Frigorifique" sailed back into the fog, having seemingly taken its revenge. In reality, the French sailors had left the engines running, and the "Frigorifique" sailed in a circle before striking the "Rumney" and finally sinking. But its story became one of the many tales of ghost ships, unmanned vessels that apparently sail themselves. And although they've influenced works like "Dracula" and "Pirates of the Caribbean," crewless ships aren't the product of ghostly spirits, just physics at work. One of the most famous ghost ships was the "Mary Celeste" found sailing the Atlantic in 1872 with no one aboard, water in its hold, and lifeboats missing. The discovery of its intact cargo and a captain's log that ended abruptly led to wild rumors and speculation. But the real culprits were two scientific phenomena: buoyancy and fluid dynamics. Here's how buoyancy works. An object placed in a liquid displaces a certain volume of fluid. The liquid in turn exerts an upward buoyant force equal to the weight of the fluid that's been displaced. This phenomenon is called Archimedes's Principle. Objects that are less dense than water, such as balsa wood, icebergs, and inflatable rafts always float. That's because the upward buoyant force is always stronger than the downward force of gravity. But for objects or ships to float when they're made of materials, like steel, that are denser than water, they must displace a volume of water larger than their weight. Normally, the water filling a ship's hull would increase its weight and cause it to sink - just what the "Mary Celeste's" crew feared when they abandoned ship. But the sailors didn't account for fluid dynamics. The water stopped flowing at the point of equilibrium, when it reached the same level as the hull. As it turned out, the weight of the water wasn't enough to sink the ship and the "Mary Celeste" was found a few days later while the unfortunate crew never made it to shore. Far stranger is the tale of "A. Ernest Mills," a schooner transporting salt, whose crew watched it sink to the sea floor following a collision. Yet four days later, it was spotted floating on the surface. The key to the mystery lay in the ship's heavy cargo of salt. The added weight of the water in the hull made the vessel sink, but as the salt dissolved in the water, the weight decreased enough that the force of gravity became less than the buoyant force and the ship floated back to the surface. But how do we explain the most enduring aspect of ghost ship legends: multiple sightings of the same ships hundreds of miles and several years apart? The answer lies in ocean currents, which are like invisible rivers flowing through the ocean. Factors, like temperature, salinity, wind, gravity, and the Coriolis effect from the Earth's rotation create a complex system of water movement. That applies both at the ocean's surface and deep below. Sailors have always known about currents, but their patterns weren't well known until recently. In fact, tracking abandoned ships was how scientists determined the shape and speed of the Atlantic Gyre, the Gulf Stream, and related currents in the first place. Beginning in 1883, the U.S. Hydrographic Office began collecting monthly data that included navigation hazards, like derelict ships, whose locations were reported by passing vessels. So abandoned ships may not be moved by ghost crews or supernatural curses, but they are a real and fascinating phenomenon born through the ocean and kept afloat by powerful, invisible, scientifically studied forces.

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翻译人员: Di SUN 校对人员: Yolanda Yao在1884年一个雾蒙蒙的早晨，英国蒸汽船罗姆尼号 撞上了法国费格里齐号。发现船舱进水后，法国船员迅速登上了罗姆尼号。然而当他们驶向最近的港口时，被抛弃的费格里齐号突然从寂静的迷雾中浮现出来。当时船已经来不及掉头，而撞击足以让罗姆尼号沉没。正当水手们匆忙爬上救生船，空船费格里齐号驶回迷雾中，就好像完成了自己的复仇。实际上，法国水手弃船时 没有关掉发动机，因此费格里齐号在撞上罗姆尼号之前 一直在水里做圆周运动，直到沉没。不过这个无人驾驶的船只自己航行的故事成为了众多幽灵船故事中的一个。虽然这些故事给《德拉库拉》和《加勒比海盗》这样的作品提供了素材，但是无人驾驶的船只 与幽灵并没有关系，只不过是物理作用。有一艘非常有名的幽灵船 玛丽·塞勒斯特号，在1872年被人发现行驶在大西洋上， 船上空无一人。船体进水，救生船也不见了。船货保存完好， 船长的航行日志却突兀的结束，引起了人们无限的猜想。而造成这样现象的真正原因是 两个科学现象：浮力和流体力学。浮力的原理如下：一个放在液体里的物体 会排走一定体积的液体，于是被排开的液体 施加了一个向上的浮力，等同于这些被排开液体的重力。这一现象被称为阿基米德原理。密度小于水的物体，比如软木，冰山，充气式小船，可以一直漂浮在水面上。这是因为向上的浮力总是大于向下的重力。但像轮船这些由钢铁等材料 制成的物体，其密度大于水，为了使其漂浮在水面上， 则需要排开比其本身重力更大的水量。一般来说，船体进水， 船体的重力增加，会导致沉没，也就是玛丽·塞勒斯特号船员 在弃船时所担心的。但是船员们没有考虑到流体力学。当涌入的水和外部水面齐平时，就满足了平衡，水也就停止流入了。正如事实那样，船体中水的重力 不足以让船沉没，因此玛丽·塞勒斯特号 在几天之后被人发现，而不幸的船员们却再也没能回到岸上。A·欧内斯特·米尔斯号的故事更加离奇。它是一艘运盐的纵帆船，船员目睹了他们的船被撞后沉入海底。然而四天之后， 船被发现漂浮在水面上。解开这个谜团的要点 在于沉重的货物——盐。船体进水重力上升导致沉没，但随着盐在水中溶解，船体重量的下降足以使得船体的重力小于浮力，因此船又重新回到了水面。但是我们又该如何解释 幽灵船传说经久不衰的话题：同一艘船几年后出现在 相隔几百英里的地方。答案是洋流，它们像是海洋中隐形的河流。各种因素，比如温度、盐度、风、重力，以及地球自传产生的 科里奥利效应共同作用形成 一个复杂的海水流动系统，既影响着海面也影响着海底。水手们都知道洋流，但是直到近些年来 洋流的具体模式才被人知晓。事实上，科学家一开始是 通过追踪被弃的船来研究大西洋环流和墨西哥湾暖流的速度和形状，并且把洋流联系在一起的。1883年， 美国水文局开始每月收集包括航运风险的数据，比如荒废船只的坐标可以由路过的船只上报。因此，被弃船只可不是受幽灵船员或 超自然诅咒控制才航行。它们是真实而又迷人的现象，源自海洋，因强大、隐形和被科学证实过的力量 而漂浮在海洋之上。

**P443 2017-02-23 How to practice effectively...for just about anything - Annie Bosler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=443)

Mastering any physical skill, be it performing a pirouette, playing an instrument, or throwing a baseball, takes practice. Practice is the repetition of an action with the goal of improvement, and it helps us perform with more ease, speed, and confidence. So what does practice do in our brains to make us better at things? Our brains have two kinds of neural tissue: grey matter and white matter. The grey matter processes information in the brain, directing signals and sensory stimuli to nerve cells, while white matter is mostly made up of fatty tissue and nerve fibers. In order for our bodies to move, information needs to travel from the brain's grey matter, down the spinal cord, through a chain of nerve fibers called axons to our muscles. So how does practice or repetition affect the inner workings of our brains? The axons that exist in the white matter are wrapped with a fatty substance called myelin. And it's this myelin covering, or sheath, that seems to change with practice. Myelin is similar to insulation on electrical cables. It prevents energy loss from electrical signals that the brain uses, moving them more efficiently along neural pathways. Some recent studies in mice suggest that the repetition of a physical motion increases the layers of myelin sheath that insulates the axons. And the more layers, the greater the insulation around the axon chains, forming a sort of superhighway for information connecting your brain to your muscles. So while many athletes and performers attribute their successes to muscle memory, muscles themselves don't really have memory. Rather, it may be the myelination of neural pathways that gives these athletes and performers their edge with faster and more efficient neural pathways. There are many theories that attempt to quantify the number of hours, days, and even years of practice that it takes to master a skill. While we don't yet have a magic number, we do know that mastery isn't simply about the amount of hours of practice. It's also the quality and effectiveness of that practice. Effective practice is consistent, intensely focused, and targets content or weaknesses that lie at the edge of one's current abilities. So if effective practice is the key, how can we get the most out of our practice time? Try these tips. Focus on the task at hand. Minimize potential distractions by turning off the computer or TV and putting your cell phone on airplane mode. In one study, researchers observed 260 students studying. On average, those students were able to stay on task for only six minutes at a time. Laptops, smartphones, and particularly Facebook were the root of most distractions. Start out slowly or in slow-motion. Coordination is built with repetitions, whether correct or incorrect. If you gradually increase the speed of the quality repetitons, you have a better chance of doing them correctly. Next, frequent repetitions with allotted breaks are common practice habits of elite performers. Studies have shown that many top athletes, musicians, and dancers spend 50-60 hours per week on activities related to their craft. Many divide their time used for effective practice into multiple daily practice sessions of limited duration. And finally, practice in your brain in vivid detail. It's a bit surprising, but a number of studies suggest that once a physical motion has been established, it can be reinforced just by imagining it. In one study, 144 basketball players were divided into two groups. Group A physically practiced one-handed free throws while Group B only mentally practiced them. When they were tested at the end of the two week experiment, the intermediate and experienced players in both groups had improved by nearly the same amount. As scientists get closer to unraveling the secrets of our brains, our understanding of effective practice will only improve. In the meantime, effective practice is the best way we have of pushing our individual limits, achieving new heights, and maximizing our potential.

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翻译人员: Yusi Chen 校对人员: Jenny Hsu掌握任何关于身体的技巧，比如用脚尖旋转、演奏一门乐器、或者投掷棒球，都需要练习。练习就是为了达成目标 而不断的重复，它能让我们表现的更从容、敏捷， 并且有自信。那练习究竟是怎样作用于我们的大脑 让我们做的更好的呢？我们的大脑有两种神经组织：灰质，和白质。灰质在大脑中处理信息，引导信号和感官刺激到达神经元，而白质主要是由脂肪组织 和神经纤维组成。为了能使我们的身体进行活动，信息会从大脑中的灰质，沿着脊髓，穿过轴突，也就是一系列的神经纤维，最后到达肌肉组织。那么重复的练习能对我们的大脑 造成怎样的影响呢？轴突存在于大脑的白质中，被一种叫做髓磷脂的脂质物质 所包裹着，而髓磷脂的包裹程度会随着 我们进行练习 而变化。髓磷脂就像是电缆外包裹的绝缘体，它阻止了在大脑使用过程中 电子信号能量的流失，使他们能够在神经系统中 更有效的传输。近期有对小白鼠的研究显示， 重复的进行某项身体活动，能够使髓磷脂保护套的层数变多， 将轴索都分隔开。层数越多，轴索外的绝缘性能也就越强。这样就形成了连接你大脑和肌肉的一系列“高速公路。”所以，尽管许多运动员和表演者把它们的成功归结于肌肉记忆，但是肌肉本身其实是没有记忆的。是神经通路的髓鞘化，让这些运动员和表演者能够使得他们是神经通路运转得 更快，更有效。有很多的理论试图将掌握一门技术的时间定量，定量到几小时、几天，甚至几年。但我们还没有得到一个确切的数字，我们知道，对一项技巧的掌握 不仅仅取决于练习的时长，它还取决于练习的质量和效率。有效的练习是连续的，高度集中注意力的，并且关注个人现阶段所达到的程度，以及还存在的不足。如果有效的练习是成功的关键，那如何才能最大化得利用 我们的练习时间？试试这些方法吧。专注于手头的工作。将周围存在干扰的可能性最小化，比如， 关掉电视或电脑，把手机调成飞行模式。在一项研究中， 观察员观察了260学生的学习状况。总的来说，学生一次只能在学习上集中 6分钟的注意力。电脑，手机，特别是脸书推送,都会对他们形成干扰。在开始练习的时候把动作放慢，协调性是在不断的重复中养成的， 不论是错的还是对的。如果你逐渐增加有效练习的速度，你会更有可能做出正确的动作。其次，优秀的表演者往往会懂得合理的分配休息的时间。研究表明，许多顶级的运动员、音乐家和舞者，通常会在自己的领域 在每周花50到60小时来进行练习。他们大多数会把练习的总量分配成几个部分，定时定量进行训练。最后一点， 在大脑中回想训练的细节。听起来会有点不可思议，但是许多研究表明， 一旦建立了一套物理运动，通过想象就可以加强巩固。一项研究中，有144名篮球运动员 被分成了两队。A组的训练内容是去实地练习 单手发球，而B组只是通过大脑 不断重放这个过程。在两周的实验结束后，测试结果表明， 两组中处于中高水平的运动员得到了几乎相同水平的提高。随着科学家对大脑研究的不断深入，我们对进行有效练习的理解 也就越来越高。对于高效练习的了解，是我们挑战自身极限、到达新的高度、以及激发我们潜能的最好方法。

**P444 2017-02-23 What happened to trial by jury - Suja A. Thomas**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=444)

Dating back at least to the time of Socrates, some early societies decided that certain disputes, such as whether a person committed a particular crime, should be heard by a group of citizens. Several centuries later, trial by jury was introduced to England, where it became a fundamental feature of the legal system, checking the government and involving citizens in decision-making. Juries decided whether defendants would be tried on crimes, determined whether the accused defendants were guilty, and resolved monetary disputes. While the American colonies eventually cast off England's rule, its legal tradition of the jury persisted. The United States Constitution instructed a grand jury to decide whether criminal cases proceeded, required a jury to try all crimes, except impeachment, and provided for juries in civil cases as well. Yet, in the US today, grand juries often are not convened, and juries decide less than 4% of criminal cases and less than 1% of civil cases filed in court. That's at the same time as jury systems in other countries are growing. So what happened in the U.S.? Part of the story lies in how the Supreme Court has interpreted the Constitution. It's permitted plea bargaining, which now occurs in almost every criminal case. The way it works is the prosecutor presents the accused with a decision of whether to plead guilty. If they accept the plea, the case won't go in front of a jury, but they'll receive a shorter prison sentence than they'd get if a jury did convict them. The risk of a much greater prison sentence after a trial can frighten even an innocent defendant into taking a plea. Between the 19th century and the 21st century, the proportion of guilty pleas has increased from around 20% to 90%, and the numbers continue to grow. The Supreme Court has permitted the use of another procedure that interferes with the jury called summary judgement. Using summary judgement, judges can decide that civil trials are unnecessary if the people who sue have insufficient evidence. This is intended only for cases where no reasonable jury would disagree. That's a difficult thing to determine, yet usage of summary judgement has stretched to the point where some would argue it's being abused. For instance, judges grant fully, or in part, over 70% of employers' requests to dismiss employment discrimination cases. In other cases, both the person who sues and the person who defends forgo their right to go to court, instead resolving their dispute through a professional arbitrator. These are generally lawyers, professors, or former judges. Arbitration can be a smart decision by both parties to avoid the requirements of a trial in court, but it's often agreed to unwittingly when people sign contracts like employment applications and consumer agreements. That can become a problem. For example, some arbitrators may be biased towards the companies that give them cases. These are just some of the ways in which juries have disappeared. But could the disappearance of juries be a good thing? Well, juries aren't perfect. They're costly, time-consuming, and may make errors. And they're not always necessary, like when people can simply agree to settle their disputes. But juries have their advantages. When properly selected, jurors are more representative of the general population and don't have the same incentives as prosecutors, legislators, or judges seeking reelection or promotion. The founders of the United States trusted in the wisdom of impartial groups of citizens to check the power of all three branches of government. And the jury trial itself has given ordinary citizens a central role in upholding the social fabric. So will the jury system in the U.S. survive into the future?

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翻译人员: Xu Huang 校对人员: Jiawei Ni时间至少回溯到苏格拉底时期，一些早期社会在解决纠纷，比如裁决某人是否犯罪的时候，采用听证制度。几世纪之后， 陪审团制度被介绍至英国，并且成为英国法律系统的一个基本特征，以此来监督政府， 并让公民参与决定。陪审员决定被告是否违法，裁决刑事被告是否有罪，还有解决经济争端。美洲殖民地最终放弃了英式规则，和它的陪审制度。美国宪法规定了大陪审团制度，并由他们决定是否进行刑事起诉，由陪审团来裁决除弹劾以外的刑事案件，同时也为民事法庭配置陪审团。然而，现今的美国法庭经常并不召集大陪审团，而且他们仅仅裁决不到4%的刑事案件，和不到1%的民事案件。与此同时别国的陪审团制度却在发展。那么，美国这里发生了什么？这一定程度上在于最高法院如何解释宪法。它允许辩诉交易，这是如今几乎每案都有的。它是由公诉人向被告提出是否决定进行有罪辩护如果被告同意，则不会 在陪审团面前进行审理，同时他们以此获得较短的刑期，这要比由当庭陪审团决定的刑期短得多。上庭后的更长服刑的风险甚至可以迫使一个无辜的人接受有罪辩护。19至21世纪中，有罪辩护的比例已经从20%左右增加到90%，并且持续增加着。最高法院已经允许了另一种程序来干预陪审制度，它就是即审判决。法官以即审判决用来决定一些案件是否必要，如果原告证据不足，则不会开庭。这仅仅是为多数法官无异议的案件准备的。虽然很难证明，但这种即审判决也已经到了某种被滥用的程度。比如，法官全然或部分地驳回70%的雇主要求撤销其被诉雇佣歧视的案件。另外一些案件中，起诉者和被起诉者放弃对簿公堂，而选择通过仲裁人员来解决争端。仲裁者通常是律师、专家或前任法官。仲裁有可能对双方都是聪明的选择，因为它避免了庭审。但是，这样也常导致了 有人不情愿地签署协议，比如雇佣申请和消费者协议。这就可能是一个问题。举例说，有些仲裁者可能偏袒给他们仲裁机会的公司。这些只是几种不需要陪审团的情况。然而，陪审制度的消亡会是一件好事吗？这样讲吧，这个制度本身也不完美。它花费高、耗时、失误众多。并且不总是有必要，就像双方本来就有机会和解的情况。可是，陪审团也有自己的优势。选择得当的时候，陪审员们代表大众，他们并没有检方、立法委员或者法官那种寻求连任或升职的动因。美国的建立者们信赖于以公民的公正智慧，来检阅三权分立的政府职能。并且陪审制度使得普通公民成为维系社会关系的主角。那么美国的陪审制度会在将来继续存在吗？

**P445 2017-02-24 Does 'The Wonderful Wizard of Oz' have a hidden message - David B. Pa**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=445)

In the summer of 1963, a high school teacher changed the way the world looked at "The Wizard of Oz." His name was Henry Littlefield, and he was teaching an American history class. He'd made it to the late 19th century, a time called The Gilded Age, but he was struggling to keep his class interested in the complex social and economic issues of the time. Then one night, while he was reading "The Wonderful Wizard of Oz" to his daughters, he had an idea. In the 1890s, farmers wanted to add silver to the gold standard to put more money in circulation and make it easier for farmers to borrow. In the book, Dorothy walked to the Emerald City on the Yellow Brick Road in her silver shoes. The movie's ruby red slippers started out as silver. Silver and gold on the road to prosperity. L. Frank Baum had published the book in 1900 at the height of The Gilded Age, and the analogy didn't seem out of the question. No one else had seen these connections, but that didn't deter Littlefield. He taught his class about The Gilded Age using the book, and soon he and his students were finding more connections. For instance, in the late 1890s, the U.S. had recently recovered from the Civil War and integrated vast new territories, bringing an era of prosperity for some. But while industry and finance in the North and East prospered, farmers across the South and Midwest struggled. This led to the Populist movement, uniting farmers and workers against urban elites. By 1896, the movement had grown into the People's Party, and its support of Democrat Williams Jennings Bryan put him in reach of the presidency. Meanwhile in Oz, claimed Littlefield, Dorothy is a typical American girl whose hard life in Kansas is literally turned upside down by powerful forces outside her control. The munchkins are the common people oppressed by the Witch of the East, banks and monopolies. The Scarecrow is the farmer, considered naive but actually quite resourceful, the Tin Woodman is the industrial worker dehumanized by factory labor, and the Cowardly Lion is William Jennings Bryan who could be an influential figure if only he were brave enough to adopt the Populist's radical program. Together, they travel along a golden yellow road towards a grand city whose ruler's power turns out to be built on illusions. Littlefield published some of these observations in an essay. His claim that this fantasy was actually a subversive critique of American capitalism appealed to many people in 1960s. Other scholars took up the theme, and the proposed analogies and connections multiplied. They suggested that Dorothy's dog Toto represented the teetotalers of the prohibition party. Oz was clearly the abbreviation for ounces, an important unit in the silver debate. The list goes on. By the 1980s, this understanding of the book was accepted so widely that several American history textbooks mentioned it in discussions of late 19th century politics. But is the theory right? L. Frank Baum's introduction claims the book is just an innocent children's story. Could he have been deliberately throwing people off the trail? And is it fair to second guess him so many decades later? There's no definitive answer, which is part of why authorial intent is a complex, tangled, fun question to unravel. And some recent scholars have interpreted "The Wonderful Wizard of Oz" in the opposite way as Littlefield. They claim it's a celebration of the new urban consumer culture. Historian William Leach argued that the dazzling Emerald City of Oz was meant to acclimate people to the shiny, new America. In the end, all we know for sure is that Baum, inspired by European folk legends, had set out to create one for American children. And whether or not he intended any hidden meanings, its continuing relevance suggests he succeeded in creating a fairytale America can call its own.

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翻译人员: Guohui He 校对人员: Yolanda Zhang1963年的夏天，一名高中老师改变了 人们对《绿野仙踪》的看法。他叫亨利·利特菲尔德，是一名历史老师。他顺利地教到了 被称为镀金时代的19世纪，但是往后，他很难再 提起学生们的兴趣了，因为这段时间的 社会经济问题非常复杂。有一天晚上，他正在给他的女儿们读《绿野仙踪》，他突然想到了一个好主意。19世纪90年代，农民们希望 在金子里掺入银，以此增加能够流通的钱，这样就能更容易地借到物资。书中写到桃乐茜沿着 黄砖路走到了翡翠城，脚上穿着一双银鞋子。电影里的红宝石鞋子， 一开始其实是银的——通往繁荣富裕路上的金和银。作者L. Frank Baum在 1900年出版了这本书，正值镀金时代的辉煌时期，而这个比喻似乎并没有什么问题。没有任何人发现这其中的联系，不过这并没有阻止利特菲尔德。他用这本书来给学生讲镀金时代，很快，他的学生们 渐渐找到了更多的联系。例如，在19世纪90年代末，美国终于从南北战争的 创伤中恢复过来，并且将广阔的领土集合成了一个整体，给一些人带来了繁荣时代。不过，当工业和金融业 在北部和东部繁荣发展的同时，广大的南部和中西地区的农民 却过着艰难的生活。这于是引起了民粹主义运动，农民和工人联合起来反对城市精英。到了1896年，这项运动 已经发展成了“人民党”，并且它对民主党 Williams Jennings Bryan的支持让他坐上了总统的宝座。利特菲尔德说， 同时在《绿野仙踪》里面，女主桃乐茜是一个典型的美国女孩，她在堪萨斯穷困潦倒的生活完全被超出她所能控制的外界力量 所彻底改变了。小矮人们是被 “东方女巫“压迫的普通人，“东方女巫”就是银行和垄断资本。稻草人是农民，虽然看起来很天真，但其实足智多谋，铁皮人是被工厂劳动 麻木了人性的工人，而胆小的狮子，就是 总统William Jennings Bryan，如果他足够勇敢， 采用民粹主义的激进计划，那他就会成为 一个很有影响力的人物。他们一起沿着金黄色的路 朝着伟大的城市而去，然而城市统治者的权力 事实上只构建于幻想之上。利特菲尔德发布了论文， 讲述了他的一部分发现。他认为这部幻想小说其实是 一部对美国20世纪60年代吸引了很多人的 资本主义的颠覆性批判。其他学者接受了这个理论，而这种类比和联系更是被延伸了。他们说女主桃乐茜的宠物狗TOTO隐喻美国禁酒党的禁酒主义者。书名的“Oz”明显是“盎司”的缩写，银金属交易的重要单位。这样的隐喻还有更多。到了20世纪80年代， 这样的解读被广泛接受，以至于一些美国历史教科书也引用其来讨论20世纪后期的政治问题。但这些理论真的正确吗？作者的序言中 说了这本书只是童话故事。他真的一直在 给大家留下线索吗?而在几十年后才对他的意图 进行猜测真的合适吗？这些仍没有确定的答案，因为阐述作者写作意图是个复杂有趣的过程。最近，有学者对《绿野仙踪》的解读出现了另一个相反的版本。他们说这是向 新的城市消费文化致敬。历史学家William Leach说， 书中令人眼花缭乱的翡翠城是想使人们适应这个 闪耀的新美国。最后，我们可以确定的是作者Baum受到欧洲民间传说的启发，为美国儿童创作了一个好童话。先不说他是否有意暗喻现实，这些层出不穷的解读 显示了作者成功地写出了一本属于美国自己的本土童话。

**P446 2017-03-01 How the popsicle was invented \_ Moments of Vision 11 - Jessica Oreck**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=446)

In a Moment of Vision... It's 1905, Northern California. Frank Epperson is eleven years old. He's sitting on his front porch making a sort of DIY drink that's very popular at this time. He has just poured a sugary soda powder into a glass of water and is mixing enthusiastically with a wooden stir stick. We don't know exactly how the next 24 hours play out, but we can imagine that something catches Frank's attention and he abandons his drink mid-stir. After a cold Bay Area night, Frank rediscovers his mix drink the next morning. It's frozen solid. But instead of throwing it out, Frank pulls the icy block of soda out of the glass by the embedded stir stick and, in a moment of vision, licks it. Delighted by his invention, Frank begins making the frozen treat for friends, and as he grows older, begins selling them as Eppsicles, a contraction of his last name and the word icicle. It is rumored that later, Frank's own kids dubbed the icy delicacy Pop's 'cicle. Others claim the name is a combination of lollipop and icicle. Regardless where the name comes from, the popsicle is here to stay. Approximately 2 billion popsicles are sold each year.

**P446 2017-03-01 How the popsicle was invented \_ Moments of Vision 11 - Jessica Oreck**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=446)

翻译人员: Riley WANG 校对人员: Lipeng Chen灵光一现…1905年，加利福尼亚州北部。一个11岁的孩子，Frank Epperson坐在走廊，正在自己制作饮料，这种饮料在当时非常流行。他把含糖的小苏打粉末融到一杯水里，并用一根小木棍使劲搅拌。我们不确定之后的24小时 Frank去哪儿玩了，但是我们能想象到 某件事转移了他的注意力，使得他把这饮料扔在了一边。一个凉爽的夜晚之后，Frank又想起了 只搅拌到一半的饮料。它已经被冻成固体。但Frank并没有扔掉它，而是把它连着搅拌棒拿了出来，就在此时，他舔了一下这个冰柱。他为自己的发明而感到惊喜，并且开始拿这种冰柱款待朋友们。长大之后，Frank开始售卖这种冰柱，他将其称为Eppsicles， 这是他姓氏和棒冰“icicle”的结合。之后有传言道，是Frank的孩子称这种冰为“Pop's 'cicle”.其他人则认为这个名字是 棒棒糖“ lollipop”和冰柱“ icicle”的结合。不管名字的来历如何， 这就是我们所吃的冰棒。而每年大约有20亿支冰棒被卖出。

**P447 2017-03-08 Where do superstitions come from - Stuart Vyse**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=447)

Are you afraid of black cats? Would you open an umbrella indoors? And how do you feel about the number thirteen? Whether or not you believe in them, you're probably familiar with a few of these superstitions. So how did it happen that people all over the world knock on wood, or avoid stepping on sidewalk cracks? Well, although they have no basis in science, many of these weirdly specific beliefs and practices do have equally weird and specific origins. Because they involve supernatural causes, it's no surprise that many superstitions are based in religion. For example. the number thirteen was associated with the biblical Last Supper, where Jesus Christ dined with his twelve disciples just before being arrested and crucified. The resulting idea that having thirteen people at a table was bad luck eventually expanded into thirteen being an unlucky number in general. Now, this fear of the number thirteen, called triskaidekaphobia, is so common that many buildings around the world skip the thirteenth floor, with the numbers going straight from twelve to fourteen. Of course, many people consider the story of the Last Supper to be true but other superstitions come from religious traditions that few people believe in or even remember. Knocking on wood is thought to come from the folklore of the ancient Indo-Europeans or possibly people who predated them who believed that trees were home to various spirits. Touching a tree would invoke the protection or blessing of the spirit within. And somehow, this tradition survived long after belief in these spirits had faded away. Many superstitions common today in countries from Russia to Ireland are thought to be remnants of the pagan religions that Christianity replaced. But not all superstitions are religious. Some are just based on unfortunate coincidences and associations. For example, many Italians fear the number 17 because the Roman numeral XVII can be rearranged to form the word vixi, meaning my life had ended. Similarly, the word for the number four sounds almost identical to the word for death in Cantonese, as well as languages like Japanese and Korean that have borrowed Chinese numerals. And since the number one also sounds like the word for must, the number fourteen sounds like the phrase must die. That's a lot of numbers for elevators and international hotels to avoid. And believe it or not, some superstitions actually make sense, or at least they did until we forgot their original purpose. For example, theater scenery used to consist of large painted backdrops, raised and lowered by stagehands who would whistle to signal each other. Absentminded whistles from other people could cause an accident. But the taboo against whistling backstage still exists today, long after the stagehands started using radio headsets. Along the same lines, lighting three cigarettes from the same match really could cause bad luck if you were a soldier in a foxhole where keeping a match lit too long could draw attention from an enemy sniper. Most smokers no longer have to worry about snipers, but the superstition lives on. So why do people cling to these bits of forgotten religions, coincidences, and outdated advice? Aren't they being totally irrational? Well, yes, but for many people, superstitions are based more on cultural habit than conscious belief. After all, no one is born knowing to avoid walking under ladders or whistling indoors, but if you grow up being told by your family to avoid these things, chances are they'll make you uncomfortable, even after you logically understand that nothing bad will happen. And since doing something like knocking on wood doesn't require much effort, following the superstition is often easier than consciously resisting it. Besides, superstitions often do seem to work. Maybe you remember hitting a home run while wearing your lucky socks. This is just our psychological bias at work. You're far less likely to remember all the times you struck out while wearing the same socks. But believing that they work could actually make you play better by giving you the illusion of having greater control over events. So in situations where that confidence can make a difference, like sports, those crazy superstitions might not be so crazy after all.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=447)

翻译人员: Hong Zhang 校对人员: Di SUN你害怕黑猫吗？你会在室内打伞吗？你忌讳数字13吗？无论你相信与否，估计这些迷信对你来说并不陌生。那么为什么世界各地的人都会敲木头，或者避免踩在人行道的砖缝？尽管在科学上缺乏依据，这些令人匪夷所思的迷信和做法确实有着奇怪而特别的起源。由于涉及一些超自然因素，许多迷信的起源与宗教有关。比如说，数字13就与 圣经里最后的晚餐有关，耶稣基督和十二个门徒吃饭，随后耶稣被抓 并被钉在十字架上。因此人们认为 一桌13个人会带来厄运。后来13慢慢变成一个 不吉利的数字。现在被称为十三恐惧症的现象变得非常普遍，以至于世界各地 很多建筑都跳过第13层，直接从12跳到14。当然，很多人相信最后的晚餐 是真实存在的。但是其他来源于宗教的迷信，就没有那么多人知道或者相信。敲击木头被认为 源于古代印欧的民间故事，或是可能源于更早之前的人们，他们相信树木是各种神灵的家。抚摸树木可以得到保护或者受到神灵的保佑。而且，尽管人们不再相信这些神灵， 这个传统却保留了下来。现在从俄国到爱尔兰许多国家的迷信都被认为是基督教之前的 异教徒留下的。但不是所有的迷信都与宗教有关。有些来源于不幸的巧合和联想。比如，很多意大利人 害怕17这个数字。因为罗马数字十七 可以重组为vixi，意思是我的生命到头了。同样，数字4的发音在粤语中， 听起来和死是一样的。这在日语和韩语里也一样它们借用了中国数字。由于数字1听起来像要，数字14听起来像要死。于是电梯和国际酒店 都避免使用这些数字。无论你信不信，有些迷信其实是有道理的，至少是在我们了解 它们渊源的前提下。比如说，过去舞台的背景板 由大块的布景组成。舞台助理需要通过吹口哨 来示意拉上或是放下布景。其他人随意吹口哨 可能引起意外。但是后台不允许吹口哨的禁忌 现在仍然存在，尽管人们很久以前 就已经开始用耳机沟通。同样的，一根火柴点三根烟确实会带来厄运， 如果你是一名藏在掩体的士兵。一根火柴燃烧太久 会引起敌军狙击手的注意。大多数烟民无需再担心狙击手，但是这一迷信依然存在。那么为什么人们 依然相信这些被遗忘的信仰，巧合，以及过时的忠告？他们是完全不理性吗？没错，但是对于有些人，迷信更多的源于传统习俗 而非有意识的信仰。毕竟没有人一出生就知道 要避免在梯子下面走，或是在室内打口哨，但是如果家人告诉你要避免这些，这些迷信就有可能会令你不安，哪怕过后你理性地明白 没有坏事会发生。而且，像敲一下木头这样很简单，遵从迷信的做法 比有意识地抗拒它更容易。况且迷信常常似乎有效。你可能记得穿着你的幸运袜子 打了一个全垒打。这其实只是我们的心理作用。你很可能不记得 有多少次你出局的时候也穿着同样的袜子。但是相信它们有用 确实会让你打得更好，让你感觉对比赛有更大把握。所以像在体育运动中， 信心可以起到关键性的作用，那些看似荒唐的迷信 便不显得那么荒唐了。

**P448 2017-03-09 The myth of Icarus and Daedalus - Amy Adkins**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=448)

In mythological ancient Greece, soaring above Crete on wings made from wax and feathers, Icarus, the son of Daedalus, defied the laws of both man and nature. Ignoring the warnings of his father, he rose higher and higher. To witnesses on the ground, he looked like a god, and as he peered down from above, he felt like one, too. But, in mythological ancient Greece, the line that separated god from man was absolute and the punishment for mortals who attempted to cross it was severe. Such was the case for Icarus and Daedalus. Years before Icarus was born, his father Daedalus was highly regarded as a genius inventor, craftsman, and sculptor in his homeland of Athens. He invented carpentry and all the tools used for it. He designed the first bathhouse and the first dance floor. He made sculptures so lifelike that Hercules mistook them for actual men. Though skilled and celebrated, Daedalus was egotistical and jealous. Worried that his nephew was a more skillful craftsman, Daedalus murdered him. As punishment, Daedalus was banished from Athens and made his way to Crete. Preceded by his storied reputation, Daedalus was welcomed with open arms by Crete's King Minos. There, acting as the palace technical advisor, Daedalus continued to push the boundaries. For the king's children, he made mechanically animated toys that seemed alive. He invented the ship's sail and mast, which gave humans control over the wind. With every creation, Daedalus challenged human limitations that had so far kept mortals separate from gods, until finally, he broke right through. King Minos's wife, Pasiphaë, had been cursed by the god Poseidon to fall in love with the king's prized bull. Under this spell, she asked Daedalus to help her seduce it. With characteristic audacity, he agreed. Daedalus constructed a hollow wooden cow so realistic that it fooled the bull. With Pasiphaë hiding inside Daedalus's creation, she conceived and gave birth to the half-human half-bull minotaur. This, of course, enraged the king who blamed Daedalus for enabling such a horrible perversion of natural law. As punishment, Daedalus was forced to construct an inescapable labyrinth beneath the palace for the minotaur. When it was finished, Minos then imprisoned Daedalus and his only son Icarus within the top of the tallest tower on the island where they were to remain for the rest of their lives. But Daedalus was still a genius inventor. While observing the birds that circled his prison, the means for escape became clear. He and Icarus would fly away from their prison as only birds or gods could do. Using feathers from the flocks that perched on the tower, and the wax from candles, Daedalus constructed two pairs of giant wings. As he strapped the wings to his son Icarus, he gave a warning: flying too near the ocean would dampen the wings and make them too heavy to use. Flying too near the sun, the heat would melt the wax and the wings would disintegrate. In either case, they surely would die. Therefore, the key to their escape would be in keeping to the middle. With the instructions clear, both men leapt from the tower. They were the first mortals ever to fly. While Daedalus stayed carefully to the midway course, Icarus was overwhelmed with the ecstasy of flight and overcome with the feeling of divine power that came with it. Daedalus could only watch in horror as Icarus ascended higher and higher, powerless to change his son's dire fate. When the heat from the sun melted the wax on his wings, Icarus fell from the sky. Just as Daedalus had many times ignored the consequences of defying the natural laws of mortal men in the service of his ego, Icarus was also carried away by his own hubris. In the end, both men paid for their departure from the path of moderation dearly, Icarus with his life and Daedalus with his regret.

**P448 2017-03-09 The myth of Icarus and Daedalus - Amy Adkins**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=448)

翻译人员: Heran Zhao 校对人员: Lipeng Chen在古希腊神话中,代达罗斯之子伊卡洛斯，用蜡与羽毛做的翅膀飞越克里特岛,藐视了人类与自然法则。他无视父亲的警告，飞向高空，在看到他的人的眼中，他像神一样，他向下俯视的时候，也觉得自己如神一般。但是，在古希腊神话中,人与神之间界线分明，试图越界的凡人会受到严厉的惩罚。伊卡洛斯和代达罗斯就是一个例子。在伊卡洛斯出生前多年，他的父亲代达罗斯在他的家乡雅典，被尊为天才创造家，工匠，和雕刻家。他发明了木工手艺和其需要的工具。他设计了世界上第一个浴室，和第一个舞池。他雕刻的雕塑让人栩栩如生，让大力神误以为那是个真人。尽管代达罗斯技术高明且声誉卓著，但是他却是一个自我主义又善妒的人。代达罗斯担心他的外甥比他更出色，于是代达罗斯杀害了他。作为惩罚，代达罗斯被驱逐出雅典， 前往克里特岛。出于他以前显著的名声，代达罗斯受到了国王米诺斯的欢迎。在那里，他成为了宫廷技术顾问，代达罗斯做着不断地突破。他为国王的孩子们制造了 一个个活灵活现的机械玩具。他发明了船帆和桅杆，使人们能够操纵风。他的每一个发明都缩短了人与神之间的距离，直到最后，他直接穿过了那条界线。米诺斯国王的妻子帕西淮，被海神波塞冬诅咒，与国王的公牛坠入爱河。在法术的影响下， 她请求代达罗斯帮助她勾引公牛。出于代达罗斯大胆的性格，他应允了。他造了一个空心的木牛以假乱真，公牛被他造的木牛所愚弄。帕西淮藏在木牛里，她怀孕并生下了一个人身牛头怪。这显然激怒了国王，他指责代达罗斯扭曲了自然法则。代达罗斯被迫在牛头人身怪的宫殿下建造一个无法逃脱的迷宫作为惩罚。完工之后，米诺斯国王关押了代达罗斯和他的独子伊卡洛斯在岛上最高的塔里，并打算让他们在那度过余生。但是代达罗斯依旧还是一个天才发明家。他在囚牢里观察周围的鸟的时候，他找到了逃脱的办法。他和伊卡洛斯能够飞出监狱，像只有鸟和神能做到的那样。他用在塔上栖息的鸟群的羽毛和蜡烛的蜡，他造了两对巨大的羽翼。在他给他的儿子伊卡洛斯绑上翅膀的时候，代达罗斯警告了他：你如果飞得太低，羽翼会碰到海水，羽翼沾湿了就会变得过于沉重。要是飞得太高，翅膀上的蜡就会融化，翅膀就会碎裂。不论是在哪种情况下，他们都会死。因此，逃脱的关键在于保持在半空中飞行。在指令清晰以后，二人从塔上跃下。他们是世上首个能够飞翔的凡人。当代达罗斯小心翼翼在半空中飞行的时候，伊卡洛斯因为能够飞行而感到狂喜，且被自己有如上帝一般的力量的感觉所压倒。代达罗斯只能恐惧地看着伊卡洛斯越飞越高，却无法改变他可悲的命运。当太阳的热量融化他翅膀上的蜡时，伊卡洛斯从高空坠落。就像代达罗斯屡次无视违抗自然法则的后果，伊卡洛斯也被他的傲慢自大而冲昏头脑。最后，二人都为自己的行为付出了代价，伊卡洛斯的代价是他的生命，而代达罗斯的代价是永恒的懊悔。

**P449 2017-03-15 Why do people get so anxious about math - Orly Rubinsten**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=449)

When French mathematician Laurent Schwartz was in high school, he started to worry that he wasn't smart enough to solve math problems. Maybe you know a similar feeling. You sit down to take a math test, and you feel your heart beat faster and your palms start to sweat. You get butterflies in your stomach, and you can't concentrate. This phenomenon is called math anxiety, and if it happens to you, you're not alone. Researchers think about 20% of the population suffers from it. Some psychologists even consider it a diagnosable condition. But having mathematical anxiety doesn't necessarily mean you're bad at math - not even close. Laurent Schwartz went on to win the Fields Medal, the highest award in mathematics. People might think that they're anxious about math because they're bad at it, but it's often the other way around. They're doing poorly in math because they're anxious about it. Some psychologists think that's because math anxiety decreases a cognitive resource called working memory. That's the short-term memory system that helps you organize the information you need to complete a task. Worrying about being able to solve math problems, or not doing well on a test, eats up working memory, leaving less of it available to tackle the math itself. People can suddenly struggle with even basic math skills, like arithmetic, that they've otherwise mastered. Academic anxiety certainly isn't limited to math, but it does seem to happen much more frequently, and cause more harm in that subject. So why would that be? Researchers aren't yet sure, but some studies suggest that the way children are exposed to math by their parents and teachers play a large part. If parents talk about math like something challenging and unfamiliar, children can internalize that. Teachers with math anxiety are also likely to spread it to their students. Pressure to solve problems quickly dials up stress even more. And in some cultures, being good at math is a sign of being smart in general. When the stakes are that high, it's not surprising that students are anxious. Even Maryam Mirzakhani, an influential mathematician who was the first woman to win the Fields Medal, felt unconfident and lost interest in mathematics because her math teacher in middle school didn't think she was talented. So if you experience mathematical anxiety, what can you do? Relaxation techniques, like short breathing exercises, have improved test performance in students with math anxiety. Writing down your worries can also help. This strategy may give you a chance to reevaluate a stressful experience, freeing up working memory. And if you have the chance, physical activity, like a brisk walk, deepens breathing and helps relieve muscle tension, preventing anxiety from building. You can also use your knowledge about the brain to change your mindset. The brain is flexible, and the areas involved in math skills can always grow and develop. This is a psychological principle called the growth mindset. Thinking of yourself as someone who can grow and improve can actually help you grow and improve. If you're a teacher or parent of young children, try being playful with math and focusing on the creative aspects. That can build the numerical skills that help students approach math with confidence later on. Importantly, you should give children the time and space to work through their answers. And if you're an administrator, make sure your teachers have the positive attitudes and mathematical confidence necessary to inspire confidence in all of their students. Also, don't let anyone spread the myth that boys are innately better than girls at math. That is completely false. If you experience math anxiety, it may not help to just know that math anxiety exists. Or perhaps it's reassuring to put a name to the problem. Regardless, if you take a look around yourself, the odds are good that you'll see someone experiencing the same thing as you. Just remember that the anxiety is not a reflection of your ability, but it is something you can conquer with time and awareness.

**P449 2017-03-15 Why do people get so anxious about math - Orly Rubinsten**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=449)

翻译人员: Riley WANG 校对人员: Di SUN法国数学家洛朗·施瓦茨读高中时他开始担心自己不够聪明 算不出数学题很可能你也有同感当你坐下来开始进行数学考试会感觉到自己心跳加速手心出汗胃里翻江倒海 难以集中注意力这种现象叫做数学焦虑症如果你也遇到过这种情况 你并不是例外研究者认为20%的人有数学焦虑症一些心理学家甚至认为 这是一种可诊断的症状但是有数学焦虑症 并不意味着你不擅长数学二者甚至毫无关联洛朗·施瓦茨后来获得了菲尔茨奖这是数学领域的最高奖项可能人们认为产生焦虑的原因是 他们不擅长数学但事实上二者的关系恰好相反因为人们太过紧张 才会导致数学方面表现不佳一些心理学家认为这是因为数学焦虑症 消耗了一种被称为工作记忆的认知资源工作记忆是短期记忆系统它能帮你组织用于完成任务的信息担心能否解出数学题或能否很好地完成考试都会消耗工作记忆而此时用于解答数学题的 工作记忆就会变少人们可能会突然丧失 最基本的解题技能例如他们已经非常擅长的算术学术方面的焦虑不止体现在 数学这一个科目上但数学焦虑症似乎发生得更加频繁并且在这个科目上 造成了更大的消极影响这究竟是为什么呢研究者们现在还不能确定但一些研究表明孩子通过家长和老师来 接触数学的方式在其中扮演着重要的角色如果家长们对数学问题 感到无所适从 难以驾驭孩子们就会认同并接受这一观点有数学焦虑症的老师 也很可能会将其传染给学生们催促学生解题则会 加大学生的精神压力而在某些文化中擅长数学 被普遍认为是聪明的标志当数学扮演着如此重要的角色也难怪学生们会焦虑连玛丽亚姆·米尔扎汉 这位享誉世界的数学家也是第一位赢得菲尔茨奖的女性也曾对数学失去了信心和兴趣因为她中学时的数学老师 曾认为她并没有天赋所以如果你正经历数学焦虑症要如何缓解呢一些放松的技巧 例如短时间的呼吸训练可以缓解学生们在考试时的数学焦虑写下你的担忧也会有所帮助它能够使你重新审视充满压力的经历从而释放工作记忆如果有机会体育活动如快步走 也可以促进深呼吸同时帮助缓解肌肉紧张从而防止焦虑产生你也可以运用关于大脑的知识去改变你的心态大脑是非常灵活的负责数学技能的区域 可以持续提高和发展这个心理学原理叫做成长心态认为自己是可以进步和提高的想法可以切实地促进你成长和进步如果你是一名教师或为人父母试着轻松对待数学 并关注其创造性的方面这可以培养学生的算数能力使其在今后更有信心地面对数学问题重要的是应该给孩子们时间和空间让他们去寻找答案如果你是一位管理者你需要确保你的老师们面对数学也有积极的态度和信心继而才能激发他们学生的信心同时不要让任何人散播男生天生比女生擅长数学这种说法这是完全错误的观念如果你经历了数学焦虑症了解它的存在并不一定能有所帮助或者给这个问题起个名字 至少能减轻你的担忧不管怎样 如果你观察周围的人很可能你会发现其他人 也有数学焦虑症切记焦虑并不能反映出你的能力但你可以用时间和意识克服焦虑

**P450 2017-03-16 How the bendy straw was invented \_ Moments of Vision 12 - Jessica Ore**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=450)

In a Moment of Vision... It's the 1930s, San Francisco. Joseph B. Friedman and his young daughter Judith are sitting at the counter in a soda parlor. Judith has just ordered a milkshake. Vanilla or strawberry, we may never know. When the milkshake arrives, Joseph watches as little Judith struggles. Seated on the parlor stool, she is unable to reach the mouth of the striped paper straw protruding from her shake. Joseph, in a moment of vision, modifies Judith's straw. He inserts a screw into one end, and using a piece of dental floss, crushes the paper between the threads of the screw creating a series of tiny equidistant corrugations. After removing the screw, the straw is able to bend over the side of the glass and Judith is able to savor her milkshake. Joseph initially markets the new flexible straw to hospitals to help patients drink while reclining, but eventually, with the marketing and business savvy from his sister Betty, the bendy straw becomes a beloved utensil of every child and a regular household item.

**P450 2017-03-16 How the bendy straw was invented \_ Moments of Vision 12 - Jessica Ore**

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翻译人员: Cherry Zhou 校对人员: Zhouwenqi Xu灵光一闪...1930年的旧金山。约瑟夫·B·弗里德曼和他的小女儿朱迪思正坐在汽水店的柜台前。朱迪思刚点了一杯奶昔。香草味的还是草莓味的， 也许我们永远不知道。当奶昔送过来的时候， 约瑟夫看着小朱迪思很吃力。因为坐在店里的凳子上，她的嘴巴碰不着那支条纹纸吸管，吸管是从她那杯奶昔中伸出来的。约瑟夫灵光一闪， 给朱迪思的吸管做了一些调整。他把螺丝插到一端，还用上一条牙线，利用螺旋上的螺纹将纸弄皱，做出了一些细小的等距折皱。把螺旋移走之后，吸管就可以向着玻璃杯的一边弯曲，这样朱迪思就可以尽情享用她的奶昔了。约瑟夫最初是把这个新颖的可弯曲性吸管用于医院里，帮助病人在身体 处于倾斜状态的时候也能喝上东西，但最终。凭着约瑟夫的姐姐贝蒂的 营销和商业头脑，吸管成为了每个孩子都心爱的器皿和日常家庭用品。

**P451 2017-03-16 How the food you eat affects your gut - Shilpa Ravella**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=451)

Trillions of bacteria, viruses, and fungi live on or inside of us, and maintaining a good, balanced relationship with them is to our advantage. Together, they form the gut microbiome, a rich ecosystem that performs a variety of functions in our bodies. The bacteria in our guts can break down food the body can't digest, produce important nutrients, regulate the immune system, and protect against harmful germs. We don't yet have the blueprint for exactly which good bacteria a robust gut needs, but we do know that it's important for a healthy microbiome to have a variety of bacterial species. Many factors affect our microbiomes, including our environment, medications like antibiotics, and even whether we were delivered by C-section or not. Diet, too, is emerging as one of the leading influences on the health of our guts. And while we can't control all these factors, we can manipulate the balance of our microbes by paying attention to what we eat. Dietary fiber from foods like fruits, vegetables, nuts, legumes, and whole grains is the best fuel for gut bacteria. When bacteria digest fiber, they produce short chain fatty acids that nourish the gut barrier, improve immune function, and can help prevent inflammation, which reduces the risk of cancer. And the more fiber you ingest, the more fiber-digesting bacteria colonize your gut. In a recent study, scientists exchanged the regular high-fiber diets of a group of rural South Africans with the high-fat, meat-heavy diets of a group of African-Americans. After just two weeks on the high-fat, low-fiber, Western-style diet, the rural African group showed increased inflammation of the colon, as well as a decrease of butyrate. That's a short chain fatty acid thought to lower risk of colon cancer. Meanwhile, the group that switched to a high-fiber, low-fat diet had the opposite result. So what goes wrong with our gut bacteria when we eat low-fiber processed foods? Lower fiber means less fuel for the gut bacteria, essentially starving them until they die off. This results in less diversity and hungry bacteria. In fact, some can even start to feed on the mucus lining. We also know that specific foods can affect gut bacteria. In one recent microbiome study, scientists found that fruits, vegetables, tea, coffee, red wine, and dark chocolate were correlated with increased bacterial diversity. These foods contain polyphenols, which are naturally occurring antioxidant compounds. On the other hand, foods high in dairy fat, like whole milk, and sugar-sweetened sodas were correlated with decreased diversity. How food is prepared also matters. Minimally processed, fresh foods generally have more fiber and provide better fuel. So lightly steamed, sautéed, or raw vegetables are typically more beneficial than fried dishes. There are also ways of preparing food that can actually introduce good bacteria, also known as probiotics, into your gut. Fermented foods are teeming with helpful probiotic bacteria, like lactobacillus and bifidobacteria. Originally used as a way of preserving foods before the invention of refrigeration, fermentation remains a traditional practice all over the world. Foods like kimchi, sauerkraut, tempeh, and kombucha provide variety and vitality to our diets. Yogurt is another fermented food that can introduce helpful bacteria into our guts. That doesn't necessarily mean that all yogurt is good for us, though. Brands with too much sugar and not enough bacteria may not actually help. These are just general guidelines. More research is needed before we fully understand exactly how any of these foods interact with our microbiomes. We see positive correlations, but the insides of our guts are difficult places to make direct observations. For instance, we don't currently know whether these foods are directly responsible for the changes in diversity, or if something more complicated is happening. While we're only beginning to explore the vast wilderness inside our guts, we already have a glimpse of how crucial our microbiomes are for digestive health. The great news is we have the power to fire up the bacteria in our bellies. Fill up on fibers, fresh and fermented foods, and you can trust your gut to keep you going strong.

**P451 2017-03-16 How the food you eat affects your gut - Shilpa Ravella**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=451)

翻译人员: Liu Qi 校对人员: Tianji (Homer) Li数万亿细菌、病毒和真菌 生活在我们身上及体内，和它们保持良好平衡的关系是对我们有利的。它们一起形成肠道微生物群，这是一个丰富的生态系统， 在我们的身体中发挥各种作用。肠道细菌可以分解 体内无法消化的食物，产生重要的营养物质，调节免疫系统，防止有害细菌。我们目前还无法明确健康的肠道需要哪些有益细菌，但我们确切地知道， 对于健康的微生物群来说，拥有多种细菌非常重要。影响微生物群的因素有很多，包括环境、药品，如抗生素，以及我们是否生于剖腹产。饮食也渐渐变成了 影响肠道健康的主要因素之一。虽然无法控制所有因素，但我们可以通过关注饮食来控制体内微生物群的平衡。来自水果、蔬菜、坚果、豆类 和全谷类食物的膳食纤维是肠道菌群最好的补给。当细菌分解纤维时，它们会产生短链脂肪酸， 滋养肠道屏障，改善免疫功能，帮助预防炎症， 从而降低癌症风险。摄入的纤维越多，肠道中消化纤维的细菌就越多。在最近的一项研究中，科学家们将南非农村人 长期食用的高纤维饮食，换成非洲裔美国人的高脂多肉饮食。改用高脂肪、低纤维的 西式饮食仅仅两周后，非洲农村人实验组出现结肠炎症增加、丁酸盐减少的现象。这种短链脂肪酸， 可以降低患结肠癌的风险。与此同时，改用高纤维、 低脂肪饮食的实验组则出现相反的结果。当我们摄入低纤维加工食品时， 肠道细菌出现了什么问题呢？对于肠道细菌来说， 纤维越少意味着补给越少，致使肠道细菌挨饿，直至死亡。这会使细菌多样性减少，并产生饥饿细菌。事实上，有些细菌甚至 开始吃黏液层。特定的食物也会影响肠道细菌。在最近的一项微生物组研究中，科学家发现水果、蔬菜、茶、咖啡、红酒、以及黑巧克力都可以增加细菌多样性。这些食物含有多酚，一种天然抗氧化剂。另一方面，乳脂含量高的食物，如全脂牛奶，加糖的苏打水则会使细菌多样性降低。如何烹制食物也很重要。最低限度加工的新鲜食品 通常含有更多纤维，可以提供更多营养。所以清蒸的，淡炒的，或生的蔬菜通常比油炸菜品更有益。还有一些食物制作方法， 可以切实地将有益细菌，也称为益生菌，引入肠道。发酵的食物中含有大量有益的益生菌，如乳酸杆菌和双歧杆菌。在制冷工艺发明之前，本来是作为一种保存食物的方式。发酵这种传统工艺 一直广泛流传于全世界。韩国泡菜、德国酸菜、印尼豆豉和红茶菌等食物为我们的饮食提供了多样性和活力。酸奶是另一种可以为肠道 带来有益菌的发酵食品，但这并不意味着所有的 酸奶对我们都是有益的。那些糖分较多、 细菌较少的品牌可能对我们没有好处。这些只是一般指导原则。要彻底了解食物与我们体内 微生物群之间的相互作用，还需要很多研究。我们看到了正向相关性，但肠道内部很难进行直接观察。例如，我们目前还不知道是这些食物直接 改变了细菌多样性，还是发生了更加复杂的过程。仅仅是刚开始研究肠道世界内部，我们就已经初窥微生物 对消化系统健康的重要性。好消息是我们可以 调动肠道里的细菌。补充纤维、多吃新鲜和发酵食品，剩下的事情放心交给肠道， 它会让你变得强壮。

**P452 2017-03-16 The history of chocolate - Deanna Pucciarelli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=452)

If you can't imagine life without chocolate, you're lucky you weren't born before the 16th century. Until then, chocolate only existed in Mesoamerica in a form quite different from what we know. As far back as 1900 BCE, the people of that region had learned to prepare the beans of the native cacao tree. The earliest records tell us the beans were ground and mixed with cornmeal and chili peppers to create a drink - not a relaxing cup of hot cocoa, but a bitter, invigorating concoction frothing with foam. And if you thought we make a big deal about chocolate today, the Mesoamericans had us beat. They believed that cacao was a heavenly food gifted to humans by a feathered serpent god, known to the Maya as Kukulkan and to the Aztecs as Quetzalcoatl. Aztecs used cacao beans as currency and drank chocolate at royal feasts, gave it to soldiers as a reward for success in battle, and used it in rituals. The first transatlantic chocolate encounter occurred in 1519 when Hernán Cortés visited the court of Moctezuma at Tenochtitlan. As recorded by Cortés's lieutenant, the king had 50 jugs of the drink brought out and poured into golden cups. When the colonists returned with shipments of the strange new bean, missionaries' salacious accounts of native customs gave it a reputation as an aphrodisiac. At first, its bitter taste made it suitable as a medicine for ailments, like upset stomachs, but sweetening it with honey, sugar, or vanilla quickly made chocolate a popular delicacy in the Spanish court. And soon, no aristocratic home was complete without dedicated chocolate ware. The fashionable drink was difficult and time consuming to produce on a large scale. That involved using plantations and imported slave labor in the Caribbean and on islands off the coast of Africa. The world of chocolate would change forever in 1828 with the introduction of the cocoa press by Coenraad van Houten of Amsterdam. Van Houten's invention could separate the cocoa's natural fat, or cocoa butter. This left a powder that could be mixed into a drinkable solution or recombined with the cocoa butter to create the solid chocolate we know today. Not long after, a Swiss chocolatier named Daniel Peter added powdered milk to the mix, thus inventing milk chocolate. By the 20th century, chocolate was no longer an elite luxury but had become a treat for the public. Meeting the massive demand required more cultivation of cocoa, which can only grow near the equator. Now, instead of African slaves being shipped to South American cocoa plantations, cocoa production itself would shift to West Africa with Cote d'Ivoire providing two-fifths of the world's cocoa as of 2015. Yet along with the growth of the industry, there have been horrific abuses of human rights. Many of the plantations throughout West Africa, which supply Western companies, use slave and child labor, with an estimation of more than 2 million children affected. This is a complex problem that persists despite efforts from major chocolate companies to partner with African nations to reduce child and indentured labor practices. Today, chocolate has established itself in the rituals of our modern culture. Due to its colonial association with native cultures, combined with the power of advertising, chocolate retains an aura of something sensual, decadent, and forbidden. Yet knowing more about its fascinating and often cruel history, as well as its production today, tells us where these associations originate and what they hide. So as you unwrap your next bar of chocolate, take a moment to consider that not everything about chocolate is sweet.

**P452 2017-03-16 The history of chocolate - Deanna Pucciarelli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=452)

翻译人员: Eric Gou 校对人员: 文琪 赵如果你不能想象没有巧克力的生活，那你该为没在16世纪前出生感到庆幸。在那之前，巧克力仅存于中美洲，并且形态和我们所知道的大有区别。早在公元前1900年，该地区的人民已经学会了如何处理天然的可可豆。根据最早的记载，这些豆子被研磨后 跟玉米面和红辣椒混合在一起，用来制作饮料——不是令人放松的热可可，而是一种味苦却振奋精神的 带泡沫的混合饮料。如果你认为如今我们 对巧克力的热爱已到极致，中美洲人绝对是第一个不服气的。他们认为可可是神圣的食物，受赐于一位被玛雅人称为Kukulkan的羽蛇神，阿兹特克人也将其 称之为Quetzalcoatl。阿兹特克人将可可豆作为货币使用，并在皇家盛宴中饮用巧克力，以及将其作为士兵战功的奖励，和用于宗教仪式。第一次跨大西洋的巧克力邂逅 发生在1519年，当荷南·科尔蒂斯拜访位于特诺奇蒂特兰城蒙特祖马的皇宫时。根据科尔特斯的陆军中尉记载，国王将50罐巧克力饮料拿出来倒入金杯。当殖民者满载 这种新奇古怪的豆子回归时，传教士对土著风俗的诲淫解释，使其被打上了壮阳药的烙印。起初，巧克力因其苦味被用作可治愈像肚子痛一类小病的药，但将其和蜂蜜、糖、香草混合增甜后，美味的巧克力迅速 风靡于西班牙的皇宫中。很快，巧克力成为了 贵族家中的必需品。大量生产这种时尚饮料是耗时耗力的，并且制作过程需要用到种植园，及从加勒比海区和非洲海岸 附近岛屿俘虏来的奴隶。1828年，来自阿姆斯特丹的 康纳德·凡·休顿用他发明的可可豆压榨机 改变了巧克力的未来。这种压榨机能将可可豆里的油脂分离开，制造出一种可以冲泡成饮料的粉末或者和可可豆油脂重新混合，就得到了我们今天所熟知的固体巧克力。不久后，一位名为丹尼尔·彼得 的瑞士巧克力大亨将奶粉和巧克力粉混合，发明了牛奶巧克力。到了20世纪，巧克力 已不再是精英阶层的奢侈品，普及到了千家万户。巧克力的大量生产 增大了对可可豆的需求，但问题在于其只能生长于赤道附近。现在与其将非洲奴隶运往南美洲可可园，不如直接在西非生产可可豆。截止2015年， 科特迪亚出产了世界五分之二的可可豆。但是，这个产业的壮大伴随着太多对人权的残忍掠夺。西非很多向西方国家供应可可豆的种植园使用了奴隶和童工。据估算，有超过200万的孩童被迫劳作，这个问题复杂庞大，依然存在，尽管很多巧克力公司 和非洲国家沟通干涉让他们减少对童工和契约工的使用。今天，巧克力成为了我们 现代文化重要的一部分。因为其和土著文化在殖民方面的联系，和广告中的大力宣传，巧克力隐约暗示了性欲，堕落，和禁忌。了解更多关于巧克力迷人却残酷的历史，以及如今的生产现状，能够使人们更多的知道这种暗示的起源和背后的故事。那么，当你下一次撕开一包巧克力棒时，停留片刻思考一下， 并不是关于巧克力的一切都是香甜可口的。

**P453 2017-03-24 How did Dracula become the world's most famous vampire - Stanley Step**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=453)

How did Dracula become the world's most famous vampire? More than 100 years after his creator was laid to rest, Dracula lives on as the most famous vampire in history. But this Transylvanian noble, neither the first fictional vampire nor the most popular of his time, may have remained buried in obscurity if not for a twist of fate. Dracula's first appearance was in Bram Stoker's 1897 novel of the same name. But that was far from the beginning of vampire myths. Blood-sucking monsters had already been part of folklore for at least 800 years. It was Slavic folklore that gave us the word vampire, or "upir" in Old Russian. The term's first known written mention comes from the 11th century. Vampire lore in the region predated Christianity's arrival and persisted despite the church's efforts to eliminate pagan beliefs. Stories of vampires originated from misinterpretations of diseases, such as rabies, and pellagra, and decomposition. In the case of the latter, gasses swelling the body and blood oozing from the mouth could make a corpse look like it had recently been alive and feeding. Vampires were describe as bloated with overgrown teeth and nails. This gave rise to many rituals intended to prevent the dead from rising, such as burying bodies with garlic or poppyseeds, as well as having them staked, burned, or mutilated. Vampire lore remained a local phenomenon until the 18th century when Serbia was caught in the struggle between two great powers, the Habsburg Monarchy and Ottoman Empire. Austrian soldiers and government officials observed and documented the strange local burial rituals, and their reports became widely publicized. The resulting vampire hysteria got so out of hand that in 1755, the Austrian Empress was forced to dispatch her personal physician. He investigated and put an end to the rumors by publishing a thorough, scientific refutation. The panic subsided, but the vampire had already taken root in Western Europe's imagination, spawning works like "The Vampyre" in 1819, and Joseph Sheridan Le Fanu's "Carmilla" in 1872. This book would greatly influence a young Irish drama critic named Bram Stoker. Stoker, who was born in Dublin in 1847, was famously bedridden with an unknown illness until the age of seven. During that time, his mother told him folktales and true tales of horror, including her experiences during an outbreak of cholera in 1832. There, she described victims buried alive in mass graves. Later in his life, Stoker went on to write fantasy, romance, adventure stories, and, in 1897, "Dracula." Although the book's main villain and namesake is thought to be based on the historical figure of Vlad III Dracula, or Vlad the Impaler, the association is mostly just that they share a name. Other elements and characters were inspired directly and indirectly by various works in the Victorian Era, such as "The Mysterious Stranger." The novel, upon release, was only a moderate success in its day, nor was it even Stoker's most well-known work, mentioned only briefly in a 1912 obituary. But a critical copyright battle would completely change Dracula's fate, and catapult the character into literary renown. In 1922, a German studio adapted the novel into the now classic silent film "Nosferatu" without paying royalties. Despite changes in character names and minor plot points, the parallels were obvious, and the studio was sued into bankruptcy. To prevent more plagiarism attempts, Stoker's widow decided to establish copyright over the stage version of "Dracula" by approving a production by family-friend Hamilton Deane. Although Deane's adaptation made drastic cuts to the story, it became a classic, thanks largely to Bela Lugosi's performance on Broadway. Lugosi would go on to star in the 1931 film version by Universal, lending the character many of his signature characteristics. And since then, Dracula has risen again in countless adaptations, finding eternal life far beyond the humble pages of his birth.

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翻译人员: Riley WANG 校对人员: Lipeng Chen德古拉是如何成为世界最著名的吸血鬼的？德古拉的创作者百年之前就已去世，而德古拉永存，成为了历史上最著名的吸血鬼。但是这位特兰西瓦尼亚贵族，既不是第一个虚构的吸血鬼， 也不是当时最流行的一个，若不是命运的转折，他可能就此湮没于无名。1897年，德古拉第一次出现于 Bram Stoker创作的同名小说，但这远远晚于最早的吸血鬼传说。这种吸血怪物在八百多年前 就是民间故事的一部分。斯拉夫地区的民间传说创造出 “vampire—吸血鬼”这个名字，在古俄语中写作“upir”。这个名称的第一次文字记载出现于11世纪。吸血鬼传说在当地早于基督教兴起，并持续存在，尽管教会努力遏制这种异教徒看法。吸血鬼故事来源于对疾病的错误解读，例如狂犬病、糙皮病、以及尸体分解腐败。在尸解时，气体会充满身体， 血液也会从嘴里渗出，这让尸体看起来像刚进食完的活人。吸血鬼被描述为臃肿的，长着獠牙和长指甲。这产生了很多防止诈尸的仪式，比如，把大蒜或罂粟籽和尸体一同下葬，或是把尸体钉住、焚烧、或是肢解。直到18世纪，吸血鬼故事都只是地方性传说，此时正值塞尔维亚陷入哈布斯堡君主国与奥斯曼帝国之间的纷争。哈布斯堡君主国与奥斯曼帝国之间的纷争时奥地利军队和政府考察并记录了当地奇特的埋葬死者的仪式。他们的报道得以广泛传播。对吸血鬼故事的狂热几近失控，以至于在1775年，奥地利皇后不得不 派遣自己的私人医生前往调查。医生进行了调研，并且发布了一篇详实的文章辟谣。恐慌退却，但吸血鬼的形象却已经深入人心，它充斥在西欧人们的想象中。1819年《吸血鬼》问世，1872年 Joseph Sheridan Le Fanu 出版了《卡米拉》。这本书极大地影响了爱尔兰少年Bram Stoker，他后来成为了一名戏剧评论家。Stoker于1847年出生在都柏林，他七岁之前都因为疾病而卧床不起。在那期间，他的母亲经常给他讲民间传说以及可怕的恐怖故事，其中包括她亲身经历的1832年霍乱。她描述了感染者们如何被活埋。之后，Stoker创作了很多奇幻的、 浪漫的以及冒险类故事，并且在1897年写出了“德古拉”。尽管书中的主要反派人物被认为是基于历史上 弗拉德三世而塑造的同名人物，被认为是基于历史上 弗拉德三世而塑造的同名人物，但两个人物也只是名字相同。其他人物性格及要素直接或间接地来源于维多利亚时代的众多作品，例如“神秘的陌生人”。“德古拉”问世时并未大获成功，它也不是Stoker最著名的作品，在1912年Stoker去世的讣告中也只是一笔带过。但是一场激烈的版权之争 彻底改变了德古拉的命运，并且使这个人物在文学界一举成名。1922年一家德国电影公司将其改编为 无声电影——“诺斯费拉图”，但其并未交付版税。尽管人物名称和情节细节都有改编，但二者的相似却是非常明显的。最后德国公司被起诉并因此而破产。为了防止其他盗版行为，Stoker的遗孀决定为舞台剧版本的“德古拉”申请版权。她同意了一位朋友Hamilton Deane进行的制作。尽管Deane的改编大量删除了故事情节，但作品成为了经典，这也归功于Bela Lugosi在百老汇的精彩演出。Lugosi后来在1931年环球影业 出品的电影版中也担任主演，并在塑造角色时加入了很多自己的特点。从那之后，又有不计其数的对德古拉形象的改编。它也因此而摆脱其平凡的诞生，得以永世留名。

**P454 2017-03-24 Why do animals have such different lifespans - Joao Pedro de Magalhae**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=454)

For the microscopic lab worm, C. elegans life equates to just a few short weeks on Earth. Compare that with the tortoise, which can age to more than 100 years. Mice and rats reach the end of their lives after just four years, while for the bowhead whale, Earth's longest-lived mammal, death can come after 200. Like most living things, the vast majority of animals gradually degenerate after reaching sexual maturity in the process known as aging. But what does it really mean to age? The drivers behind this process are varied and complicated, but aging is ultimately caused by cell death and dysfunction. When we're young, we constantly regenerate cells in order to replace dead and dying ones. But as we age, this process slows down. In addition, older cells don't perform their functions as well as young ones. That makes our bodies go into a decline, which eventually results in disease and death. But if that's consistently true, why the huge variance in aging patterns and lifespan within the animal kingdom? The answer lies in several factors, including environment and body size. These can place powerful evolutionary pressures on animals to adapt, which in turn makes the aging process different across species. Consider the cold depths of the Atlantic and Arctic Seas, where Greenland sharks can live to over 400 years, and the Arctic clam known as the quahog can live up to 500. Perhaps the most impressive of these ocean-dwelling ancients is the Antarctic glass sponge, which can survive over 10,000 years in frigid waters. In cold environments like these, heartbeats and metabolic rates slow down. Researchers theorize that this also causes a slowing of the aging process. In this way, the environment shapes longevity. When it comes to size, it's often, but not always, the case that larger species have a longer lifespan than smaller ones. For instance, an elephant or whale will live much longer than a mouse, rat, or vole, which in turn have years on flies and worms. Some small animals, like worms and flies, are also limited by the mechanics of their cell division. They're mostly made up of cells that can't divide and be replaced when damaged, so their bodies expire more quickly. And size is a powerful evolutionary driver in animals. Smaller creatures are more prone to predators. A mouse, for instance, can hardly expect to survive more than a year in the wild. So, it has evolved to grow and reproduce more rapidly, like an evolutionary defense mechanism against its shorter lifespan. Larger animals, by contrast, are better at fending off predators, and so they have the luxury of time to grow to large sizes and reproduce multiple times during their lives. Exceptions to the size rule include bats, birds, moles, and turtles, but in each case, these animals have other adaptations that allow them to escape predators. But there are still cases where animals with similar defining features, like size and habitat, age at completely different rates. In these cases, genetic differences, like how each organism's cells respond to threats, often account for the discrepancies in longevity. So it's the combination of all these factors playing out to differing degrees in different animals that explains the variability we see in the animal kingdom. So what about us? Humans currently have an average life expectancy of 71 years, meaning that we're not even close to being the longest living inhabitants on Earth. But we are very good at increasing our life expectancy. In the early 1900s, humans only lived an average of 50 years. Since then, we've learned to adapt by managing many of the factors that cause deaths, like environmental exposure and nutrition. This, and other increases in life expectancy make us possibly the only species on Earth to take control over our natural fate.

**P454 2017-03-24 Why do animals have such different lifespans - Joao Pedro de Magalhae**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=454)

翻译人员: Ying Lu 校对人员: Frank Wang对于微观实验室中的秀丽隐杆线虫而言，在地球上的生命仅短短几周。与能活100多年的乌龟相比，老鼠们的寿命不过4年。但是对于地球上寿命最长的哺乳动物 弓头鲸来说，死亡在200年后才会发生。正如大部分的生物，大部分的动物在达到性成熟之后便逐渐退化，这正是我们所熟知的“老化”。但是老化到底是什么意思呢？这个过程背后有着既多样又复杂的因素，但总而言之，老化是由于细胞的死亡和 功能紊乱所导致的。当我们年轻时，身体中的细胞会不断再生来取代死亡或衰竭的细胞。但是随着我们年龄渐长， 细胞再生长过程变缓。此外，老化细胞的表现也不如新生的细胞。这将使我们身体机能下降，并最终导致疾病和死亡。但如果事实果断如此，为什么动物们会有差异如此之大的 老化模式和寿命长短呢？答案将包括以下因素，例如环境和体型。这些因素在动物适应过程中扮演着重要作用，反之也影响着物种的老化差异。考虑到大西洋和北冰洋海域的极寒因素，生活在此海域的格林兰鲨鱼寿命长达400多年，称为“quahog”（北极蛤）的北极蛤蜊寿命 甚至长达500年。也许在这些海洋生物祖先中，令人印象深刻的莫属南极玻璃海绵，在极寒水域中它可存活超过1万年之久。在像这样的寒冷环境中， 心率和新陈代谢速率减缓。研究者推理认为，这也将减缓老化进程。因此，环境影响着寿命。当涉及体型因素时，通常情况是体型更大的物种比体型较小的物种 拥有更长的寿命。例如，大象或者鲸鱼比老鼠、大老鼠活着田鼠活得更长，同样，老鼠们的寿命也远超 苍蝇和蠕虫数年。一些小型动物，例如蠕虫和苍蝇，受限于它们的细胞分裂机制。它们体内大部分细胞受损时，既不能分裂 也无法被新的细胞取代，因此它们生命衰竭得很快。因此体型对动物而言是一个重要的进化因素。小型动物更容易受到掠食动物的袭击。例如，小老鼠是很难独自在野外 存活超过一年。因此，它必须通过快速成长和繁衍这种进化防卫方式与寿命短来抗衡。相反，大型动物则能更好地防卫捕食者，因此它们有足够的时间来成长和进行多次繁衍。体型因素也有例外， 比如蝙蝠、鸟、鼹鼠和乌龟，这些动物有其他适应方式让它们免遭掠食者的袭击。有些动物虽然有着类似的特征例如体型和生活环境，但是老化速率却完全不同。对于这些情况，基因的差别例如每个生物细胞如何应对威胁常常影响着寿命的长短。因此这些因素的结合在不同动物中有着不同程度的影响这也说明了为什么我们在动物中看到了 寿命的多样性。那么我们人类呢？如今人类平均寿命在71岁，这意味着我们寿命远不及地球上 最长寿的生物。但是我们人类很善于延长寿命。早在20世纪初，人类平均寿命仅仅50岁。自此以后，我们通过控制诱发死亡的各种因素来延长寿命，例如环境和营养。这种与其他延长寿命方法的结合，将让我们人类成为地球上唯一能主宰自己命运的物种。

**P455 2017-03-30 Can you solve the virus riddle - Lisa Winer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=455)

Your research team has found a prehistoric virus preserved in the permafrost and isolated it for study. After a late night working, you're just closing up the lab when a sudden earthquake hits and knocks out the power. As the emergency generators kick in, an alarm confirms your worst fears: all the sample vials have broken. The virus is contained for now, but unless you can destroy it, the vents will soon open and unleash a deadly airborne plague. Without hesitation, you grab your HazMat suit and get ready to save the world. The lab is a four by four compound of 16 rooms with an entrance on the northwest corner and an exit at the southeast. Each room is connected to the adjacent ones by an airlock, and the virus has been released in every room except the entrance. To destroy it, you must enter each contaminated room and pull its emergency self-destruct switch. But there's a catch. Because the security system is on lockdown, once you enter the contaminated room, you can't exit without activating the switch, and once you've done so, you won't be able to go back in to that room. You start to draw out possible routes on a pad of paper, but nothing seems to get you to the exit without missing at least one room. So how can you destroy the virus in every contaminated room and survive to tell the story? Pause here if you want to figure it out for yourself. Answer in: 3 Answer in: 2 Answer in: 1 If your first instinct is to try to graph your possible moves on a grid, you've got the right idea. This puzzle is related to the Hamiltonian path problem named after the 19th century Irish mathematician William Rowan Hamilton. The challenge of the path problem is to find whether a given graph has a Hamiltonian path. That's a route that visits every point within it exactly once. This type of problem, classified as NP-complete, is notoriously difficult when the graph is sufficiently large. Although any proposed solution can be easily verified, we have no reliable formula or shortcut for finding one, or determining that one exists. And we're not even sure if it's possible for computers to reliably find such solutions, either. This puzzle adds a twist to the Hamiltonian path problem in that you have to start and end at specific points. But before you waste a ton of graph paper, you should know that a true Hamiltonian path isn't possible with these end points. That's because the rooms form a grid with an even number of rooms on each side. In any grid with that configuration, a Hamiltonian path that starts and ends in opposite corners is impossible. Here's one way of understanding why. Consider a checkerboard grid with an even number of squares on each side. Every path through it will alternate black and white. These grids will all also have an even total number of squares because an even number times and even number is even. So a Hamiltonian path on an even-sided grid that starts on black will have to end on white. And one that starts on white will have to end on black. However, in any grid with even numbered sides, opposite corners are the same color, so it's impossible to start and end a Hamiltonian path on opposite corners. It seems like you're out of luck, unless you look at the rules carefully and notice an important exception. It's true that once you activate the switch in a contaminated room, it's destroyed and you can never go back. But there's one room that wasn't contaminated - the entrance. This means that you can leave it once without pulling the switch and return there when you've destroyed either of these two rooms. The corner room may have been contaminated from the airlock opening, but that's okay because you can destroy the entrance after your second visit. That return trip gives you four options for a successful route, and a similar set of options if you destroyed this room first. Congratulations. You've prevented an epidemic of apocalyptic proportions, but after such a stressful episode, you need a break. Maybe you should take up that recent job offer to become a traveling salesman.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=455)

翻译人员: 小布 陈 校对人员: Cissy Yun你的研究团队发现了一种被保存在永冻土层的史前病毒，你们将它分离出来用作研究。在一整晚的工作后，当你正关上实验室的门时， 一个突如其来的地震发生了，导致电源断了。启用紧急电源之后， 一声警报证实了你最惧怕的事：所有的小药瓶样本已被打碎了。病毒现在还存留着，但是除非你能销毁它，不久排风扇就会打开， 释放出这种通过空气传播的致命病毒。毫不犹豫，你抓起了你的防护服准备去拯救世界。实验室是由4乘4， 16个房间组成的，西北角有一个入口， 东南角一个出口。每个房间都与相邻的房间由 气塞连接着，除了入口那间， 病毒已经弥漫到了其他所有房间。想要销毁它， 你必须进入每一个被污染的房间，拉下各自的紧急自毁开关。但是这里有个问题因为安全系统是处于一级防范禁闭，一旦你进入了被污染的房间，你不开启开关就不能逃出去，一旦你开了开关，你就没法再回到那个房间去。你开始在一叠纸上 画出可能的路线，但是似乎找不到一个能够 不错过任何一个房间就能走到出口的路线。因此，要怎样才能销毁 每个被污染的房间活着逃出来， 再给大家说起这段故事呢？如果你想自己琢磨的话， 就按一下暂停键。答案即将揭晓：3！2！1！如果你的直觉是尝试在方格上 画出可能的路线的话，你的想法是对的。这个谜团与汉密尔顿路径有关，它是以19世纪爱尔兰数学家 威廉·汉密尔顿命名的。这个路径问题的挑战是能否在已有图表上 找出一条汉密尔顿路径。这是一条要求在每个点上 正好划过一次的路线。这种类型的问题， 被归类为NP完全问题，众所周知，当图表足够大时， 这问题奇难无比。虽然任何提出的解决方法 都可以被轻易证实，我们没有可靠的方程式或捷径 来找出这个方法，或证明这个方法存在。我们甚至也不确定能否依赖计算机来可靠地找出这种解决方法。这个难题又将汉密尔顿路径问题 提升了一个难度,因为你要在一个特定的点开始， 并在另一个特定的点结束。但是在浪费你无数的稿纸之前，你应该知道真正的汉密尔顿路径若用这些开始或结束的点， 是无法成立的。那是因为房间形成一个表格， 每边房间的数量都是偶数。在任何一个这样结构的表格里，找出一条起点和终点在相反角落的 汉密尔顿路径是不可能的。这有一个解释。比如说一个棋盘两边 都有一个偶数量的正方格，通过它的每条路径都会黑白交替。这些方格的总数量将是偶数，因为偶数与偶数的积是偶数。因此在一个偶数边表格上， 汉密尔顿路径若是从黑色方格开始，最终将在白色方格结束。若是以白色方格开始的话， 就会以黑色方格结束。但是，在任何偶数边表格中，对角的颜色是相同的，要找到一个起点和终点在对角的 汉密尔顿路径是不可能的。似乎你已经没辙了，但是如果你仔细看一下规则， 可以注意到一个很重要的例外。没错，一旦你启动污染房间的开关，它已自毁并且你再也没法回去了。但有一个房间是没有被污染的， 就是入口的房间。这意味着你可以在 不启动开关的情况下离开一次，在你销毁与它相邻的两个房间 其中之一后，再回到入口房间。角落的房间可能已经 因开着的气塞而被污染了,但这没问题,因为你可以在第二次进入之后 再销毁入口房间。重返路线给你提供了 四条可行的路线，如果你先销毁这个房间的话， 也会出现四类似的方案。恭喜，你已经阻止了一个能导致 世界末日的传染病，渡过这一难关之后， 你需要休息一下。或许你应该答应那个工作机会， 去做一名旅行推销员。

**P456 2017-03-31 How do focus groups work - Hector Lanz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=456)

Why do we buy certain products or choose certain brands? This is the sort of question advertisers have always asked, and there are no easy answers. However, there is a handy tool that helps companies explore this and similar questions, and it's called the focus group. Until the 1940s, market research was often quantitative using things like sales figures and customer polls to track consumption. But this changed during World War II. Sociologists Robert Merton and Paul Lazarsfeld set out to learn how unprecedented exposure to wartime propaganda was affecting the public. Instead of polling large numbers of people with straightforward questions and quantifiable answers, the researchers conducted in-person interviews, sometimes with small groups, engaging them in more open discussions. Later, this method was picked up by the advertising industry with the help of consultants, like Austrian-born psychologist Ernest Dichter, who first coined the term focus group. This new technique was a type of qualitative research focused on the nature of people's preferences and thoughts. It couldn't tell marketers what percentage of people buy a certain product or brand, but it could tell them more about the people who do, their reasoning for doing so, and even the unconscious motivations behind those reasons. Rather than providing definite conclusions for business and sales, focus groups would be used for exploratory research, generating new ideas for products and marketing based on deeper understanding of consumer habits. For example, early focus groups found that contrary to popular opinion at the time, wives often had more influence than their husbands when choosing which car to buy, so Chrysler shifted gears by marketing cars directly to women. And Dr. Dichter himself conducted focus groups for Mattel to learn what girls wanted in a doll. The result was the original Barbie doll. So how does a focus group work? First, companies recruit between six and ten participants according to specific criteria that meet their research objectives. They could be mothers of children between five and seven, or teenagers planning to buy a new phone in the next three months. This is often done through professional recruiters who manage lists of people who've agreed to participate in focus groups for payment or other rewards. During a session, participants are asked to respond to various prompts from the group moderator, like sharing their opinions on a certain product, or their emotional reactions to an advertisement. They may even be asked to do seemingly unrelated tasks, like imagining brands as animals in a zoo. The idea is that this can reveal useful information about the participant's feelings that traditional questions might not get to. Beyond these basics, many variations are possible. A focus group may have two or more moderators perhaps taking opposite sides on a question, or a researcher might be hidden in the focus group unknown to other participants to see how their answers can be influenced. And the whole process may also be observed by researchers through a one-way mirror. But although they can provide valuable insight, focus groups do have their limitations, and one of the main ones is that the simple act of observing something can change it. This principle is called observer interference. The answers participants give are likely to be affected by the presence of the researchers, social pressure from the rest of the group, or simply knowing that they're taking part in a focus group. And because researchers often use a small sample size in a specific setting, it's hard to generalize their results. The findings that researchers do reach from focus groups are often tested through experiments and data gathering. Those put numbers on questions like how many potential customers there are and what price they'd be willing to pay. This part of the process changes as technology evolves. But focus groups have remained largely the same for decades. Perhaps when it comes to the big, important questions, there's no substitute for people genuinely interacting with each other.

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翻译人员: Riley WANG 校对人员: Di SUN为什么我们会购买特定产品 或特定品牌？这是广告商经常问的问题，但想要得到答案并不容易。然而有一种便捷的工具可以帮助公司解答这类问题，它叫焦点小组。1940年代之前， 市场调研主要是定量研究，通过使用诸如 销售数据、消费者调查来追踪销量。但是这在二战时发生改变。社会学家罗伯特·莫顿和 保罗·拉泽飞开始研究前所未有的战时宣传是如何影响大众的。研究者没有对大量人 进行直接提问并给出量化的答案选项，研究者选择了个人访谈，有时以小组形式进行，使受访者参与到更开放的讨论中。这种方法随后被广告业采用，得益于咨询师的协助，例如，出生于奥地利的 心理学家欧内斯特·迪希特，最先提出“焦点小组”这个概念。这种新的方法是一种定性研究，专注于人们偏好及想法。它不能够告诉市场营销人员 多少人会购买该产品或品牌，但是能说明哪类人群会购买，以及他们购买的理由，甚至是购买理由背后的无意识动机。相比于为商业销售提供绝对的结论，焦点小组多被用于探索性研究。为产品本身以及营销方式提供更深刻地 基于消费者习惯的理解。比如说，早期的焦点小组发现 与当时的主流观点相悖的是，对于买车决定， 妻子比丈夫的影响更大。因此克莱斯勒公司改变策略 直接针对女性进行营销。迪希特博士自己也 为马特尔公司组织了焦点小组访谈，研究女孩们想要什么样的洋娃娃。研究结果则是芭比娃娃的原形。那么，焦点小组是如何运作的呢？首先，公司会找到6-10个参与者，他们符合一定条件来满足研究目标。参与者可能是5-7岁儿童的母亲，或是计划在三个月内 购买新手机的中学生。这通常是由专业招聘人员完成， 他们联络愿意参加的人，并给予参与者酬金或其他奖励。讨论时，参与者被要求回应小组主持人提出的各类指示，例如分享关于某产品的想法，或是对某个广告的情绪反应。受访者或许还会被要求完成 看上去毫不相关的任务，例如， 将品牌想象成动物园里的动物。这样的讨论旨在揭示参与者感受，这些有用信息是无法通过传统的问题研究获得的。除了基本的模式以外， 还有很多其他的变式。一个小组可能有2个及以上主持人,组内可能会形成对立双方，研究员也有可能是参与者，在其他参与者不知情的情况下， 观察他们的回应如何受到影响。研究人员可能通过单向镜观察整个过程。尽管焦点小组研究 可以提供有价值的信息，它也有一定局限。主要局限之一是观察某种行为可以改变该行为。这叫做观察者干扰。参与者给出的答案很可能由于研究者在场，或来自其他成员的社会压力，以及知道自己正在参与焦点小组 而受影响。由于研究者通常选取小样本 在特定场景下进行研究，其结果的推广是很困难的。通过焦点小组得出的研究结果，经常需要通过实验 以及数据收集来检验一些数字，比如，潜在消费者的数量，以及他们愿意支付的价格。随着科技的发展， 这一过程也发生变化。但几十年来， 焦点小组的基本形式没变。或许， 在当遇到重大问题时，没有什么能够代替 人与人之间真实的交流互动。

**P457 2017-03-31 The three different ways mammals give birth - Kate Slabosky**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=457)

What do these animals have in common? More than you might think. Along with over 5,000 other species, they're mammals, or members of class mammalia. All mammals are vertebrates, meaning they have backbones. But mammals are distinguished from other vertebrates by a number of shared features. That includes warm blood, body hair or fur, the ability to breathe using lungs, and nourishing their young with milk. But despite these similarities, these creatures also have many biological differences, and one of the most remarkable is how they give birth. Let's start with the most familiar, placental mammals. This group includes humans, cats, dogs, giraffes, and even the blue whale, the biggest animal on Earth. Its placenta, a solid disk of blood-rich tissue, attaches to the wall of the uterus to support the developing embryo. The placenta is what keeps the calf alive during pregnancy. Directly connected to the mother's blood supply, it funnels nutrients and oxygen straight into the calf's body via the umbilical cord, and also exports its waste. Placental mammals can spend far longer inside the womb than other mammals. Baby blue whales, for instance, spend almost a full year inside their mother. The placenta keeps the calf alive right up until its birth, when the umbilical cord breaks and the newborn's own respiratory, circulatory, and waste disposal systems take over. Measuring about 23 feet, a newborn calf is already able to swim. It will spend the next six months drinking 225 liters of its mothers thick, fatty milk per day. Meanwhile, in Australia, you can find a second type of mammal - marsupials. Marsupial babies are so tiny and delicate when they're born that they must continue developing in the mother's pouch. Take the quoll, one of the world's smallest marsupials, which weighs only 18 milligrams at birth, the equivalent of about 30 sugar grains. The kangaroo, another marsupial, gives birth to a single jelly bean-sized baby at a time. The baby crawls down the middle of the mother's three vaginas, then must climb up to the pouch, where she spends the next 6-11 months suckling. Even after the baby kangaroo leaves this warm haven, she'll return to suckle milk. Sometimes, she's just one of three babies her mother is caring for. A female kangaroo can often simultaneously support one inside her uterus and another in her pouch. In unfavorable conditions, female kangaroos can pause their pregnancies. When that happens, she's able to produce two different kinds of milk, one for her newborn, and one for her older joey. The word mammalia means of the breast, which is a bit of a misnomer because while kangaroos do produce milk from nipples in their pouches, they don't actually have breasts. Nor do monotremes, the third and arguably strangest example of mammalian birth. There were once hundreds of monotreme species, but there are only five left: four species of echidnas and the duck-billed platypus. The name monotreme means one hole referring to the single orifice they use for reproduction, excretion, and egg-laying. Like birds, reptiles, fish, dinosaurs, and others, these species lay eggs instead of giving birth to live young. Their eggs are soft-shelled, and when their babies hatch, they suckle milk from pores on their mother's body until they're large enough to feed themselves. Despite laying eggs and other adaptations that we associate more with non-mammals, like the duck-bill platypus's webbed feet, bill, and the venomous spur males have on their feet, they are, in fact, mammals. That's because they share the defining characteristics of mammalia and are evolutionarily linked to the rest of the class. Whether placental, marsupial, or monotreme, each of these creatures and its unique birthing methods, however bizarre, have succeeded for many millennia in bringing new life and diversity into the mammal kingdom.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=457)

翻译人员: Di SUN 校对人员: Ying Lu这些动物有什么共同之处？比你能想到的多。有5000多种物种是哺乳动物，或者属于哺乳动物纲。所有哺乳动物都是脊椎动物， 也意味着它们都有脊椎。但是哺乳动物与其他脊椎动物的 不同之处在于以下这些共同特征。这包括体温恒温，拥有体毛或者毛皮，能够使用肺部呼吸，以及给幼崽喂奶。但除了这些共同点，这些动物在生理上也有差异，其中一个最显著的差异 是生育方式。我们从最熟悉的 胎盘类哺乳动物开始。这一类别包括人类、猫、狗、长颈鹿，以及地球上最大的哺乳动物蓝鲸。胎盘是充满血液的 盘状固体组织，贴在子宫内膜上， 来帮助胚胎发育。胎盘在孕期能维持幼崽的生命。它直接与母体的供血系统相连，胎盘通过脐带将营养和氧气直接输送到幼崽的身体,同时排出废弃物。胎盘类哺乳动物比其他哺乳动物 在子宫内待的时间要长很多。比如蓝鲸宝宝在母体内 几乎要待近一年的时间。胎盘保证幼崽在出生前的生命，当脐带被剪断，新生儿开始使用自己的呼吸系统、循环系统，以及废物排泄系统。刚出生的蓝鲸宝宝体长约23英尺， 一出生就会游泳了。在出生之后的6个月中，它每天会喝掉225公升 浓稠高脂的母乳。同时，在澳大利亚， 你会找到第二类哺乳动物——有袋目哺乳动物。有袋目哺乳动物宝宝刚出生时候 个头娇小且体弱多病，以致于它们必须继续 待在妈妈的育儿袋里面。比如袋鼬，它是世界上最小的有袋目哺乳动物之一，刚出生的时候只有18毫克重，差不多相当于30颗砂糖颗粒的重量。而另一种有袋目哺乳动物，袋鼠每次仅生育一个 软糖大小的幼崽。幼崽从妈妈的第三个阴道出生，然后必须爬到育儿袋里面，这是它在接下来6-11个月中 喝奶的地方。即便在袋鼠幼崽 离开育儿袋后，它还会回来吃奶。有时候，袋鼠妈妈需要照顾 3个宝宝。通常袋鼠妈妈在怀孕的同时，育儿袋中还可以哺乳一个幼崽。在条件不利时，雌性袋鼠可以暂停怀孕。当这种情形发生时，它能产生两种不同的乳汁，一种给新生儿，另一种给幼袋鼠。哺乳这个词意味着乳房，但其实有点名不副实。因为尽管袋鼠育儿袋中的乳头确实产生母乳，但是它们并没有乳房。单孔目哺乳动物也没有乳房，它们是第三类以及 哺乳动物生育方式中最奇怪的一类。曾经有好几百种单孔目哺乳动物，现在仅存5种：4种针鼹和鸭嘴兽。单孔目这个词指一个孔，指的是一个用于生育、排泄和下蛋的孔。跟鸟类、两栖类、鱼类、恐龙以及其他动物一样，单孔目动物是卵生， 而非直接生育幼崽。它们的蛋壳很软，当幼崽孵出后， 它们通过母体的细孔吮吸母乳，直到它们长大能够独立生存。尽管卵生以及其他进化特征会 让我们更多联系到非哺乳动物，比如鸭嘴兽的蹼足、鸭嘴,以及雄性脚上才有的毒刺,事实上，它们是哺乳动物。这是因为它们拥有哺乳动物的界定性征，而且在进化上与其他哺乳动物有 千丝万缕的联系。无论是胎盘类，有袋类，或是单孔目类，虽然各自有着既奇怪又独特 的生育方式，但在过去的几千年， 它们都成功地在哺乳动物的王国繁衍生息。

**P458 2017-04-05 Secrets of the X chromosome - Robin Ball**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=458)

The secrets of the X chromosome. These women are identical twins. They have the same nose, the same hair color, the same eye color. But this one is color blind for green light, and this one isn't. How is that possible? The answer lies in their genes. For humans, the genetic information that determines our physical traits is stored in 23 pairs of chromosomes in the nucleus of every cell. These chromosomes are made up of proteins and long, coiled strands of DNA. Segments of DNA, called genes, tell the cell to build specific proteins, which control its identity and function. For every chromosome pair, one comes from each biological parent. In 22 of these pairs, the chromosomes contain the same set of genes, but may have different versions of those genes. The differences arrive from mutations, which are changes to the genetic sequence that may have occurred many generations ago. Some of those changes have no effect, some cause diseases, and some lead to advantageous adaptations. The result of having two versions of each gene is that you display a combination of your biological parents' traits. But the 23rd pair is unique, and that's the secret behind the one color blind twin. This pair, called the X and Y chromosomes, influences your biological sex. Most women have two X chromosomes while most men have one X and one Y. The Y chromosome contains genes for male development and fertility. The X chromosome, on the other hand, contains important genes for things other than sex determination or reproduction, like nervous system development, skeletal muscle function, and the receptors in the eyes that detect green light. Biological males with an XY chromosome pair only get one copy of all these X chromosome genes, so the human body has evolved to function without duplicates. But that creates a problem for people with two X chromosomes. If both X chromosomes produced proteins, as is normal in other chromosomes, development of the embryo would be completely impaired. The solution is X inactivation. This happens early in development when an embryo with two X chromosomes is just a ball of cells. Each cell inactivates one X chromosome. There's a certain degree of randomness to this process. One cell may inactivate the X chromosome from one parent, and another the chromosome from the other parent. The inactive X shrivels into a clump called a Barr body and goes silent. Almost none of its genes order proteins to be made. When these early cells divide, each passes on its X inactivation. So some clusters of cells express the maternal X chromosome, while others express the paternal X. If these chromosomes carry different traits, those differences will show up in the cells. This is why calico cats have patches. One X had a gene for orange fur and the other had a gene for black fur. The pattern of the coat reveals which one stayed active where. Now we can explain our color blind twin. Both sisters inherited one mutant copy of the green receptor gene and one normally functioning copy. The embryo split into twins before X inactivation, so each twin ended up with a different inactivation pattern. In one, the X chromosome with the normal gene was turned off in the cells that eventually became eyes. Without those genetic instructions, she now can't sense green light and is color blind. Disorders that are associated with mutations of X chromosome genes, like color blindness, or hemophilia, are often less severe in individuals with two X chromosomes. That's because in someone with one normal and one mutant copy of the gene, only some of their cells would be affected by the mutation. This severity of the disorder depends on which X got turned off and where those cells were. On the other hand, all the cells in someone with only one X chromosome can only express the mutant copy of the gene if that's what they inherited. There are still unresolved questions about X inactivation, like how some genes on the X chromosome escape inactivation and why inactivation isn't always random. What we do know is that this mechanism is one of the many ways that genes alone don't tell our whole story.

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翻译人员: Riley WANG 校对人员: Lipeng ChenX染色体的秘密。这两位女性是双胞胎。她们有相同的鼻子，同样的发色，眼睛颜色也相同。但其中一人却是绿色色盲，另一人则不是。这是为什么呢？答案在于她们的基因。对于人类来说， 决定身体特征的遗传信息存在于细胞核中的23对染色体。这些染色体由蛋白质和卷曲的长链DNA构成。DNA由基因构成， 它可以使细胞生成特定蛋白质，控制其特性和功能。一对染色体中， 一条来自父亲，另一条则来自母亲。22对染色体都携带一组基因，但它们表达的性状可能并不相同。这种改变来源于变异，即基因序列的变化，这可能在几代人之前就已产生。一些变异不会造成影响，一些会导致疾病，另一些则会帮助提高适应性。存在这两种状态的基因会使你综合表现出父母的特性。但是第23对染色体非常独特，这也是色盲双胞胎之谜的所在。这一对X和Y染色体决定着性别。绝大多数女性拥有两条X染色体，而男性拥有X、Y染色体各一条。Y染色体包含与男性特征和生殖系统相关的基因。而X染色体则包含除性征和生殖之外其他发展所需要的基因，例如神经系统的发育、骨骼肌肉功能、以及眼睛中绿色光的感受器。男性拥有X和Y染色体意味着他只能获得一组X染色体信息，进化使人们能够在无基因复制 的情况下也能实现基因的表达。但是这给拥有两条X染色体的人带来了问题。如果两条X染色体都如其他 染色体一样表达蛋白质性状，它将彻底破坏胚胎阶段的发育。为了应对这种情况，X染色体需要失活。这个过程在胚胎发育初期产生，此时的胚胎只是一团细胞。每个细胞中的一条X染色体会失活。这个过程存在一定的随机性。某细胞中，来自父亲的X染色体可能失活，而另一细胞中，失活的则是来自母亲的X染色体。失活的X染色体会萎缩成一团，称为巴尔小体。它的基因几乎无法表达蛋白质。当这些早期细胞分裂时， 每个细胞都带有失活的X染色体。一些细胞表达的是母系X染色体，而另一些则表达父系的X染色体。如果这些染色体携带不同的特质，这些差异将表现在细胞中。这也是杂色猫身上不同毛色的原因。一条X染色体上的基因决定着橙色毛， 而另一条则会产生黑色毛。毛色分布也可以体现出基因的位置。现在我们来解释色盲双胞胎的问题。二人都继承了一个变异的和一个正常的绿色光感受基因。早期胚胎在X染色体失活之前 就已分裂成双胞胎，因此每个人拥有了不同的失活模式。在发育成眼睛的细胞中，一人的正常绿光感受基因失活。由于缺失了这个基因，她无法感受绿色光，成为色盲。X染色体基因变异引起的失调病症有很多，例如色盲，或是血友病，拥有两条X染色体的个体更不容易患上这些疾病。原因在于如果人同时拥有正常和变异基因，只有部分细胞会受到变异的影响。失调的严重性取决于哪一条X染色体失活，以及这些细胞的位置。然而若某人只有一条X染色体，那么所有的细胞只能表达变异的基因。很多关于X染色体失活的问题仍然尚未解决，例如，为何某些X染色体上的基因并不会失活，为何失活并不总是随机的。我们现在只能确定基因并不是这种机制唯一的解释。

**P459 2017-04-06 Oxygen’s surprisingly complex journey through your body - Enda Butler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=459)

You breathe in about 17,000 times per day. It's a process you rarely think about, but behind the scenes, a huge coordinated effort is playing out. Your vital organs, the gut, brain, bones, lungs, blood, and heart work together to sustain your life by delivering oxygen to tissues throughout your body. Most of our cells need oxygen because it's one of the key ingredients of aerobic respiration. That's the process that produces a molecule called ATP, which our cells use to power their many incredible functions. But getting oxygen throughout our bodies is a surprisingly difficult task. Gas enters cells by diffusing in from their surroundings. And that only happens efficiently over tiny distances. So for oxygen to reach the cells within our bodies, it needs a transportation network. This is where our 20 trillion red blood cells come in. Each one contains about 270 million oxygen-binding molecules of hemoglobin, which is what gives blood its scarlet hue. To make these cells, the body uses raw materials that become available from the food we eat. So in some ways, you could say that oxygen's journey through the body really begins in the gut. Here, in an amazing display of mechanical and chemical digestion, food gets broken down into its smallest elements, like iron, the building block of hemoglobin. Iron is carried through the cardiovascular system to the body's hematopoietic tissue. This tissue is the birthplace of red blood cells, and it can be found enclosed within our bone marrow cavities. The kidneys regulate our levels of red blood cells through the release of erythropoietin, a hormone which causes marrow to increase production. Our bodies churn out roughly 2.5 million red blood cells per second, a number equivalent to the entire population of Paris, so that oxygen that makes it to the lungs will have ample transportation. But before oxygen can even reach the lungs, the brain needs to get involved. The brainstem initiates breathing by sending a message through your nervous system, all the way to muscles of the diaphragm and ribs. This causes them to contract, thus increasing the space inside the rib cage, which allows the lungs to expand. That expansion drops your lungs internal air pressure, making air rush in. It's tempting to think of our lungs as two big balloons, but they're actually a lot more complicated than that. Here's why. The red blood cells in the vessels within your lungs can only pick up oxygen molecules that are very close to them. If our lungs were shaped like balloons, air that was not in direct contact with the balloon's inner surface couldn't diffuse through. Luckily, our lungs' architecture ensures that very little oxygen is wasted. Their interior is divided into hundreds of millions of miniature balloon-like projections called alveoli that dramatically increase the contact area to somewhere around 100 square meters. The alveolar walls are made of extremely thin flat cells that are surrounded by capillaries. Together, the alveolar wall and capillaries make a two-cell thick membrane that brings blood and oxygen close enough for diffusion. These oxygen-enriched cells are then carried from the lungs through the cardiovascular network, a massive collection of blood vessels that reaches every cell in the body. If we laid this system out end to end in a straight line, the vessels would wrap around the Earth several times. Propelling red blood cells through this extensive network requires a pretty powerful pump, and that's where your heart comes in. The human heart pumps an average of about 100,000 times per day, and it's the powerhouse that ultimately gets oxygen where it needs to go, completing the body's team effort. Just think - this entire complex system is built around the delivery of tiny molecules of oxygen. If just one part malfunctioned, so would we. Breathe in. Your gut, brain, bones, lungs, blood, and heart are continuing their incredible act of coordination that keeps you alive. Breathe out.

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翻译人员: Owen Yu 校对人员: Lipeng Chen你一天大概会呼吸17000次。你很少会注意这个过程，但在这些过程背后， 包含着巨大的、协调过的努力。你至关重要的器官，肠道、大脑、骨骼、肺、血液、心脏，它们为了维持你的生命一起工作，通过运输氧气到全身的各个组织。我们身体的大多数细胞都需要氧气，因为它是生物有氧呼吸的要素之一。有氧呼吸能产生叫 三磷酸腺苷(ATP)的分子，细胞能使用这种分子 发挥出很多不可思议的功能。但是，把氧气运送到全身是 一个困难出奇的任务。气体通过扩散到周围来进入细胞。当它们之间的距离很小时， 气体才能有效地扩散。所以，氧气需要一个运输网络，以抵达身体的各个细胞。这就是我们体内20万亿红细胞的功能。每个红细胞含有2亿7千万血红蛋白，这些蛋白是导致血液是深红色的原因。我们的身体使用从食物中摄取的原材料来制造这些细胞。所以，从某种程度上，氧气在我们身体内的旅行，是从肠道开始的。这是一个关于物理消化和化学消化的展示，食物被分解成最小的元素，就像铁，血红蛋白的基本材料。铁元素通过心血管系统被运送到体内的造血组织。这些组织是红细胞的出生地，这些组织处于骨骼的骨髓腔内。肾脏通过释放红细胞生成素来控制体内的红细胞水平，红细胞生成素是一种可以促进 骨髓产生红细胞的激素。每秒钟，我们的身体会调动250万红细胞，大概是整个巴黎人口的数量，来充分地运输肺部氧气。但是，在氧气到达肺部之前，大脑需要参与这个过程。脑干会通过神经系统发送讯号到横膈膜和肋骨肌肉，从而开始呼吸。这会使肌肉收缩，从而扩大胸腔内的空间，导致肺部扩张。扩张会降低肺部空气压力，从而让空气进入到肺部。我们可以将肺部想象成两个大气球，但是实际过程却复杂得多。原因是：肺部血管内的红细胞只能取得离它们非常近的氧气分子。如果我们的肺部是气球形状的话，未能和气球内表面直接接触的空气不能扩散出去。幸运的是，我们的肺部结构保证了氧气不被浪费。它们的内部被分为了好几亿个叫做肺泡的气球状小分区，它们能使接触面积增加到大概100平米。肺泡墙是由极细的扁平细胞组成的，它们被毛细血管包围着。总的来说，肺泡墙和毛细血管 组成了2个细胞厚度的薄膜，它们能拉近血液和氧气之间的距离 到能进行气体扩散的程度。然后，这些充满氧气的细胞会被血管数量巨大的心血管系统从肺部运送到全身的各个细胞。如果我们把整个系统拉伸成一条直线，这些血管能绕地球好几圈。在这个巨大的系统中推动红细胞需要一个非常强大的泵，这就是心脏的作用。人类的心脏一天会跳动平均十万次左右，它是一个能把氧气运送到指定地点的能源中心，从而让人体能够运作。想像一下，整个复杂的系统都是围绕着氧气分子的运送系统而建造的。如果有一个部位停止运作， 整个人体也会停止工作。吸进空气。你的肠道、大脑、骨骼、肺、血液、心脏会继续这些不可思议的 协调工作来维持你的生命。呼出空气。

**P460 2017-04-07 Why do we itch - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=460)

You're standing at the ready inside the goal when suddenly, you feel an intense itch on the back of your head. We've all experienced the annoyance of an inconvenient itch, but have you ever pondered why we itch in the first place? The average person experiences dozens of individual itches each day. They can be triggered by all sorts of things, including allergic reactions, dryness, and even some diseases. And then there are the mysterious ones that pop up for no reason at all, or just from talking about itching. You're scratching your head right now, aren't you? Anyhow, let's take one of the most common sources: bug bites. When a mosquito bites you, it releases a compound into your body called an anticoagulant that prevents your blood from clotting. That compound, which we're mildly allergic to, triggers the release of histamine, a chemical that makes our capillaries swell. This enables increased blood flow, which helpfully accelerates the body's immune response to this perceived threat. That explains the swelling, and it's the same reason pollen can make your eyes puff up. Histamine also activates the nerves involved in itching, which is why bug bites make you scratch. But the itchy sensation itself isn't yet fully understood. In fact, much of what we do know comes from studying the mechanics of itching in mice. Researchers have discovered that itch signals in their skin are transmitted via a subclass of the nerves that are associated with pain. These dedicated nerves produce a molecule called natriuretic polypetide B, which triggers a signal that's carried up the spinal cord to the brain, where it creates the feeling of an itch. When we scratch, the action of our fingernails on the skin causes a low level pain signal that overrides the itching sensation. It's almost like a distraction, which creates the sensation of relief. But is there actually an evolutionary purpose to the itch, or is it simply there to annoy us? The leading theory is that our skin has evolved to be acutely aware of touch so that we're equipped to deal with risks from the outside world. Think about it. Our automatic scratching response would dislodge anything harmful that's potentially lurking on our skin, like a harmful sting, a biting insect, or the tendrils of a poisonous plant. This might explain why we don't feel itching inside our bodies, like in our intestines, which is safe from these external threats, though imagine how maddening that would be. In some people, glitches in the pathways responsible for all of this can cause excessive itching that can actually harm their health. One extreme example is a psychological condition called delusory parasitosis where people believe their bodies are infested with mites or fleas scurrying over and under their skin, making them itch incessantly. Another phenomenon called phantom itching can occur in patients who've had amputations. Because this injury has so severely damaged the nervous system, it confuses the body's normal nerve signaling and creates sensations in limbs that are no longer there. Doctors are now finding ways to treat these itching anomalies. In amputees, mirrors are used to reflect the remaining limb, which the patient scratches. That creates an illusion that tricks the brain into thinking the imaginary itch has been satisfied. Oddly enough, that actually works. Researchers are also searching for the genes involved in itching and developing treatments to try and block the pathway of an itch in extreme cases. If having an unscratchable itch feels like your own personal hell, Dante agreed. The Italian poet wrote about a section of hell where people were punished by being left in pits to itch for all eternity.

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翻译人员: Molly Qian 校对人员: Warren Liow你站在球门前，准备就绪。突然，后脑勺一阵奇痒难耐。人人都有因抓不到痒而无比烦躁的时候，但你有没有想过为什么会痒？普通人一天会感受到数十次瘙痒。原因更是五花八门，包括过敏反应、干燥，甚至某些疾病。更有一些原因不明的发痒，或只是因提到“痒”而莫名感到痒。你现在是不是正在挠头抓痒？不管怎样，我们先聊聊最常见的发痒原因：被虫咬。蚊子在叮人的时候，会向人体释放一种被称为“抗凝血剂”的化合物，它防止人体内血液凝结。人体会对这种化合物轻微过敏，进而释放出组胺，而组胺会导致毛细血管肿胀。这促使血液流量增加，有助于加快人体对该已知威胁的免疫反应。这解释了皮肤红肿的原因，花粉过敏导致眼睛肿胀也是同样的原理。组胺也会触发与痒相关的神经，这就是我们会因蚊虫叮咬而挠痒的原因。尽管如此，瘙痒感本身却尚未得到充分的认识。事实上，我们所知的大部分来源于对老鼠的瘙痒机制进行的研究。研究人员发现，老鼠的皮肤组织里的痒信号是通过属于疼痛类的某些神经传输的。这些专属神经会产生一种被称为“利钠多肽B”的分子，它会发出一个信号，由脊髓传送至大脑，造成瘙痒的感觉。当我们抓痒时，指甲触碰肌肤的动作会触发一种盖过瘙痒感的低水平疼痛信号，从而分散注意力，舒缓瘙痒感。但瘙痒感是否具有革命性作用，还是纯粹为了惹人烦躁？主流理论认为，人类的皮肤通过不断进化，最终具备敏锐地感知触碰的能力，这样更有利于人们就能抵御外界风险。想想看。人类的自主抓挠反应可以驱除潜伏在皮肤上的有害物质，例如毒虫刺伤、昆虫叮咬、或者有毒植物的藤蔓。这就可以解释为什么我们不会觉得身体内部发痒，例如肠子里，因为内脏不会遇到外部威胁。尽管如此，设想下内脏发痒，还是挺让人抓狂的。在某些人身上，过度瘙痒甚至会损害健康，这往往是由于神经通路的故障。一个极端的例子就是被称为“寄生虫妄想症”的心理疾病，患者固执地认为自己感染了螨虫或跳蚤，虫子在皮上和皮下乱窜，让他们瘙痒不停。另一种情况是幻肢瘙痒，发生在经历过截肢的病人身上。这种损伤会严重损害神经系统，迷惑身体的正常神经信号，并造成在不再存在的肢体上的感觉。如今，医生们已经找到了 治疗这种瘙痒异常的方法。在截肢者身上，用镜子反射尚存的肢体，代替已截肢的肢体让患者抓痒。这个办法制造了一个幻象来欺骗大脑，让它相信幻想的瘙痒已经得到满足了。奇怪的是，这真的行得通。研究人员也在寻找跟痒相关的基因，并且正在开发一种在极端病例里能阻断痒的神经通路的治疗方案。如果痒而不能挠会让你觉得犹如身在地狱。但丁也有同感。这位意大利诗人描写的地狱中，就有人们被罚身陷坑中，受无尽瘙痒的折磨。

**P461 2017-04-24 Why are sloths so slow - Kenny Coogan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=461)

In 1796, Thomas Jefferson received a box of bones he couldn't identify. A long, sharp claw reminded him of a lion, but the arm bones suggested a larger animal, one about three meters long. Thinking it might be huge unknown species of North American lion, Jefferson warned explorers Lewis and Clark to keep an eye out for this mysterious predator. But Jefferson's box of bones didn't come from a lion. They came from an extinct giant sloth. Prehistoric ground sloths first appeared around 35 million years ago. Dozens of species lived across North, Central and South America, alongside other ancient creatures like mastodons and giant armadillos. Some ground sloths, like the megalonychid, were cat-sized, but many were massive. Jefferson's sloth, Megalonyx, weighed about a ton, and that was small compared to megatherium, which could reach six metric tons, as much as an elephant. They ambled through the forests and savannas using their strong arms and sharp claws to uproot plants and climb trees, grazing on grasses, leaves, and prehistoric avocados. In fact, we might not have avocados today if not for the giant sloths. Smaller animals couldn't swallow the avocado's huge seed, but the sloths could, and they spread avocado trees far and wide. Ground sloths flourished for millions of years, but around 10,000 years ago, they started disappearing along with the Western Hemisphere's other giant mammals. Researchers think that ground sloths could have been pushed out by an oncoming ice age, or competition with other species, maybe humans, who arrived in the region around the time most of the sloths went extinct. Some of the smaller sloths did survive and migrated to the treetops. Today, there are six species left living in the rainforest canopies of Central and South America. Hanging out in the trees is a good way to avoid predators, and there are plenty of leaves to eat. But this diet has its drawbacks. Animals extract energy from food and use that energy to move around, maintain their body temperature, keep their organs working, and all the other activities necessary for survival. But leaves don't contain much energy, and that which they do have is tough to extract. Most herbivores supplement a leafy diet with higher energy foods like fruit and seeds. But sloths, especially three-toed sloths, rely on leaves almost exclusively. They've evolved finely tuned strategies for coping with this restricted diet. First, they extract as much energy from their food as possible. Sloths have a multi-chambered stomach that takes up a third of their body, and depending on the species, they can spend five to seven days, or even weeks, processing a meal. The other piece of the puzzle is to use as little energy as possible. One way sloths do this is, of course, by not moving very much. They spend most of their time eating, resting, or sleeping. They descend from the canopy just once a week for a bathroom break. When sloths do move, it's not very fast. It would take a sloth about five minutes to cross an average neighborhood street. This unhurried approach to life means that sloths don't need very much muscle. In fact, they have about 30% less muscle mass than other animals their size. Sloths also use less energy to keep themselves warm because their body temperature can fluctuate by about five degrees Celsius, less than a cold-blooded reptile, but more than most mammals. These physical and behavioral adaptations minimize the sloth's energy expenditure, or metabolic rate. Three-toed sloths have the slowest metabolism of any mammal. The giant panda is second slowest, and two-toed sloths come in third. Moving slowly has allowed sloths to thrive in their treetop habitat. But it's also made the sloths themselves a great habitat for other organisms, including algae, which provides a little extra camouflage, and maybe even a snack. Sloths may not be giant anymore, but that doesn't make them any less remarkable.

**P461 2017-04-24 Why are sloths so slow - Kenny Coogan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=461)

翻译人员: Jack Zhang 校对人员: Tianyu Qiao1796年，托马斯·杰斐逊 收到一箱他无法辨认的骨头。那又长又尖的爪子让他想起狮子，但它的臂骨显示其为更大型的动物，一个大约三米长的动物。想着它可能是某种 未知的大型北美狮，杰斐逊提醒探险者 刘易斯和克拉克要注意这种神秘的猛兽。但是杰斐逊的那一箱骨头 并非来自狮子，而是来自已灭绝的大型树懒。大约3500万年前， 史前陆地树懒开始出现。许多物种生活在北美， 中美和南美洲，同时生活在那里的还有其它 远古生物，比如乳齿象和巨型犰狳。一些陆地树懒像猫一样大小， 如 Megalonychid，但很多体型庞大。杰斐逊收到的树懒， 巨爪地懒，大约有一吨重，但还比不上大懒兽。大懒兽可重达六吨， 比得上一头大象。它们用强壮的手臂和利爪缓步穿过森林和热带稀树草原，拔除植物，爬树，以青草，树叶和史前牛油果为食。实际上，没有大型树懒 就没有今天的牛油果。小动物吞不了牛油果的大种子，但史前树懒可以，就是就能将其树种传播得更远。大懒兽物种繁盛了几百万年，却在一万年前开始灭绝，一同灭绝的还有 西半球其他巨型哺乳动物。研究者认为，大懒兽的灭绝可能是由于即将到来的冰河时代，或是由于与其它物种间 的竞争，也许是人类，因为在同一时期， 人类到达了美洲。一些较小的树懒确实存活了下来， 并迁移到树梢。如果，有六种树懒 住在热带雨林的顶端，它们都集中在中南美洲。挂在树上是一个 避开捕食者的好方法，还有很多叶子可供食用。但这种饮食有其缺点。动物们从食物中提取能量， 并用这种能量来移动，来保持体温，保持器官正常运作，和维持生存必要的其它活动。但叶子的能量含量并不高这仅有的能量又很难提取。大多数食草动物在吃叶子的同时 也会食用其它更高能量的食物，比如水果和籽类。但树懒，特别是三趾树懒， 几乎只吃叶子。为了以这样的饮食习惯生存下去， 它们进化出了特别的习性。首先，它们可以从食物中 提取出尽可能多的能量。树懒有一个多腔胃， 占据他们身体的三分之一，不同种类的树懒需要五到七天， 甚至几周时间来消化一顿饭。它们的另一个秘诀 是尽可能少使用能量。当然，要想避免消耗能量， 首先就要减少运动。他们大部分时间 都在吃饭，休息或睡觉。他们每周从树顶下来一次， 只是为了上个厕所。当树懒动起来时，真的很慢。它们大概需要五分钟的时间 来过一条普通的马路。这种不慌不忙的生活方式意味着 树懒并不需要很多肌肉。实际上，它们的肌肉量 比其他同体型动物要少30%。树懒使用更少的能量 也是为了保持体温，因为它们的体温 可以上下波动约五摄氏度，这个波动值低于冷血的爬行动物， 但比大多数哺乳动物要高。树懒的这些身体和行为上的适应 能帮助它们减少能量消耗，降低新陈代谢率。三趾树懒的新陈代谢率 是所有哺乳动物中最慢的。大熊猫的第二慢，双趾树懒的第三慢。行动缓慢的生活方式 让树懒们在树梢的生活得意逍遥，但也使它们自己的身体 成了其它生物的生活场所，比如藻类，藻类让树懒的外形 显得更隐蔽，也可以被当作零食享用。树懒可能不再是巨型猛兽，但那并不代表它们不够酷。

**P462 2017-04-25 Why should you read Tolstoy's 'War and Peace' - Brendan Pelsue**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=462)

"War and Peace," a tome, a slog, the sort of book you shouldn't read in bed because if you fall asleep, it could give you a concussion, right? Only partly. "War and Peace" is a long book, sure, but it's also a thrilling examination of history, populated with some of the deepest, most realistic characters you'll find anywhere. And if its length intimidates you, just image how poor Tolstoy felt. In 1863, he set out to write a short novel about a political dissident returning from exile in Siberia. Five years later, he had produced a 1,200 page epic featuring love stories, battlefields, bankruptcies, firing squads, religious visions, the burning of Moscow, and a semi-domesticated bear, but no exile and no political dissidents. Here's how it happened. Tolstoy, a volcanic soul, was born to a famously eccentric aristocratic family in 1828. By the time he was 30, he had already dropped out of Kazan University, gambled away the family fortune, joined the army, written memoirs, and rejected the literary establishment to travel Europe. He then settled into Yasnaya Polyana, his ancestral mansion, to write about the return of the Decembrists, a band of well-born revolutionaries pardoned in 1856 after 30 years in exile. But, Tolstoy thought, how could he tell the story of the Decembrists return from exile without telling the story of 1825, when they revolted against the conservative Tsar Nicholas I? And how could he do that without telling the story of 1812, when Napoleon's disastrous invasion of Russia helped trigger the authoritarianism the Decembrists were rebelling against? And how could he tell the story of 1812 without talking about 1805, when the Russians first learned of the threat Napoleon posed after their defeat at the Battle of Austerlitz? So Tolstoy began writing, both about the big events of history and the small lives that inhabit those events. He focused on aristocrats, the class he knew best. The book only occasionally touches on the lives of the vast majority of the Russian population, who were peasants, or even serfs, farmers bound to serve the owners of the land on which they lived. "War and Peace" opens on the eve of war between France and Russia. Aristocrats at a cocktail party fret about the looming violence, but then change the topic to those things aristocrats always seem to care about: money, sex, and death. This first scene is indicative of the way the book bounces between the political and personal over an ever-widening canvas. There are no main characters in "War and Peace." Instead, readers enter a vast interlocking web of relationships and questions. Will the hapless and illegitimate son of a count marry a beautiful but conniving princess? Will his only friend survive the battlefields of Austria? And what about that nice young girl falling in love with both men at once? Real historical figures mix and mingle with all these fictional folk, Napoleon appears several times, and even one of Tolstoy's ancestors plays a background part. But while the characters and their psychologies are gripping, Tolstoy is not afraid to interrupt the narrative to pose insightful questions about history. Why do wars start? What are good battlefield tactics? Do nations rise and fall on the actions of so-called great men like Napoleon, or are there larger cultural and economic forces at play? These extended digressions are part of what make "War and Peace" so panoramic in scope. But for some 19th century critics, this meant "War and Peace" barely felt like a novel at all. It was a "large, loose, baggy monster," in the words of Henry James. Tolstoy, in fact, agreed. To him, novels were a western European form. Russian writers had to write differently because Russian people lived differently. "What is 'War and Peace'?" he asked. "It is not a novel. Still less an epic poem. Still less a historical chronicle. 'War and Peace' is what the author wanted and was able to express in the form in which it was expressed." It is, in other words, the sum total of Tolstoy's imaginative powers, and nothing less. By the time "War and Peace" ends, Tolstoy has brought his characters to the year 1820, 36 years before the events he originally hoped to write about. In trying to understand his own times, he had become immersed in the years piled up behind him. The result is a grand interrogation into history, culture, philosophy, psychology, and the human response to war.

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翻译人员: Riley WANG 校对人员: Lipeng Chen《战争与和平》它是一部恢弘的巨著，也是一部呕心沥血的作品。它并不是一本枕边书， 因为如果你打算睡了，它会冲击你的心灵，不是吗？不过，这也只是对一部分人来说。《战争与和平》确实是一本很厚的书，但它精彩地展现了历史，书中充满了现实、却不乏深刻的人物。如果读这个大部头令你止步， 可以想象托尔斯泰写它时将多么痛苦。1863年，托尔斯泰本来打算 写一本关于政见不合的短篇小说，此时他刚从西伯利亚流亡回来。5年后，他洋洋洒洒写了1200页。这部著作中包含了爱情故事、战争、经济破产、消防队员、宗教、莫斯科大火、以及半驯化的熊，但是书中并未讲到流亡和政见不合。其原因如下：托尔斯泰这个暴脾气的人，1828年出生于贵族家庭， 此家庭以性格古怪而闻名。三十岁时，他从喀山大学辍学，挥霍着家族的财富，参了军，写了回忆录，选择去西欧旅游而不是潜心文学。他后来定居在 Yasnaya Polyana， 这也是他的祖居。在这里他写下了十二月党人的回归，即一群出身良好的改革分子 在经历30年流放后于1856年被赦免。但托尔斯泰认为，如果不描述十二月党人在1825年对沙皇尼古拉斯二世进行的起义，那该如何描写十二月党人的结束流放呢？这又不得不谈到1812年时拿破仑对俄罗斯的入侵事件触发了十二月党人所反对的专制主义。而描述1812年则需要描述1805年，当时俄罗斯在奥斯特里茨战役中失败，从而开始感受到拿破仑的威胁。因此，托尔斯泰决定了他既要描写历史上的重要事件，也要描写历史洪流中小人物的生活。他把目标放在自己熟悉的贵族阶层，书中只是偶尔涉及到俄罗斯的普通大众，其中包括农民，甚至农奴，这些人在当时不得不为地主服务。《战争与和平》的故事以法俄战争前夕为开始。鸡尾酒会上的贵族们 为逼近的战事而担忧，但话题迅速转向 贵族们一向关注的问题：钱、色、死亡。书的第一节也暗示了在一个前所未有的宏大背景下，情节同时在政治和个人两方面展开。《战争与和平》中并没有主角。相反，读者们会看到一张巨大的关系和问题交错的网。那个不幸的私生子能够娶到美丽但却骄纵的公主吗？他唯一的朋友能够在战争中活下来吗？那个对两个男人一见钟情 的年轻女孩又会如何呢？真实的历史人物和虚构的形象彼此交叉，拿破仑在书中出现数次，托尔斯泰的祖先甚至都在书中扮演了角色。尽管人物及其心理描写扣人心弦，托尔斯泰并不担心打断原有的叙述而提出深刻的，关于历史的问题：为什么战争会爆发？什么是好的战场战术？伟大人物，例如拿破仑， 是否决定了国家的兴亡？还是说更大的文化和 经济力量起着决定作用？这些延伸出的题外话也成就了这本巨著使其拥有更加宏大的格局。但19世纪的一些评论认为，很难说《战争与和平》是一部小说。Henry Jame 认为这是 “大部头、松散、拖沓的怪物。”事实上，托尔斯泰也承认这点。于他而言，小说是西欧的一种文学形式。而俄罗斯人民的生活方式和西欧不同， 这使得俄罗斯作家需要做出改变。他自问“什么是《战争与和平》？”“它并不是部小说，也不像一部史诗，也不是编年体历史。它是作者用一种能够表达的题材去表达他想要、并且能够表达的内容。换句话说，这是托尔斯泰全部的想象力，仅此而已。《战争与和平》结尾时，书中的时间已经回溯到1820年。这比托尔斯泰最初设想的1856年早了36年，在试图了解自己所处的时代的情况下，他沉浸在过去。最终诞生了这部追索 在战争背景下，历史、文化、哲学、心理、以及人类如何应对战争的巨著。

**P463 2017-05-01 How do nuclear power plants work - M. V. Ramana and Sajan Saini**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=463)

On a December afternoon in Chicago during the middle of World War II, scientists cracked open the nucleus at the center of the uranium atom and turned nuclear mass into energy over and over again. They did this by creating for the first time a chain reaction inside a new engineering marvel: the nuclear reactor. Since then, the ability to mine great amounts of energy from uranium nuclei has led some to bill nuclear power as a plentiful utopian source of electricity. A modern nuclear reactor generates enough electricity from one kilogram of fuel to power an average American household for nearly 34 years. But rather than dominate the global electricity market, nuclear power has declined from an all-time high of 18% in 1996 to 11% today. And it's expected to drop further in the coming decades. What happened to the great promise of this technology? It turns out nuclear power faces many hurdles, including high construction costs and public opposition. And behind these problems lie a series of unique engineering challenges. Nuclear power relies on the fission of uranium nuclei and a controlled chain reaction that reproduces this splitting in many more nuclei. The atomic nucleus is densely packed with protons and neutrons bound by a powerful nuclear force. Most uranium atoms have a total of 238 protons and neutrons, but roughly one in every 140 lacks three neutrons, and this lighter isotope is less tightly bound. Compared to its more abundant cousin, a strike by a neutron easily splits the U-235 nuclei into lighter, radioactive elements called fission products, in addition to two to three neutrons, gamma rays, and a few neutrinos. During fission, some nuclear mass transforms into energy. A fraction of the newfound energy powers the fast-moving neutrons, and if some of them strike uranium nuclei, fission results in a second larger generation of neutrons. If this second generation of neutrons strike more uranium nuclei, more fission results in an even larger third generation, and so on. But inside a nuclear reactor, this spiraling chain reaction is tamed using control rods made of elements that capture excess neutrons and keep their number in check. With a controlled chain reaction, a reactor draws power steadily and stably for years. The neutron-led chain reaction is a potent process driving nuclear power, but there's a catch that can result in unique demands on the production of its fuel. It turns out, most of the neutrons emitted from fission have too much kinetic energy to be captured by uranium nuclei. The fission rate is too low and the chain reaction fizzles out. The first nuclear reactor built in Chicago used graphite as a moderator to scatter and slow down neutrons just enough to increase their capture by uranium and raise the rate of fission. Modern reactors commonly use purified water as a moderator, but the scattered neutrons are still a little too fast. To compensate and keep up the chain reaction, the concentration of U-235 is enriched to four to seven times its natural abundance. Today, enrichment is often done by passing a gaseous uranium compound through centrifuges to separate lighter U-235 from heavier U-238. But the same process can be continued to highly enrich U-235 up to 130 times its natural abundance and create an explosive chain reaction in a bomb. Methods like centrifuge processing must be carefully regulated to limit the spread of bomb-grade fuel. Remember, only a fraction of the released fission energy goes into speeding up neutrons. Most of the nuclear power goes into the kinetic energy of the fission products. Those are captured inside the reactor as heat by a coolant, usually purified water. This heat is eventually used to drive an electric turbine generator by steam just outside the reactor. Water flow is critical not only to create electricity, but also to guard against the most dreaded type of reactor accident, the meltdown. If water flow stops because a pipe carrying it breaks, or the pumps that push it fail, the uranium heats up very quickly and melts. During a nuclear meltdown, radioactive vapors escape into the reactor, and if the reactor fails to hold them, a steel and concrete containment building is the last line of defense. But if the radioactive gas pressure is too high, containment fails and the gasses escape into the air, spreading as far and wide as the wind blows. The radioactive fission products in these vapors eventually decay into stable elements. While some decay in a few seconds, others take hundreds of thousands of years. The greatest challenge for a nuclear reactor is to safely contain these products and keep them from harming humans or the environment. Containment doesn't stop mattering once the fuel is used up. In fact, it becomes an even greater storage problem. Every one to two years, some spent fuel is removed from reactors and stored in pools of water that cool the waste and block its radioactive emissions. The irradiated fuel is a mix of uranium that failed to fission, fission products, and plutonium, a radioactive material not found in nature. This mix must be isolated from the environment until it has all safely decayed. Many countries propose deep time storage in tunnels drilled far underground, but none have been built, and there's great uncertainty about their long-term security. How can a nation that has existed for only a few hundred years plan to guard plutonium through its radioactive half-life of 24,000 years? Today, many nuclear power plants sit on their waste, instead, storing them indefinitely on site. Apart from radioactivity, there's an even greater danger with spent fuel. Plutonium can sustain a chain reaction and can be mined from the waste to make bombs. Storing spent fuel is thus not only a safety risk for the environment, but also a security risk for nations. Who should be the watchmen to guard it? Visionary scientists from the early years of the nuclear age pioneered how to reliably tap the tremendous amount of energy inside an atom - as an explosive bomb and as a controlled power source with incredible potential. But their successors have learned humbling insights about the technology's not-so-utopian industrial limits. Mining the subatomic realm makes for complex, expensive, and risky engineering.

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翻译人员: Hongji Zhang 校对人员: Yolanda Zhang二战期间，在芝加哥 一个十二月的下午，科学家们破开了铀原子中心的原子核，并反复地将核物质转化为能量。他们第一次在一个新的工程奇迹里创造出了一个连锁反应：核反应堆。从那时起，从铀原子核中 开采大量能量的能力使核电被一些人列为一种理想，丰富的电力来源。一个现代核反应堆可以从 一公斤的燃料里产生足够的电力，供给一个美国普通家庭近34年。但与主宰全球电力市场相反的是，核电从1996年18%的历史最高点下降到现在的11％。而且预计在未来的 几十年里它将进一步下滑。这项技术的巨大前景去哪儿了？事实证明，核电还面临着很多问题，包括昂贵的建设成本和公众的反对。而且这些问题背后还有 一系列独特的工程挑战。核能依赖于铀的核裂变和一个可控的复制性核裂变的链式反应。原子核密集地包裹着由强大核力所束缚的质子和中子。大多数铀原子总共有 238个质子和中子，但是每140个原子中大约 有一个缺少三个中子，而且这种较轻的同位素结构并不紧密。与它的近亲相比，中子的撞击很容易 将铀 - 235的原子核分成更轻的，叫做 裂变产物的放射性元素，两到三个中子，伽马射线，和一些中微子。在裂变过程中，一些核物质被转化为能量。新发现的能量中的一小部分 为速移的中子提供了能量，如果它们中的一些撞到了铀原子核，那么裂变将产生第二代更多的中子。如果这第二代中子撞到更多的铀原子核，更多的裂变会导致 更庞大的第三代，以此类推。但在核反应堆里，这种螺旋链式反应使用元素控制棒来捕捉多余的中子，并控制它们的数量。采用可控链式反应，反应器可稳定供电数年。以中子领导的链式反应 是驱动核电的重要过程，但有一个隐情会导致一些其燃料生产的独特要求。事实证明，裂变产生的 大部分中子有太多的动能，无法被铀核捕捉到。这导致裂变率太低， 链式反应会逐渐消失。芝加哥的第一个核反应堆 用石墨作为慢化剂来分散，减缓中子直到它们被铀捕抓到，从而提高裂变的速度。现代反应堆通常使用纯化水作为慢化剂，但散射的中子还是很快。为了维持链式反应，铀-235浓度会被浓缩到天然浓度的4至7倍。现今，浓缩通常是由气态铀化合物通过离心机从较重的 铀-238 分出 较轻的 铀-235来实现。但同样的步骤也可以 继续来使铀-235高量浓缩致它的天然丰度的130倍，并在炸弹中创造出爆破连锁反应。像这种离心处理的步骤必须小心处理来限制核燃料的扩散。记住，只有一丁点的核裂变能是从加速中子运动中得来的。大部分核能是核裂变产生的动能这些能量获取于在反应堆内部加温冷却剂，通常是纯净水。这些热量最终会被用来在反应堆外部蒸汽驱动汽轮机。水的流动不仅对制造电流十分关键，它还被用来防备最可怕的反应堆事故，溶解。如果承载水流的管道破裂，或者水泵失灵，铀就会迅速升温并溶解。在核溶解过程中，放射性蒸汽会浸入反应堆，如果反应堆无法承受它们，那么坚固的钢铁容器将成为最后的防线。但如果放射性气压太高，容器无法阻拦它， 那么放射性气体就会渗入空气，然后被风广泛散播。这些蒸汽中的放射性裂变物质会最终衰退成稳定元素。有的物质会在几秒钟内定型，但有的则需要上百上千年的时间。对于一个核反应堆的最大挑战就是安全的存储这些放射性元素并使它们不能伤害到人类与自然。核燃料的耗尽不代表 放射性元素储存不再是个问题。实际上，存储变成了一个更严重的问题。每过一两年，一些用完的燃料就会被从反应堆中提走，然后储存在废水池中来冷却这些残渣和隔绝辐射。辐射性燃料是由裂变失败的铀，裂变过的铀，和一种自然中不存在的 放射性钚混合而成的。这种混合物必须在它变得安全稳定化之前从自然环境中隔离出来。许多国家都计划在深层地下管道中 长期储存这些混合物，但都没有付诸实施，并且这些项目的长期安全性 还存在着不确定性要素。一个只存在了几百年的国家又怎么能计划去安存 半衰期为24000年的钚元素呢？今天，核能设施都建设在核废料上面，而这些废料并没有得到合理储存。不单是核辐射， 用过的核燃料可能更加危险。钚可以经受连锁核反应并可以从残渣中被挖掘出来制造新的炸弹。核废料的储存不仅对环境有着安全威胁，对于一个国家来说，它也有着安全隐患。那谁又该是这些燃料的监管者呢？科学家先驱在核年代伊始率先开发出了可靠的能将大量能量从原子中提取并制成炸弹，和拥有无限潜力的可控能源的方法。但后继者们却只惭愧的学习到了受工业限制的非理想科技。次原子领域的开采成为了复杂， 昂贵，和有风险的工程。

**P464 2017-05-02 How does your body process medicine - Céline Valéry**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=464)

Have you ever wondered what happens to a painkiller, like ibuprofen, after you swallow it? Medicine that slides down your throat can help treat a headache, a sore back, or a throbbing sprained ankle. But how does it get where it needs to go in the first place? The answer is that it hitches a ride in your circulatory blood stream, cycling through your body in a race to do its job before it's snared by organs and molecules designed to neutralize and expel foreign substances. This process starts in your digestive system. Say you swallow an ibuprofen tablet for a sore ankle. Within minutes, the tablet starts disintegrating in the acidic fluids of your stomach. The dissolved ibuprofen travels into the small intestine and then across the intestinal wall into a network of blood vessels. These blood vessels feed into a vein, which carries the blood, and anything in it, to the liver. The next step is to make it through the liver. As the blood and the drug molecules in it travel through liver blood vessels, enzymes attempt to react with the ibuprofen molecules to neutralize them. The damaged ibuprofen molecules, called metabolites, may no longer be effective as painkillers. At this stage, most of the ibuprofen makes it through the liver unscathed. It continues its journey out of the liver, through veins, into the body's circulatory system. Half an hour after you swallow the pill, some of the dose has already made it into the circulatory blood stream. This blood loop travels through every limb and organ, including the heart, brain, kidneys, and back through the liver. When ibuprofen molecules encounter a location where the body's pain response is in full swing, they bind to specific target molecules that are a part of that reaction. Painkillers, like ibuprofen, block the production of compounds that help the body transmit pain signals. As more drug molecules accumulate, the pain-cancelling affect increases, reaching a maximum within about one or two hours. Then the body starts efficiently eliminating ibuprofen, with the blood dose decreasing by half every two hours on average. When the ibuprofen molecules detach from their targets, the systemic blood stream carries them away again. Back in the liver, another small fraction of the total amount of the drug gets transformed into metabolites, which are eventually filtered out by the kidneys in the urine. The loop from liver to body to kidneys continues at a rate of about one blood cycle per minute, with a little more of the drug neutralized and filtered out in each cycle. These basic steps are the same for any drug that you take orally, but the speed of the process and the amount of medicine that makes it into your blood stream varies based on drug, person, and how it gets into the body. The dosing instructions on medicine labels can help, but they're averages based on a sample population that doesn't represent every consumer. And getting the dose right is important. If it's too low, the medicine won't do its job. If it's too high, the drug and its metabolites can be toxic. That's true of any drug. One of the hardest groups of patients to get the right dosage for are children. That's because how they process medicine changes quickly, as do their bodies. For instance, the level of liver enzymes that neutralize medication highly fluctuates during infancy and childhood. And that's just one of many complicating factors. Genetics, age, diet, disease, and even pregnancy influence the body's efficiency of processing medicine. Some day, routine DNA tests may be able to dial in the precise dose of medicine personalized to your liver efficiency and other factors, but in the meantime, your best bet is reading the label or consulting your doctor or pharmacist, and taking the recommended amounts with the recommended timing.

**P464 2017-05-02 How does your body process medicine - Céline Valéry**

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翻译人员: Cherry Zhou 校对人员: Lipeng Chen你可曾想过一片止痛药如布洛芬，被你吞下以后会发生什么事情吗？你吞下的药物可以治疗头痛，背疼，或者还在隐隐作痛扭伤了的踝关节。但它是怎样在第一时间 就到达它需要前往的地方呢？答案就是它会搭上你血液循环的便车，在它被身体器官和能够中和和驱除外来物质的特定分子捕捉到之前，在你身体里流通的时候赶紧去完成它的工作。这个过程发生在你的消化系统中。设想你关节疼痛，因此你吞下了一枚布洛芬片。几分钟内，药片开始在 你胃部的酸性液体中分解。溶解了的布洛芬片会来到小肠，然后穿过小肠璧进入血管网络。这些血管会汇入静脉，静脉会运送血液和血液中含有的任何物质到肝脏。下一步就是让它通过肝脏。血液和药物分子流经肝脏血管的时候，酶会跟布洛芬分子发生反应。来中和它们。被破坏的布洛芬分子，亦称代谢物，或许不能再起到止痛片的作用了。在这一阶段，绝大多数布洛芬会让自己 在免受伤害的情况下穿过肝脏。离开肝脏之后它继续自己的旅程，流经静脉，进入人体的循环系统。在你吞下药片的半小时后，部分剂量已经参与到血液循环过程。这种血液循环会流经四肢和人体器官，包括心脏、大脑和肾脏，然后回到肝脏。当布洛芬分子遇到一个地方正发出身体疼痛的强烈信号，它们会跟能引起化学反应的特定靶分子结合。止痛片像布洛芬会限制化合物的产生，这些化合物会帮助人体传递疼痛信号。药物分子积聚得越多，减轻疼痛的效果就越显著，大概在一至两小时内会达到最大值。然后身体开始高效消除布洛芬，平均每两个小时血液中的药物剂量就会减半。当布洛芬分子从靶分子中分离出来，血液循环系统会再次把它们运载出去。回到肝脏，而药物中的另一小部分会转化为代谢物，这些代谢物最终会被肾脏过滤掉而后变成尿液。从肝脏到人体再到肾脏的血液循环速率大概是每分钟一次，每次循环就会有更多的药物被中和和过滤掉。无论你口服什么药物， 这些基本步骤都是会发生的，只是过程的速率和进入你血液循环的药物剂量会因药物种类，不同的人，以及如何进入人体体内而有所差异。药物标签上的剂量介绍能给你提供帮助，但它们只是取了样本人口的平均值，并不代表每一位消费者。而摄取正确的剂量是很重要的。如果剂量太低，药物起不了作用。如果剂量太高，药物产生的代谢物可能会有毒性。这是对任何药物都适用的道理。最难摄取到正确剂量的群体之一就是儿童。因为他们的身体处理药物的过程变化得太快了。例如中和药物的肝脏酶水平，在婴儿和儿童时期波动起伏很大。而这只是众多复杂因素中的一种。遗传、年龄、饮食疾病、甚至是怀孕期都会影响身体处理药物的效率。或许有一天常规的DNA测试可以 根据你肝脏功能效率和其他因素测量药物的精确剂量。但与此同时，你最好的选择就是阅读药物标签，或者咨询你的医生或者药剂师，然后在建议的时间内服用推荐剂量。

**P465 2017-05-02 What is entropy - Jeff Phillips**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=465)

There's a concept that's crucial to chemistry and physics. It helps explain why physical processes go one way and not the other: why ice melts, why cream spreads in coffee, why air leaks out of a punctured tire. It's entropy, and it's notoriously difficult to wrap our heads around. Entropy is often described as a measurement of disorder. That's a convenient image, but it's unfortunately misleading. For example, which is more disordered - a cup of crushed ice or a glass of room temperature water? Most people would say the ice, but that actually has lower entropy. So here's another way of thinking about it through probability. This may be trickier to understand, but take the time to internalize it and you'll have a much better understanding of entropy. Consider two small solids which are comprised of six atomic bonds each. In this model, the energy in each solid is stored in the bonds. Those can be thought of as simple containers, which can hold indivisible units of energy known as quanta. The more energy a solid has, the hotter it is. It turns out that there are numerous ways that the energy can be distributed in the two solids and still have the same total energy in each. Each of these options is called a microstate. For six quanta of energy in Solid A and two in Solid B, there are 9,702 microstates. Of course, there are other ways our eight quanta of energy can be arranged. For example, all of the energy could be in Solid A and none in B, or half in A and half in B. If we assume that each microstate is equally likely, we can see that some of the energy configurations have a higher probability of occurring than others. That's due to their greater number of microstates. Entropy is a direct measure of each energy configuration's probability. What we see is that the energy configuration in which the energy is most spread out between the solids has the highest entropy. So in a general sense, entropy can be thought of as a measurement of this energy spread. Low entropy means the energy is concentrated. High entropy means it's spread out. To see why entropy is useful for explaining spontaneous processes, like hot objects cooling down, we need to look at a dynamic system where the energy moves. In reality, energy doesn't stay put. It continuously moves between neighboring bonds. As the energy moves, the energy configuration can change. Because of the distribution of microstates, there's a 21% chance that the system will later be in the configuration in which the energy is maximally spread out, there's a 13% chance that it will return to its starting point, and an 8% chance that A will actually gain energy. Again, we see that because there are more ways to have dispersed energy and high entropy than concentrated energy, the energy tends to spread out. That's why if you put a hot object next to a cold one, the cold one will warm up and the hot one will cool down. But even in that example, there is an 8% chance that the hot object would get hotter. Why doesn't this ever happen in real life? It's all about the size of the system. Our hypothetical solids only had six bonds each. Let's scale the solids up to 6,000 bonds and 8,000 units of energy, and again start the system with three-quarters of the energy in A and one-quarter in B. Now we find that chance of A spontaneously acquiring more energy is this tiny number. Familiar, everyday objects have many, many times more particles than this. The chance of a hot object in the real world getting hotter is so absurdly small, it just never happens. Ice melts, cream mixes in, and tires deflate because these states have more dispersed energy than the originals. There's no mysterious force nudging the system towards higher entropy. It's just that higher entropy is always statistically more likely. That's why entropy has been called time's arrow. If energy has the opportunity to spread out, it will.

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翻译人员: Qichun Dai 校对人员: Yolanda Zhang在化学和物理领域里 有一个非常重要的概念。这个概念可以解释为什么物理过程 会这样发生，而不是另一种结果：为什么冰会融化，为什么奶油会在咖啡中扩散，为什么空气会从穿孔的轮胎中泄露。这个概念就是熵，这是一个 让人很难理解的概念。熵通常被描述为不规则运动的量度。这是一个很方便让人理解的解释， 但却很容易产生误解。比如说，以下哪种情形 更加的无规则呢？是一杯碎冰块，还是一杯室温的水？大多数人会说冰块会更无规则，但是实际上冰块比水有更低的熵值。这儿有另一种理解熵的方法， 那就是通过概率。这个方法或许更难理解， 但一旦消化这个概念，你就会对熵有一个更深刻的理解。想象两个小块的固体，这两个固体都有六个化学键。在这个模型中， 固体的能量都存在化学键中。这些化学键可以被理解为 一个简单的容器，可以用来储存不可分割的 最小单位的能量，量子。一个固体的能量越高，温度就也越高。能量在这两个固体中分布的方式有无数种，并且这些分布方式都保证 两个固体加起来所拥有的总能量相等。每个分布方式都称作一种微态。比如说分布六个量子的能量在固体A中， 两个量子的能量在固体B中，这就有9702种微态。当然，这八个量子在两个固体中 还有其他的分布方式。比如说，所有的量子可以全都 分布在固体A中，而B中没有量子，还可以A，B固体各分一半量子。如果我们假设每种微态 发生的概率相等，我们可以发现有些能量分布发生的概率会高于其他。这是因为这样的能量分布 包含更多数量的微态。熵是每种能量分布状态的概率衡量。我们所观察到的是，能量在固体间最分散，熵值就最高。所以总体而言，熵可以被想成 能量分散的一种衡量指标。低的熵值表明能量是集中的。高的熵值则代表能量是分散的。为了理解为什么熵的概念 可以解释自然发生的过程，比如说热的物体会冷却，我们需要理解能量流动的动态系统。实际上，能量不会静止不动。而是会不停地在相邻的化学键中移动。随着能量的移动，能量的分布也会随之改变。由于微态的分布，能量极大程度分散的分布概率有21% ，13%的概率能量分布 会回到最初的状态，固体A能量增加的概率是8%。别忘了，我们看到这种现象 是因为分散能量的分布方式更多，所以我们更有可能观察到高熵值， 而不是能量集中的低熵值状态，能量更倾向于分散。这就是为什么如果你把一个 热的物体放在一个冷的物体旁，冷的物体会变热，而热的物体会冷却。但即使是在刚刚的例子里，还是有8%的概率热的物体会变得更热，那为什么这种事情从来都 没有在现实生活中发生过呢？这是因为系统的尺寸。我们假设的两个固体 每个只有六个化学键。如果我们假设每个固体有6000化学键， 需要分配的总能量为8000量子，我们再次将四分之三的能量分配给A，四分之一的能量分配给B。现在我们可以发现，A物体 能够自发获得更多能量的概率是这样一个微小的数字。同理，日常物体中会 包含比这多得多的小物体。在现实世界里，一个物体会变热的概率是一个异常小的数字，小到根本不会发生。冰块融化，奶油溶解，轮胎泄气，都是因为这些状态比 原有的状态有更加分散的能量。没有任何神秘的力量 推着系统去往一个更高的熵值。只是因为高熵值总是 在统计上更加可能发生。这就是为什么熵又被成为时间向导。如果能量有机会分散，它就会发生。

**P466 2017-05-03 The history of tea - Shunan Teng**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=466)

During a long day spent roaming the forest in search of edible grains and herbs, the weary divine farmer Shennong accidentally poisoned himself 72 times. But before the poisons could end his life, a leaf drifted into his mouth. He chewed on it and it revived him, and that is how we discovered tea. Or so an ancient legend goes at least. Tea doesn't actually cure poisonings, but the story of Shennong, the mythical Chinese inventor of agriculture, highlights tea's importance to ancient China. Archaeological evidence suggests tea was first cultivated there as early as 6,000 years ago, or 1,500 years before the pharaohs built the Great Pyramids of Giza. That original Chinese tea plant is the same type that's grown around the world today, yet it was originally consumed very differently. It was eaten as a vegetable or cooked with grain porridge. Tea only shifted from food to drink 1,500 years ago when people realized that a combination of heat and moisture could create a complex and varied taste out of the leafy green. After hundreds of years of variations to the preparation method, the standard became to heat tea, pack it into portable cakes, grind it into powder, mix with hot water, and create a beverage called muo cha, or matcha. Matcha became so popular that a distinct Chinese tea culture emerged. Tea was the subject of books and poetry, the favorite drink of emperors, and a medium for artists. They would draw extravagant pictures in the foam of the tea, very much like the espresso art you might see in coffee shops today. In the 9th century during the Tang Dynasty, a Japanese monk brought the first tea plant to Japan. The Japanese eventually developed their own unique rituals around tea, leading to the creation of the Japanese tea ceremony. And in the 14th century during the Ming Dynasty, the Chinese emperor shifted the standard from tea pressed into cakes to loose leaf tea. At that point, China still held a virtual monopoly on the world's tea trees, making tea one of three essential Chinese export goods, along with porcelain and silk. This gave China a great deal of power and economic influence as tea drinking spread around the world. That spread began in earnest around the early 1600s when Dutch traders brought tea to Europe in large quantities. Many credit Queen Catherine of Braganza, a Portuguese noble woman, for making tea popular with the English aristocracy when she married King Charles II in 1661. At the time, Great Britain was in the midst of expanding its colonial influence and becoming the new dominant world power. And as Great Britain grew, interest in tea spread around the world. By 1700, tea in Europe sold for ten times the price of coffee and the plant was still only grown in China. The tea trade was so lucrative that the world's fastest sailboat, the clipper ship, was born out of intense competition between Western trading companies. All were racing to bring their tea back to Europe first to maximize their profits. At first, Britain paid for all this Chinese tea with silver. When that proved too expensive, they suggested trading tea for another substance, opium. This triggered a public health problem within China as people became addicted to the drug. Then in 1839, a Chinese official ordered his men to destroy massive British shipments of opium as a statement against Britain's influence over China. This act triggered the First Opium War between the two nations. Fighting raged up and down the Chinese coast until 1842 when the defeated Qing Dynasty ceded the port of Hong Kong to the British and resumed trading on unfavorable terms. The war weakened China's global standing for over a century. The British East India company also wanted to be able to grow tea themselves and further control the market. So they commissioned botanist Robert Fortune to steal tea from China in a covert operation. He disguised himself and took a perilous journey through China's mountainous tea regions, eventually smuggling tea trees and experienced tea workers into Darjeeling, India. From there, the plant spread further still, helping drive tea's rapid growth as an everyday commodity. Today, tea is the second most consumed beverage in the world after water, and from sugary Turkish Rize tea, to salty Tibetan butter tea, there are almost as many ways of preparing the beverage as there are cultures on the globe.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=466)

翻译人员: Riley WANG 校对人员: Jenny Yang在森林里转了一整天寻找可吃的谷物和草药疲惫的神农已经中毒了72次。但就在他毒发身亡之前，一片叶子飘落进他的嘴中。他嚼了嚼树叶，又恢复了活力这就是发现茶叶的过程至少古代神话故事是这样讲述的。茶叶其实并不能解毒，但是神农作为中国农业的发明者但是神农作为中国农业的发明者突出了茶在古代中国的重要性考古证据显示茶最早培育在中国距今有6000年左右，比法老修建金字塔早了1500年。早先的中国茶作物与现在遍及全球的茶树一致但食用它的方法与现在却大不相同它最早作为蔬菜食用或用来煮粥它从食品变为饮品是在1500年前，那时的人们意识到加热和水汽可以使这种树叶产生出复杂而多变的口感制茶方式经过了几百年的演化形成了现在的标准流程，包括加热茶叶，压制成便携的茶饼，磨成粉末冲入热水，由此便得到了末茶末茶风靡一时，独特的中国茶文化也由此产生。茶变成了诗歌和书籍的主题，成为了皇帝最爱的饮料，也是艺术家创作的载体他们能够在茶水泡沫中作画与现在咖啡店在蒸馏咖啡上作画十分相似在9世纪，唐朝时期一位日本和尚将第一柱茶作物带到日本日本人最终形成了自己独特的品茶习惯从而产生了茶道在14世纪，明朝时期中国的皇帝将制作茶饼这种方式转变为分散的茶叶此时，中国仍然独占着世界上全部的茶树茶树，与陶瓷和丝绸共同作为中国出口的三大商品这给中国带来了强大的权力和经济影响力因为此时喝茶这一习俗已遍及全球这股风潮在1600年代达到最盛在此期间，荷兰商人将茶大量带到欧洲很多人认为葡萄牙尊贵的女王凯瑟琳皇后在1661年嫁给英国国王查尔斯二世从而使英国贵族阶层爱上了茶当时的英国正在扩张殖民地，并日渐成为世界的领导力量随着英国的壮大，对茶的兴趣遍及世界1700年的欧洲市场上， 茶的价格已经达到了咖啡的十倍但此时茶树仍然只在中国生长茶叶贸易看起来如此诱人世界上最快的帆船就因西方贸易公司之间的激烈竞争而诞生这些船只飞速地将茶叶带回欧洲从而最大化公司的利润起初，英国用银币支付茶叶当这变得过于昂贵时，他们提出用鸦片进行交换这引发了中国的公共健康问题人们吸食鸦片成瘾。到了1839年，一位中国官员下令销毁了大量英国运来的鸦片这被视为对抗英国对中国施加的影响这一行为触发了两国之间第一次鸦片战争斗争在中国沿岸此起彼伏，直到1842年清政府战败，割让香港岛给英国并接受贸易不平等条款这场战争削弱了中国的全球地位长达一个世纪。英国的东印度公司也想要种植茶作物，并进一步控制茶市场因此他们委派植物学家Robert Fortune秘密行动前往中国偷取茶叶他伪装自己，开始了这段危险的旅程他经过中国种植茶的山区偷运出了茶树以及有经验的制茶工人将他们带到印度大吉岭。经由此，茶树广泛传播促进了茶叶迅速普及成为了日常饮品现在，茶的饮用量仅次于水位于世界第二，从甜味的土耳其黑茶到咸味的西藏酥油茶茶的制作方法如此之多有如世界上不同文化的数量

**P467 2017-05-04 Check your intuition - The birthday problem - David Knuffke**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=467)

Imagine a group of people. How big do you think the group would have to be before there's more than a 50% chance that two people in the group have the same birthday? Assume for the sake of argument that there are no twins, that every birthday is equally likely, and ignore leap years. Take a moment to think about it. The answer may seem surprisingly low. In a group of 23 people, there's a 50.73% chance that two people will share the same birthday. But with 365 days in a year, how's it possible that you need such a small group to get even odds of a shared birthday? Why is our intuition so wrong? To figure out the answer, let's look at one way a mathematician might calculate the odds of a birthday match. We can use a field of mathematics known as combinatorics, which deals with the likelihoods of different combinations. The first step is to flip the problem. Trying to calculate the odds of a match directly is challenging because there are many ways you could get a birthday match in a group. Instead, it's easier to calculate the odds that everyone's birthday is different. How does that help? Either there's a birthday match in the group, or there isn't, so the odds of a match and the odds of no match must add up to 100%. That means we can find the probability of a match by subtracting the probability of no match from 100. To calculate the odds of no match, start small. Calculate the odds that just one pair of people have different birthdays. One day of the year will be Person A's birthday, which leaves only 364 possible birthdays for Person B. The probability of different birthdays for A and B, or any pair of people, is 364 out of 365, about 0.997, or 99.7%, pretty high. Bring in Person C. The probability that she has a unique birthday in this small group is 363 out of 365 because there are two birthdates already accounted for by A and B. D's odds will be 362 out of 365, and so on, all the way down to W's odds of 343 out of 365. Multiply all of those terms together, and you'll get the probability that no one shares a birthday. This works out to 0.4927, so there's a 49.27% chance that no one in the group of 23 people shares a birthday. When we subtract that from 100, we get a 50.73% chance of at least one birthday match, better than even odds. The key to such a high probability of a match in a relatively small group is the surprisingly large number of possible pairs. As a group grows, the number of possible combinations gets bigger much faster. A group of five people has ten possible pairs. Each of the five people can be paired with any of the other four. Half of those combinations are redundant because pairing Person A with Person B is the same as pairing B with A, so we divide by two. By the same reasoning, a group of ten people has 45 pairs, and a group of 23 has 253. The number of pairs grows quadratically, meaning it's proportional to the square of the number of people in the group. Unfortunately, our brains are notoriously bad at intuitively grasping non-linear functions. So it seems improbable at first that 23 people could produce 253 possible pairs. Once our brains accept that, the birthday problem makes more sense. Every one of those 253 pairs is a chance for a birthday match. For the same reason, in a group of 70 people, there are 2,415 possible pairs, and the probability that two people have the same birthday is more than 99.9%. The birthday problem is just one example where math can show that things that seem impossible, like the same person winning the lottery twice, actually aren't unlikely at all. Sometimes coincidences aren't as coincidental as they seem.

**P467 2017-05-04 Check your intuition - The birthday problem - David Knuffke**

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翻译人员: Riley WANG 校对人员: Lipeng Chen设想有一组人。当人数达到多少时，其中两人生日相同的概率会超过50%？假设这人群中没有双胞胎，所有人的生日概率都相等，并且排除掉闰年的存在。花一点时间想想。所需要的人数其实是相当少的。若一组有23个人，那么两个人有相同生日的概率是50.73%。但一年有365天这么多天，为什么只需要这么少的人就可以使其中两人生日相同？为什么我们的直觉是如此错误的？为了找到答案，让我们看看数学家是如何计算生日相同的概率的。我们可以使用组合数学的分析方法，它用来计算不同组合的概率。首先我们需要转换问题，直接计算生日相同的概率是很困难的，因为二人相同的生日可能是在任一天。相反，计算每个人生日不同的概率是更简单的。这对于问题有什么帮助呢？一组人中，要么有两人生日相同，要么没有，所以这两种情况的概率相加必然等于100%这意味着我们可以通过将无相同生日的概率从100%中减去 而得到有相同生日的概率。让我们先考虑简单情况。先从只有一对人拥有不同生日开始。假定对象A的生日是某天，那么对象B的生日就是其余364天之一。对象A和B或是任何两人生日不同的概率就是364/365，大约是99.7%，非常高的概率。我们再引入对象C。她和其他人生日都不同的概率是363/365，因为已经有两个日期被对象A和B占用。对象D不与他人生日相同的概率是362/365，以此类推，到对象W是概率为343/365。将这些数字相乘，就会得到没有人生日相同的概率。结果是0.4927，所以23人当中，大家生日都不同的概率是49.27%。再用100%减去这个数值，就得到50.73%，这就是至少有两个人生日相同的概率，已经超过了50%。在人数如此少的小组中出现高概率，其关键在于可能的组合数量巨大。随着人数增加，可能出现的组合数量会快速增加。5人当中就有10种不同的组合方式。五个人的任何一人都可以和其他四人构成组合。其中一半是重复计算，因为对象A+对象B的组合与对象B+对象A相同，所以我们将数字除以2。相同的道理，10个人当中就会出现45对组合，23人当中会有253对组合。组合的数量成倍增加，即以小组人数的基数的成比例增长。不幸的是，我们的大脑非常不擅长直接处理非线性函数。所以23人就有253种配对组合看上去是不可能的。一旦明白了这个道理，生日问题就变得合理了。253对组合中的人都能找到生日相同的另一半。同样的，在70个人构成的小组中，组合数量能达到2415个，两个人拥有相同生日的概率超过了99.9%。生日问题是一个很好的例子展示出数学可以解释看起来不可能的事情，例如同一个人中两次彩票，不是几乎不可能的。有时巧合并没有看上去那么巧。

**P468 2017-05-11 History’s deadliest colors - J. V. Maranto**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=468)

In 1898, Marie and Pierre Curie discovered radium. Claimed to have restorative properties, radium was added to toothpaste, medicine, water, and food. A glowing, luminous green, it was also used in beauty products and jewelry. It wasn't until the mid-20th century we realized that radium's harmful effects as a radioactive element outweighed its visual benefits. Unfortunately, radium isn't the only pigment that historically seemed harmless or useful but turned out to be deadly. That lamentable distinction includes a trio of colors and pigments that we've long used to decorate ourselves and the things we make: white, green, and orange. Our story begins with white. As far back as the 4th century BCE, the Ancient Greeks treated lead to make the brilliant white pigment we know today. The problem? In humans, lead is directly absorbed into the body and distributed to the blood, soft tissues, and mineralized tissues. Once in the nervous system, lead mimics and disrupts the normal functions of calcium, causing damages ranging from learning disabilities to high blood pressure. Yet the practice of using this toxic pigment continued across time and cultures. Lead white was the only practical choice for white oil or tempera paint until the 19th century. To make their paint, artists would grind a block of lead into powder, exposing highly toxic dust particles. The pigment's liberal use resulted in what was known as painter's colic, or what we'd now call lead poisoning. Artists who worked with lead complained of palseys, melancholy, coughing, enlarged retinas, and even blindness. But lead white's density, opacity, and warm tone were irresistible to artists like Vermeer, and later, the Impressionists. Its glow couldn't be matched, and the pigment continued to be widely used until it was banned in the 1970s. As bad as all that sounds, white's dangerous effects pale in comparison to another, more wide-spread pigment, green. Two synthetic greens called Scheele's Green and Paris Green were first introduced in the 18th century. They were far more vibrant and flashy than the relatively dull greens made from natural pigments, so they quickly became popular choices for paint as well as dye for textiles, wallpaper, soaps, cake decorations, toys, candy, and clothing. These green pigments were made from a compound called cupric hydrogen arsenic. In humans, exposure to arsenic can damage the way cells communicate and function. And high levels of arsenic have been directly linked to cancer and heart disease. As a result, 18th century fabric factory workers were often poisoned, and women in green dresses reportedly collapsed from exposure to arsenic on their skin. Bed bugs were rumored not to live in green rooms, and it's even been speculated that Napoleon died from slow arsenic poisoning from sleeping in his green wallpapered bedroom. The intense toxicity of these green stayed under wraps until the arsenic recipe was published in 1822. And a century later, it was repurposed as an insecticide. Synthetic green was probably the most dangerous color in widespread use, but at least it didn't share radium's property of radioactivity. Another color did, though - orange. Before World War II, it was common for manufacturers of ceramic dinnerware to use uranium oxide in colored glazes. The compound produced brilliant reds and oranges, which were appealing attributes, if not for the radiation they emitted. Of course, radiation was something we were unaware of until the late 1800s, let alone the associated cancer risks, which we discovered much later. During World War II, the U.S. government confiscated all uranium for use in bomb development. However, the atomic energy commission relaxed these restrictions in 1959, and depleted uranium returned to ceramics and glass factory floors. Orange dishes made during the next decade may still have some hazardous qualities on their surfaces to this day. Most notably, vintage fiestaware reads positive for radioactivity. And while the levels are low enough that they don't officially pose a health risk if they're on a shelf, the U.S. EPA warns against eating food off of them. Though we still occasionally run into issues with synthetic food dyes, our scientific understanding has helped us prune hazardous colors out of our lives.

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翻译人员: Riley WANG 校对人员: Lipeng Chen1898年，居里夫人与皮埃尔·居里发现了镭。镭被宣称具有修护的特性。牙膏、药物、水、食物中，都会添加镭。由于镭的绿色带有光泽感，它也用于美容产品和珠宝制作。直到19世纪中期，我们才意识到 镭，作为一种放射性元素，带来的害处超过了其好处。然而，不幸的是在历史上，镭并不是唯一的看上去无害实则致命的颜料。长期以来，我们使用了三种颜料用来装饰自己及物品，它们是：白，绿，橙。我们先来说说白色。早在公元前四世纪，古希腊人使用铅来制作白色颜料。问题在于什么呢？对于人而言，铅可以直接吸收进人体进入血液、软组织、以及矿化组织。铅一旦进入神经系统，会模仿并干扰钙元素的正常功能，造成的损害轻则使人出现学习障碍，重则导致高血压。但使用这种剧毒颜料的工艺在很多文化中持续了很久。直到19世纪，铅白是唯一的 白油和蛋彩颜料的实用选择。艺术家为了作画， 会将铅块磨成粉末这样，他们会充分接触这些剧毒的粉尘。这种颜料的过分使用 导致了画家们的腹绞痛，我们现在称之为铅中毒。使用铅的画家会出现肌肉麻痹，心情忧郁，咳嗽，视网膜放大，甚至失明。但是铅白的质感、不透明性和温暖的色调令包括弗美尔及之后的 印象派画家难以放弃。没有其他颜料可以媲美铅白的光泽，这种颜料继续广泛使用， 直到1970年代才将其禁止。如上所述，铅白带来的危险性 与另一种颜料相比则顿矢光芒。那就是广泛使用的绿色。谢勒绿和巴黎绿是 两种合成的绿色色素，18世纪时首次问世。相比于天然染料较沉闷的绿色，它们的颜色更加明亮鲜艳，因此这两种色素迅速流行， 用于绘画、纺织品染色、壁纸、香皂、蛋糕装饰、玩具、糖果、衣物。这些绿色的染料由某种化合物制成，这种化合物称为砷酸铜。人如果接触砷，会损伤细胞交换及运作功能。高剂量的砷与癌症和心脏疾病直接相关。高剂量的砷与癌症和心脏疾病直接相关。因此在十八世纪， 纺织厂工人经常出现中毒，且据报道， 穿绿裙子的女性因皮肤接触裙子上的砷而昏倒。还有传言说 臭虫也不会生活在绿色的房间中，人们甚至推测 拿破仑就死于慢性砷中毒，因为他睡在自己那 铺着绿色壁纸的卧室。这种剧毒的绿色一直处于保密状态，直到1822年发布了砷的配方。一个世纪之后， 这种化合物摇身一变成为杀虫剂。合成绿色染料或许是 广泛使用的颜色中最为危险的，但至少它并没有镭的放射性。而另一种颜色则 具备这一特性——橙色。第二次世界大战之前，陶瓷餐具制造商在釉彩中 使用氧化铀式非常普遍的，这种化合物能够产生 鲜艳的红色和橙色，如果不是因为放射性， 那么这些颜色都是吸引人的特点。当然，放射性是在 19世纪晚期才为我们意识到的，更不用提在更久之后， 才发现的与辐射相关的癌症风险。在第二次世界大战期间，美国政府没收了 全部的铀用以发展核武器。然而在1959年， 原子能委员会放松了管制，铀重新回到了瓷器和玻璃工厂。接下来十年中 生产的橙色餐盘表面很可能至今仍然具有危险的特质。最重要的是，经典的节日用具 仍在监测放射性时被显示为阳性。虽然如果这些餐盘被束之高阁时辐射较少不至于构成健康威胁，美国环保局发出警告 不要吃上面的食物。我们虽然偶尔会遇到合成的食物染料，但科学认知已经帮我们在生活中 去掉了那些危险的颜色。

**P469 2017-05-17 A brief history of goths - Dan Adams**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=469)

What do fans of atmospheric post-punk music have in common with ancient barbarians? Not much. So why are both known as goths? Is it a weird coincidence or a deeper connection stretching across the centuries? The story begins in Ancient Rome. As the Roman Empire expanded, it faced raids and invasions from the semi-nomadic populations along its borders. Among the most powerful were a Germanic people known as Goths who were composed of two tribal groups, the Visigoths and Ostrogoths. While some of the Germanic tribes remained Rome's enemies, the Empire incorporated others into the imperial army. As the Roman Empire split in two, these tribal armies played larger roles in its defense and internal power struggles. In the 5th century, a mercenary revolt lead by a soldier named Odoacer captured Rome and deposed the Western Emperor. Odoacer and his Ostrogoth successor Theoderic technically remained under the Eastern Emperor's authority and maintained Roman traditions. But the Western Empire would never be united again. Its dominions fragmented into kingdoms ruled by Goths and other Germanic tribes who assimilated into local cultures, though many of their names still mark the map. This was the end of the Classical Period and the beginning of what many call the Dark Ages. Although Roman culture was never fully lost, its influence declined and new art styles arose focused on religious symbolism and allegory rather than proportion and realism. This shift extended to architecture with the construction of the Abbey of Saint Denis in France in 1137. Pointed arches, flying buttresses, and large windows made the structure more skeletal and ornate. That emphasized its open, luminous interior rather than the sturdy walls and columns of Classical buildings. Over the next few centuries, this became a model for Cathedrals throughout Europe. But fashions change. With the Italian Renaissance's renewed admiration for Ancient Greece and Rome, the more recent style began to seem crude and inferior in comparison. Writing in his 1550 book, "Lives of the Artists," Giorgio Vasari was the first to describe it as Gothic, a derogatory reference to the Barbarians thought to have destroyed Classical civilization. The name stuck, and soon came to describe the Medieval period overall, with its associations of darkness, superstition, and simplicity. But time marched on, as did what was considered fashionable. In the 1700s, a period called the Enlightenment came about, which valued scientific reason above all else. Reacting against that, Romantic authors like Goethe and Byron sought idealized visions of a past of natural landscapes and mysterious spiritual forces. Here, the word Gothic was repurposed again to describe a literary genre that emerged as a darker strain of Romanticism. The term was first applied by Horace Walpole to his own 1764 novel, "The Castle of Otranto" as a reference to the plot and general atmosphere. Many of the novel's elements became genre staples inspiring classics and the countless movies they spawned. The gothic label belonged to literature and film until the 1970s when a new musical scene emerged. Taking cues from artists like The Doors and The Velvet Underground, British post-punk groups, like Joy Division, Bauhaus, and The Cure, combined gloomy lyrics and punk dissonance with imagery inspired by the Victorian era, classic horror, and androgynous glam fashion. By the early 1980s, similar bands were consistently described as Gothic rock by the music press, and the stye's popularity brought it out of dimly lit clubs to major labels and MTV. And today, despite occasional negative media attention and stereotypes, Gothic music and fashion continue as a strong underground phenomenon. They've also branched into sub-genres, such as cybergoth, gothabilly, gothic metal, and even steampunk. The history of the word gothic is embedded in thousands of years worth of countercultural movements, from invading outsiders becoming kings to towering spires replacing solid columns to artists finding beauty in darkness. Each step has seen a revolution of sorts and a tendency for civilization to reach into its past to reshape its present.

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翻译人员: Riley WANG 校对人员: Lipeng Chen充满神秘感的后朋克音乐的粉丝们与古代野蛮人有什么共同之处呢？虽然看上去毫无关联，但为何他们都被称为哥特人。这是个奇怪的巧合？还是二者间有长达几个世纪的深层联系？故事开始于古罗马。随着罗马帝国不断扩张，它面临着国境线附近半游牧民族的入侵和袭击。其中最强大的势力是一伙德国人——哥特，他们由两个部落构成：东哥特人，西哥特人。虽然一些德国部落始终与罗马为敌，但罗马帝国将其他部落收归整合入军队。当罗马帝国一分为二时，这些部落军队在防御和内部权力斗争上起到了很大作用。5世纪时，由一名名叫 Odoacer 的士兵领导了 一次雇佣兵反叛，他们抓住并废黜了西罗马国王。Odoacer 及东哥特首领 Theoderic理论上仍受东罗马皇帝统治，并保持着罗马的传统。但此时西罗马帝国不在团结，并分裂成不同的国家，其统治者为哥特人以及融入当地文化的其他德国部落，但现在的地图上仍能够 反映出当时部落的名称。这标志着古典时期的终结，以及黑暗时期的开始。尽管罗马文化从未完全消失，但它的影响力不断减少， 新的艺术风格逐渐产生，它们关注宗教符号和寓言而不是和谐的比例和现实意义。这种转变也延伸到了建筑风格。1137年法国圣丹尼斯修道院建立，尖拱、飞拱、大窗这样的设计使得建筑结构显得更加瘦削豪华。它强调室内要开放、明亮而不是充满古典建筑中的结实墙面和柱子。在接下来的几个世纪，这成为欧洲教堂风格的范本。但是时尚易变，意大利文艺复兴重新燃起了 对古希腊古罗马的崇敬，哥特这种近代风格 相比之下显得原始简陋。1550年，在《艺术家的生活》中作者 Giorgio Vasari 首次将这种风格称为哥特。但这是一种意指野蛮人的贬义说法，并认为这种思想毁了古典文明。这个词语一直存在， 并且开始用于描述整个中世纪时期，因为它让人联想到黑暗、迷信以及原始。时间推进，时尚也在推进。1700年代，启蒙时期到来，科学理性最受推崇。与此相对，浪漫主义作家例如歌德与拜伦，则寻求将自然景观理想化的视角以及神秘的精神力量。于此，哥特一词的含义被重新定义，它用来描述由浪漫主义衍生的 一种更黑暗的文学体裁。Horace Walpole 于1764年在他的小说《奥特兰托堡》中 首次使用这个词，用来描述小说情节及整体氛围。小说中的众多元素成为了哥特体裁的典型，并启发了众多经典故事及改编电影。直到1970年代，哥特一直是 文学和电影的风格，之后，一种新的音乐剧开始出现。受到门户乐队，地下丝绒乐队的启发，英国的大量后朋克群体，例如 Joy Division 乐队，Bauhaus 乐队，The Cure 乐队，他们的音乐混合了 阴郁的歌词，朋克的不协调音乐，维多利亚时代的意象，经典的恐惧元素，以及中性魅力。直到1980年代早期，这类风格相似的乐队都被音乐媒体称为哥特摇滚。这种风格日渐流行， 表演也由灯光阴暗的俱乐部转向主流唱片公司和音乐电视。如今，尽管偶尔会有媒体的 负面评价和刻板印象，哥特音乐和时尚仍然是活跃的地下现象。并出现了更多的细分种类，例如赛博哥特，哥特比利，哥特金属，甚至是蒸汽朋克。哥特这个词伴随了上千年的历史，它是一种反对传统文化的运动，开始于哥特民族作为外族入侵称王，而后，高耸的尖塔代替了粗壮的圆柱，艺术家在黑暗中发现了美。每一步都是一种改革，也是文明回溯过去 进而重塑现在的趋势。

**P470 2017-05-23 The world’s most mysterious book - Stephen Bax**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=470)

Deep inside Yale University's Beinecke Rare Book and Manuscript Library lies the only copy of a 240-page tome. Recently carbon dated to around 1420, its vellum pages features looping handwriting and hand-drawn images seemingly stolen from a dream. Real and imaginary plants, floating castles, bathing women, astrology diagrams, zodiac rings, and suns and moons with faces accompany the text. This 24x16 centimeter book is called the Voynich manuscript, and its one of history's biggest unsolved mysteries. The reason why? No one can figure out what it says. The name comes from Wilfrid Voynich, a Polish bookseller who came across the document at a Jesuit college in Italy in 1912. He was puzzled. Who wrote it? Where was it made? What do these bizarre words and vibrant drawings represent? What secrets do its pages contain? He purchased the manuscript from the cash-strapped priest at the college, and eventually brought it to the U.S., where experts have continued to puzzle over it for more than a century. Cryptologists say the writing has all the characteristics of a real language, just one that no one's ever seen before. What makes it seem real is that in actual languages, letters and groups of letters appear with consistent frequencies, and the language in the Voynich manuscript has patterns you wouldn't find from a random letter generator. Other than that, we know little more than what we can see. The letters are varied in style and height. Some are borrowed from other scripts, but many are unique. The taller letters have been named gallows characters. The manuscript is highly decorated throughout with scroll-like embellishments. It appears to be written by two or more hands, with the painting done by yet another party. Over the years, three main theories about the manuscript's text have emerged. The first is that it's written in cypher, a secret code deliberately designed to hide secret meaning. The second is that the document is a hoax written in gibberish to make money off a gullible buyer. Some speculate the author was a medieval con man. Others, that it was Voynich himself. The third theory is that the manuscript is written in an actual language, but in an unknown script. Perhaps medieval scholars were attempting to create an alphabet for a language that was spoken but not yet written. In that case, the Voynich manuscript might be like the rongorongo script invented on Easter Island, now unreadable after the culture that made it collapsed. Though no one can read the Voynich manuscript, that hasn't stopped people from guessing what it might say. Those who believe the manuscript was an attempt to create a new form of written language speculate that it might be an encyclopedia containing the knowledge of the culture that produced it. Others believe it was written by the 13th century philosopher Roger Bacon, who attempted to understand the universal laws of grammar, or in the 16th century by the Elizabethan mystic John Dee, who practiced alchemy and divination. More fringe theories that the book was written by a coven of Italian witches, or even by Martians. After 100 years of frustration, scientists have recently shed a little light on the mystery. The first breakthrough was the carbon dating. Also, contemporary historians have traced the provenance of the manuscript back through Rome and Prague to as early as 1612, when it was perhaps passed from Holy Roman Emperor Rudolf II to his physician, Jacobus Sinapius. In addition to these historical breakthroughs, linguistic researchers recently proposed the provisional identification of a few of the manuscript's words. Could the letters beside these seven stars spell Tauran, a name for Taurus, a constellation that includes the seven stars called the Pleiades? Could this word be Centaurun for the Centaurea plant in the picture? Perhaps, but progress is slow. If we can crack its code, what might we find? The dream journal of a 15th-century illustrator? A bunch of nonsense? Or the lost knowledge of a forgotten culture? What do you think it is?

**P470 2017-05-23 The world’s most mysterious book - Stephen Bax**

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翻译人员: Lipeng Chen 校对人员: Jack Zhang在耶鲁大学的拜内克古籍善本图书馆里，有一本240页古书的唯一复件。最近它被测得可以追溯至1420年左右，它的牛皮封面上，不断循环的文字引人注目，手绘的图案仿佛是梦中所得。真假交错的植物，悬浮空中的城堡，正在洗浴的妇女，星象图，星座戒指，还有文字周围的脸谱化的日月。这本24厘米长、16厘米宽的古书， 被称作伏尼契手稿，它是历史上最大的未解之谜之一。为什么呢？没人知道这本书在说什么。书的名字来源于威尔弗雷德·伏尼契，在1912年的意大利， 一个碰巧在天主教书院看到这本书的波兰裔书商。他被难住了。谁写的这本书？在哪里写的？这些奇怪的文字和鲜艳的图画代表着什么？书里到底隐含着什么秘密？他从书院拮据的牧师那儿买下了这份手稿，并最终带回了美国，在美国，专家们为它苦苦思考了一个多世纪。密码学家说，书中的文字包含了 某种真实存在的语言的所有字母，只不过从来没人见过这种语言。为什么这么说呢？ 因为在真实的语言中，文字或特定的文字组合以一定的频率出现，而伏尼契手稿中的语言有着一些不可能是被随机生成的特征。除此之外，我们几乎一无所知。不同的字母有不同的形状和高度。有些字母可以在其它的手稿里找到， 但很多字母是独一无二的。那些高一点的字母被称为"吊架"字。整部手稿从头到尾，都用漩涡形的点缀精心装饰过。它似乎是由两个或更多人执笔，而画画的还有另一群人。这么多年过去了， 关于这本书的内容形成了三种主流的观点。第一种认为，这本书是用密文写的，为了掩藏某些秘密而特意设计的密文。第二种认为，这本书就是个骗局，某个人胡编乱造了它， 骗那些人傻钱多的人。有些人觉得这人是个中世纪骗子。还有些人觉得就是伏尼契自己。第三种理论认为这本手稿 确实是用一种特殊语言写的，只不过没人懂而已。也许写这本书的人是一群中世纪学者，他们正试着为一种尚未书面化的语言编写字母表。如果真是这样，那伏尼契手稿可能就像写于复活岛的朗格朗格手稿一样，由于当年的文明早已消失， 如今已无人能懂。尽管没人能读懂伏尼契手稿，还是有很多人猜测它可能在讲些什么。有些人觉得它可能试图创造一种新的书面语言，他们觉得伏尼契手稿可能是一份百科全书，包含了创造它的文化的知识。有些人相信伏尼契手稿 是由13世纪的哲学家罗杰·培根所写，培根曾尝试理解世界通用的语法法则，也可能由16世纪伊丽莎白时代的 神秘主义者约翰·迪所写，迪曾经研究过炼药术和占卜术。还有些人觉得是意大利的女巫大会写了这本书，甚至有人认为是火星人写的。在一百多年的困惑之后，科学家们最近稍稍有了一些眉目。第一个突破是碳素测年法。另外，现在的历史学家已经 追溯了这份手稿的起源，到它出现在罗马和布拉格之前，差不多是1612年。当时，它可能是被神圣罗马帝国皇帝鲁道夫二世给了他的医生，雅各布斯·希纳皮亚斯。除了这些历史上的突破，语言学家们最近发布了对手稿中少数文字的暂定识别。在这七颗星星旁边的文字会是 Tauran 吗？Taurus（金牛座）的别称，一个包含着昴宿星团七颗星的星座？这个词会是 Centaurun 吗？ 来标识图画里面的Centaurea（矢车菊）？可能吧，但进展缓慢。如果我们能破解它的秘密，我们会发现什么？一个15世纪插画家的梦记？一堆胡言乱语？还是一个被历史遗忘的文明所失去的知识？你觉得是什么呢？

**P471 2017-05-23 Who were the Vestal Virgins, and what was their job - Peta Greenfield**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=471)

A lone priestess walks towards an underground chamber. People line the streets to watch as she proclaims her innocence. It doesn't matter. She's already been judged and found guilty. The sentence? Live burial. The underground chamber contains a portion of bread, water, milk, and oil. She will have a lamp, a bed, and a blanket, but she won't emerge alive. At the threshold, the priestess pauses, claims her innocence one last time, then enters the chamber never to be seen again by the Roman people. The priestess is one of Rome's six Vestal Virgins, each carefully selected as children from Rome's most aristocratic families. But now with her death, there are only five, and a new priestess must be chosen. The six-year-old Licinia witnessed the spectacle, never suspecting that a few days later, she'd be chosen as the next Vestal Virgin. Her age, her patrician family lineage, and her apparent good health makes her the best candidate to serve the goddess Vesta in the eyes of the Romans. Her parents are proud that their daughter's been chosen. Licinia is afraid, but she has no choice in the matter. She must serve the goddess for at least the next 30 years. For the first ten years of Licinia's service, she's considered in training, learning how to be a Vestal Virgin. Her most important duty is keeping vigil over the flame of Vesta, the virgin goddess of the hearth. Vesta doesn't have a statue like other Roman gods and goddesses. Instead, she's represented by the flame which burns day and night in her temple located next to the Forum in the center of the city. Like all Vestal priestesses, Licinia spends part of each day on shift, watching and tending to the flame. The flame represents two things. The first is the continuation of Rome as a power in the world. The Romans believed that if the flame goes out, the city's in danger. The flame also symbolizes the continuing virginity of Vesta's priestesses. For the Romans, a Vestal's virginity signaled not only her castitas, or modest spirit and body, but also her ritual purity. So Licinia knows she must never let the flame go out. Her life, the lives of her fellow Vestals, and the safety of Rome itself depends upon it. Licinia learns to collect water each day from a nearby fountain to cleanse the temple. She learns the Fasti, the calendar of sacred rituals and she watches while the senior priestesses conduct sacrifices. By the time Licinia completes her training, she's 16 years old. Licinia understands that the way she must act is a reflection of the goddess she serves. When it's her turn to collect the water, she keeps her eyes lowered to the ground. When she performs sacrifices, she focuses intently on the task. Licinia directs her energy towards being the best priestess she can be. She's worried that someday the state will claim her life for its own purposes to protect itself from danger. Licinia could be accused of incestum, meaning unchastity, at any time and be sacrificed whether she's innocent or guilty. Licinia fully understands now why her predecessor was buried alive. Ten years ago, the flame of Vesta went out. The priestesses knew that they couldn't keep it a secret. The future of Rome depended upon it. They went to the chief priest and he opened an investigation to discover why the flame had failed. Someone came forward and claimed that one of the Vestals was no longer a virgin. That was the beginning of the end. The accused protested her innocence, but it wasn't enough. She was tried and found guilty. That Vestal's death was meant to protect the city, but Licinia weeps for what has been lost and for what she knows now. Her own path was paved by the death of another, and her life could be taken just as easily for something as simple as a flame going out.

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翻译人员: Cherry Zhou 校对人员: Lipeng Chen这名孤独的女祭司正走向一间地下室。当她宣称自己是无罪时， 人们站在街边看着她。但无济于事。她已经被判有罪。判决结果是？活葬。地下室里有一些面包、水、牛奶和油。她还有一盏灯、一张床和一张毛毯，但她并不会因此而存活下来。来到入口时 她停了下来，最后一次辩解自己是无罪的，然后就走进地下室， 再也没有罗马人看到过她了。女祭司是六位罗马维斯塔贞女中的一名，每一位都是在孩提时代从 罗马最有贵族气派的家庭中精心挑选出来。但她死了以后，就只剩下五名，人们需要挑选一名新的女祭司。六岁大的莱姬尼娅目睹了这一情景，万万没想到几天后，她会被选中 成为下一名维斯塔贞女。她的年龄，她的贵族家庭血统，还有她良好的健康状况，让她成为罗马人眼中维斯塔贞女的最佳人选。她的父母都为女儿被选中一事感到自豪。莱姬尼娅感到害怕，但她别无选择。在接下来至少30年的时间里，她将为女神效劳。莱姬尼娅服务期的前十年，她需要接受训练， 学习怎样成为一名维斯塔贞女。最重要的职责就是为维斯塔的焰火和贞洁女神的火炉守夜。维斯塔不像其他罗马诸神那样有一个雕像，而是用火焰作为象征， 火焰需要在她的神殿里没日没夜地燃烧着，神殿位于城中心古罗马广场的旁边。跟所有维斯塔贞女一样， 莱姬尼娅每天都需要轮流值班，看守火焰。火焰象征着两样东西。第一样是罗马势力在世界范围内的延续。罗马人认为如果火焰熄灭， 城市命运就会岌岌可危。火焰还象征维斯塔女祭司童贞的延续。对于罗马人来说， 维斯塔的处子之身不仅表示她的贞洁，端庄的身体和灵魂，还表示宗教仪式的纯洁性。所以莱姬尼娅知道她绝不能让火焰熄灭。她的生命，其他维斯塔贞女的生命，还有罗马的安危都由焰火定夺。莱姬尼娅学会了每天从附近的喷泉打水，用来清洁神殿。她学会了解读记载神圣仪式的年表，她观察更资深的女祭司进行献祭。等到莱姬尼娅训练完毕，她已经16岁了。莱姬尼娅明白她的行为举止反映出她所效劳的女神形象。当轮到她打水时，她非常虔诚。当她进行献祭时，她非常专注。莱姬尼娅使出最大的力气， 尽可能让自己成为最棒的女祭司。她担心国家会有一天夺取她的性命以保护国家免陷于危难之中。无论何时莱姬尼娅都可以 被冠以乱伦即不贞洁的罪名，以及无论她是否有罪， 都可以被作为祭祀品而作牺牲。莱姬尼娅现在完全能理解 为什么她的前辈会被活葬。维斯塔的火焰在10年前曾熄灭过。女祭司们知道她们无法掩盖这个真相。焰火关乎罗马的未来。她们寻求祭司长的帮助并展开调查，要查明焰火为什么会熄灭。有人主动宣称其中一名维斯塔贞女不再是处子之身。这是灭亡的开始。受指控的维斯塔贞女坚称自己是无辜的， 但无补于事。她已接受审判并判以罪名。维斯塔贞女的死亡能够让这座城市幸免于难，但莱姬尼娅现在正为她所失去的和 她所知道的一切而哭泣。她的人生道路是用另一个人的死亡铺垫出来的，她的生命还会轻而易举地被夺走，只是因为焰火熄灭那么简单。

**P472 2017-05-26 The ferocious predatory dinosaurs of Cretaceous Sahara - Nizar Ibrahi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=472)

There are few places on Earth less hospitable to life than the bone-dry Sahara Desert. Yet it wasn't always this way. 100 million years ago, during a period known as the Mid-Cretaceous, a gargantuan river system flowed across the region from modern day Egypt to Morocco. The whole world at that time would look rather different to us. The continents had yet to assume their current positions. Extreme temperatures were common and fierce storms made life unpredictable. Dinosaurs flourished on land, pterosaurs roamed the skies, and giant marine reptiles and sharks swam in warm seas. Small mammals, our ancestors, lived quite literally in the shadow of these extraordinary creatures. In this world of huge predators, the River of Giants, which is what some call this region of what is now northern Africa, stood out as particularly dangerous. In most ecosystems, it's lonely at the top of the food chain. There usually isn't enough prey to sustain many predators. Yet an incredible variety of aquatic prey species in the river-based ecosystem may have allowed a large and diverse population of apex predators to coexist. We know this thanks to a wealth of fossils we found in an area called the Kem Kem Beds. Many of the predators we've discovered had head and body shapes that made them uniquely adapted to hunt the different types and sizes of aquatic prey. This allowed many Kem Kem predators to take full advantage of the one abundant food source in this environment: fish. This also allowed them to avoid direct competition with the predators going after land-loving animals. Prey species in the river system had to contend with attacks from all sides, including from above. Flying reptiles dominated the skies. Alanqa Saharica had a wingspan of up to nine meters, and long slender jaws that helped it snatch fish and small terrestrial animals. At least seven different types of crocodile-like predators patrolled the waterways, including the roughly ten-meter-long Elosuchus. And multiple species of T-rex-sized carnivorous dinosaurs called theropods, lived side by side. In the River of Giants, Spinosaurus was king. This 15-meter-long dinosaur was even longer than T-rex, with short muscular hind legs, a flexible tail, and broad feet. It's two-meter-high sail warned other creatures of its fearsome size and may have also been used to attract mates. Spinosaurus' long slender jaws were spiked with conical teeth, perfect for swiftly clamping down on slippery aquatic prey. This apex predator, as well as its ecosystem, is unparalleled in the history of life on Earth. All that's left of these fearsome predators are fossils. About 93 million years ago, sea levels rose, submerging the Kem Kem region in a shallow sea. Tens of millions of years later, an asteroid impact, volcanic eruptions, and associated changes in climate wiped out the dinosaurs, pterosaurs, and many other groups of animals and plants, including their unique ecoysystems. That mass extinction paved the way for the rise of new kinds of birds, larger mammals, and eventually us.

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翻译人员: Cherry Zhou 校对人员: Lipeng Chen地球上很少有这么不适合生物生存的地方能比得上极其干燥的撒哈拉沙漠了。但它本来并不是这样的。1亿年前的白垩纪中期，有一个庞大的河流体系流经这个区域，从现代埃及延伸至摩洛哥。那时的世界面貌跟我们如今所看到的截然不同。各大洲还没有呈现出现时的地理位置。极端温度的出现是很常见的事情，还有猛烈的暴风雨让生存变得不可预测。恐龙在陆地上繁衍不息，翼龙漫游在天空中，大型海洋爬行动物和鲨鱼在温暖的大海中畅游。我们的祖先即小型的哺乳动物生活在这些非凡生物的阴影里。这个大型捕食者的世界，还有巨人之河，有人说这里就是现在的北非地区，因极其危险而引人关注。在绝大多数生态系统中， 位于食物链顶端的生物是孤寂的。通常没有足够的猎物能够供养那么多捕食者。然而，在以河流为基础的生态系统中 有各种各样的水生猎物，得以让数量庞大品种多样 而且处于食物链顶端的捕食者共存。多亏了我们在某个区域里发现的大量化石， 我们才知道了这一切，这个区域名字叫卡玛卡玛地层。我们所发现的许多捕食者都具有头部和身体形态，这使它们能特异性适应于不同类型和大小的水生生物的猎捕。这让卡玛卡玛捕食者能充分利用在这个环境里一种充足的食物来源：鱼。这得以让它们避免直接的竞争，不用跟其他捕食者一起追逐陆地动物。河流体系中的猎物需要应对来自四面八方的攻击，包括天上飞的捕食者的攻击。飞行类爬行动物在天空中占支配地位。萨哈瑞卡翼龙的翅膀展开后可达九米，还有它细长的下颚能够协助它捕捉鱼类和小型的陆生生物。至少有七种不同类型的鳄鱼类捕食者在水域中巡视，其中包括了身长大概10米的埃罗鳄。还有一类被统称为是兽脚亚目恐龙的 有着霸龙王体型的肉食性恐龙，它们和平共存着。在巨人之河中，棘龙是国王。这种恐龙身长15米，比霸王龙还要长，它有强壮的短小后腿，一条灵活自如的尾巴，和宽大的脚。它两米高的帆翼让其他生物惧怕于它的体型，或许还被用来吸引雌性恐龙。棘龙细长的下颚中长满了锥形牙齿，能快速地将表面光滑的水生猎物完美制服。这种位于食物链顶端的捕食者， 还有它赖以生存的生态系统，在地球的生命史上是前所未有的。但这些可怕的捕食者最后剩下的只有化石。大约在9300万年前，海平面上升，将卡玛卡玛地区淹没成一片浅海。数千万年后，小行星撞击，火山爆发，气候随之改变，恐龙、翼龙、还有许多动植物都因而灭绝，这其中包括了它们独一无二的生态系统。这种大规模的灭绝为新物种如鸟类，还有大型哺乳动物的诞生创造了条件，最终人类得以诞生。

**P473 2017-05-26 The genius of Marie Curie - Shohini Ghose**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=473)

If you want a glimpse of Marie Curie's manuscripts, you'll have to sign a waiver and put on protective gear to shield yourself from radiation contamination. Madame Curie's remains, too, were interred in a lead-lined coffin, keeping the radiation that was the heart of her research, and likely the cause of her death, well contained. Growing up in Warsaw in Russian-occupied Poland, the young Marie, originally named Maria Sklodowska, was a brilliant student, but she faced some challenging barriers. As a woman, she was barred from pursuing higher education, so in an act of defiance, Marie enrolled in the Floating University, a secret institution that provided clandestine education to Polish youth. By saving money and working as a governess and tutor, she eventually was able to move to Paris to study at the reputed Sorbonne. There, Marie earned both a physics and mathematics degree surviving largely on bread and tea, and sometimes fainting from near starvation. In Paris, Marie met the physicist Pierre Curie, who shared his lab and his heart with her. But she longed to be back in Poland. Upon her return to Warsaw, though, she found that securing an academic position as a woman remained a challenge. All was not lost. Back in Paris, the lovelorn Pierre was waiting, and the pair quickly married and became a formidable scientific team. Another physicist's work sparked Marie Curie's interest. In 1896, Henri Becquerel discovered that uranium spontaneously emitted a mysterious X-ray-like radiation that could interact with photographic film. Curie soon found that the element thorium emitted similar radiation. Most importantly, the strength of the radiation depended solely on the element's quantity, and was not affected by physical or chemical changes. This led her to conclude that radiation was coming from something fundamental within the atoms of each element. The idea was radical and helped to disprove the long-standing model of atoms as indivisible objects. Next, by focusing on a super radioactive ore called pitchblende, the Curies realized that uranium alone couldn't be creating all the radiation. So, were there other radioactive elements that might be responsible? In 1898, they reported two new elements, polonium, named for Marie's native Poland, and radium, the Latin word for ray. They also coined the term radioactivity along the way. By 1902, the Curies had extracted a tenth of a gram of pure radium chloride salt from several tons of pitchblende, an incredible feat at the time. Later that year, Pierre Curie and Henri Becquerel were nominated for the Nobel Prize in physics, but Marie was overlooked. Pierre took a stand in support of his wife's well-earned recognition. And so both of the Curies and Becquerel shared the 1903 Nobel Prize, making Marie Curie the first female Nobel Laureate. Well funded and well respected, the Curies were on a roll. But tragedy struck in 1906 when Pierre was crushed by a horse-drawn cart as he crossed a busy intersection. Marie, devastated, immersed herself in her research and took over Pierre's teaching position at the Sorbonne, becoming the school's first female professor. Her solo work was fruitful. In 1911, she won yet another Nobel, this time in chemistry for her earlier discovery of radium and polonium, and her extraction and analysis of pure radium and its compounds. This made her the first, and to this date, only person to win Nobel Prizes in two different sciences. Professor Curie put her discoveries to work, changing the landscape of medical research and treatments. She opened mobile radiology units during World War I, and investigated radiation's effects on tumors. However, these benefits to humanity may have come at a high personal cost. Curie died in 1934 of a bone marrow disease, which many today think was caused by her radiation exposure. Marie Curie's revolutionary research laid the groundwork for our understanding of physics and chemistry, blazing trails in oncology, technology, medicine, and nuclear physics, to name a few. For good or ill, her discoveries in radiation launched a new era, unearthing some of science's greatest secrets.

**P473 2017-05-26 The genius of Marie Curie - Shohini Ghose**

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翻译人员: Riley WANG 校对人员: Lipeng Chen如果要翻阅玛丽·居里的手稿，你可能需要签一份免责声明并带好防护器具，才能不受到放射性污染。居里夫人的遗体也被置于内衬铅的棺材中，免受辐射的影响，这是她研究的核心，也很可能是她的死因。居里夫人成长于俄国控制的波兰首都，华沙，原名为玛丽·斯克沃多夫斯卡自小便是一个聪明的孩子，却面临诸多挑战。作为女性，她不能够获得高等教育，作为反抗，她进入“空中大学”读书，这是一个为波兰年轻人提供教育的地下机构。通过辛苦攒钱和做家教，玛丽终于能够前往著名的巴黎索邦大学读书。在此，玛丽获得了物理和化学学位，生活艰苦的她主要以面包、茶水充饥，有时还会因为饥饿而昏倒。在巴黎，玛利亚遇到了物理学家皮埃尔·居里，他提供自己的实验室给玛丽， 也献出了自己的爱。但玛丽仍渴望回到波兰。在她回到华沙后，她发现女性仍然无法在学术领域占有一席之地。一切都还是老样子。于是她重返巴黎，等待她的是单相思的皮埃尔，二人迅速结婚，并组成了坚定的科学伙伴。另一位物理学家的研究引起了玛丽的兴趣。1896年，亨利·贝克勒尔发现铀可以自发产生类似X光的射线，使感光胶片显影。居里夫人马上发现 钍也能产生类似的放射性。最重要的是，放射性的强度只与元素的量相关，且不受物理或化学性变化的影响。这使得她得出结论： 放射性来源于元素原子核内更基本的某种物质。这是一个非常大胆的设想，并证明了长久以来 对原子结构模型的推测是错误的。之后，通过专注研究放射性极强的沥青油矿，居里夫妇意识到 铀并不是唯一的放射性来源。因此，是否还存在其他放射性元素？1898年，他们二人发现了两种新的元素：以玛丽的祖国命名的钋，以及镭，是拉丁语中“射线”的意思。他们同时也创造了“放射性”这个词。到1902年时，居里夫妇从几吨沥青油矿中提炼出了十分之一克纯氯化镭，这在当时是一件不可思议的功绩。下半年，皮埃尔·居里与亨利·贝克勒尔被提名为诺贝尔物理学奖获得者，但玛丽并未获得提名。皮埃尔支持妻子得到她应当的褒奖。于是，居里夫妇和贝克勒尔 共同获得了1903年的诺贝尔奖。这使得玛丽·居里成为了 第一位获得诺贝尔奖的女性。居里夫妇得到了充足的资金和尊重， 一切都很顺利。但灾难也在1906年降临，皮埃尔在通过一个车流密集的十字路口时被一辆马车撞倒。绝望的玛丽只能让自己沉浸在研究中，并接手了皮埃尔在索邦大学的教职，她也是这里的第一位女教授。居里夫人的工作取得了丰硕的成果。1911年，她再次获得了诺贝尔奖，这次则为诺贝尔化学奖以表彰她发现镭和钋，以及对镭及其化合物的提纯与分析。这使她成为迄今为止第一也是唯一一位，在不同领域获得诺贝尔奖的人士。居里夫人将其研究应用到实践中，改变了医学研究和治疗的前景。一战期间，她建立了移动式放射中心，并调查了射线对肿瘤的影响。但是，全人类的获益伴随着巨大的个人牺牲。居里夫人因骨髓病逝于1934年，很多人认为这是由于她大量接触的放射性所导致。玛丽·居里革命性的研究为众多科学领域打下了坚实基础，包括物理、化学，开辟了肿瘤学、技术工艺，药学 以及核物理等新领域。她在放射性领域的发现 开创了一个新的纪元，揭示了科学中一些最为重大的秘密。

**P474 2017-05-31 Why do people join cults - Janja Lalich**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=474)

When Reverend Jim Jones founded the Peoples Temple in 1955, few could have imagined its horrifying end. This progressive religious movement rose in popularity and gained support from some of San Francisco's most prominent politicians. But in 1977, amidst revelations of brainwashing and abuse, Jones moved with several hundred followers to establish the commune of Jonestown in Guyana. Billed as a utopian paradise, the colony was more like a prison camp, and when a congressional delegation arrived to investigate its conditions, Jones executed his final plan. On November 18, 1978, 909 men, women, and children died after being forced to drink poisoned Flavor Aid. That grizzly image has since been immortalized as shorthand slang for single-minded cult-like thinking, "They drank the Kool-aid." Today, there are thousands of cults around the world. It's important to note two things about them. First, not all cults are religious. Some are political, therapy-based, focused on self-improvement, or otherwise. And on the flip side, not all new religions are what we're referring to as cults. So what exactly defines our modern understanding of cults, and why do people join them? Broadly speaking, a cult is a group or movement with a shared commitment to a usually extreme ideology that's typically embodied in a charismatic leader. And while few turn out as deadly as Jonestown or Heaven's Gate, which ended in a mass suicide of 39 people in 1997, most cults share some basic characteristics. A typical cult requires a high level of commitment from its members and maintains a strict hierarchy, separating unsuspecting supporters and recruits from the inner workings. It claims to provide answers to life's biggest questions through its doctrine, along with the required recipe for change that shapes a new member into a true believer. And most importantly, it uses both formal and informal systems of influence and control to keep members obedient, with little tolerance for internal disagreement or external scrutiny. You might wonder whether some of these descriptions might also apply to established religions. In fact, the world "cultus" originally described people who cultivated the worship of certain gods by performing rituals and maintaining temples. But in time, it came to mean excessive devotion. Many religions began as cults, but integrated into the fabric of the larger society as they grew. A modern cult, by contrast, separates its members from others. Rather than providing guidelines for members to live better lives, a cult seeks to directly control them, from personal and family relationships, to financial assets and living arrangements. Cults also demand obedience to human leaders who tend to be highly persuasive people with authoritarian and narcissistic streaks motivated by money, sex, power, or all three. While a cult leader uses personal charisma to attract initial followers, further expansion works like a pyramid scheme, with early members recruiting new ones. Cults are skilled at knowing whom to target, often focusing on those new to an area, or who have recently undergone some personal or professional loss. Loneliness and a desire for meaning make one susceptible to friendly people offering community. The recruitment process can be subtle, sometimes taking months to establish a relationship. In fact, more than two-thirds of cult members are recruited by a friend, family member, or co-worker whose invitations are harder to refuse. Once in the cult, members are subjected to multiple forms of indoctrination. Some play on our natural inclination to mimic social behaviors or follow orders. Other methods may be more intense using techniques of coercive persuasion involving guilt, shame, and fear. And in many cases, members may willingly submit out of desire to belong and to attain the promised rewards. The cult environment discourages critical thinking, making it hard to voice doubts when everyone around you is modeling absolute faith. The resulting internal conflict, known as cognitive dissonance, keeps you trapped, as each compromise makes it more painful to admit you've been deceived. And though most cults don't lead members to their death, they can still be harmful. By denying basic freedoms of thought, speech, and association, cults stunt their members' psychological and emotional growth, a particular problem for children, who are deprived of normal developmental activities and milestones. Nevertheless, many cult members eventually find a way out, whether through their own realizations, the help of family and friends, or when the cult falls apart due to external pressure or scandals. Many cults may be hard to identify, and for some, their beliefs, no matter how strange, are protected under religious freedom. But when their practices involve harassment, threats, illegal activities, or abuse, the law can intervene. Believing in something should not come at the cost of your family and friends, and if someone tells you to sacrifice your relationships or morality for the greater good, they're most likely exploiting you for their own.

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翻译人员: Cherry Zhou 校对人员: Lyra Shi当1955年吉姆·琼斯牧师 创立了人民神殿教时几乎没有人能料想到 它会带来可怕的结局。一开始，这种革新性的宗教活动 逐渐流行起来并且获得了一些在旧金山最为著名的政客支持。但在1977年，洗脑和虐待事件被揭露,琼斯带着数百个教徒来到圭亚那创立了琼斯镇公社。这个殖民地被标榜是乌托邦天堂， 实际上更像是个集中营，一个国会代表团正要过来调查情况时，琼斯展开了他的终极计划。在1978年11月18日， 909名男人、女人和孩子丧生，他们被迫喝下有毒的增味饮料。这种灰暗的情景随之成为了 永久性的速记俚语，用来形容极端的异教思想，“他们喝了酷爱牌饮料。”如今，世界上仍存在数千个异教。关于它们有两点需要注意。首先，不是所有异教都带有宗教性质的。有些是带有政治色彩的，还有基于医学疗法的，专注于自我发展的，还有其他内容等。另一方面，并不是所有的新兴宗教 都要被定义为是异教。那么对异教准确的现代理解 应该是怎样的呢？为什么人们会加入异教？一般来说，异教是一个团体或者行动他们通常会对一个极端意识形态 有共同的意志，这通常在一个富有魅力的领导者身上 得以体现。虽然很少有像琼斯镇或 天堂之门那样致命性的宗教，在1997年致使39人集体自杀，但绝大多数异教都共有一些基本特征。一个典型的异教需要教徒高度服从并且要坚守严格的等级制度，毫无戒心的支持者和新成员会从内部运作团队中分离出去。异教宣称可以给出人生中 最大问题的答案只需通过它的教义还有需要作出改变的妙法，将新成员塑造成一名真正的信徒。最重要的是，异教会同时使用正式和 非正式的影响和控制体系让信徒保持顺从，绝不容忍有内部分歧和外部监视。你可能想知道这些情况是否也存在于成熟的宗教体系中。实际上，“崇拜”（cultus） 这个词本来是用来形容崇拜神灵的人，他们通常会举办祭拜仪式和 维护寺庙的敬仰方式，但现在发展为过度崇拜的意思。很多宗教都是作为“异教”兴起的，但发展起来后， 它们会被合并到更大的社会组织中。相比之下，现代异教则会把它们的信徒 从其他组织中分离出来。异教没有给信徒提供 过上更好的生活的指引，相反是想要直接控制信徒，从个人和家庭关系到财务资产和生活安排。异教还要求信徒服从由人类领袖这个领袖通常具有非常强的说服力，他们独裁而自恋，会受到金钱、性、权利 这三者诱惑的驱使。异教领袖会利用个人魅力 吸引首批追随者，随后的扩张就像是传销组织的运作，早期成员会招揽新成员。异教徒非常清楚谁是他们的目标人群，常常会盯上那些初来乍到 对周边环境还很陌生的人，或者是最近刚经历过个人 或者职业损失的人。孤独，并有着对寻找意义的渴望,这些人很容易受到友善 而又能提供归属感的对方的影响。这种招揽过程很微妙，有时要花费数月才能建立起关系。实际上，超过三分之二的异教信徒 都是被朋友、家庭成员或者同事招引进去的，这些人的邀约往往很难推却。一旦进入异教， 信徒们会受到各种形式的教化。有些会利用我们模仿社会行为 和执行命令的自然倾向。其他方法可能会变本加厉，会使用胁迫式的牵涉到人的内疚、 羞愧和恐惧的说服技巧。而且在很多情况下， 信徒们可能会出于对被接纳的渴望和为了获得承诺奖励 而心甘情愿地服从。异教环境会抑制批判性思维的发展，让人难以发出质疑之声，因为在你身边的所有人 都树立起绝对的信仰由此产生的内部冲突， 也称之为认知失调会让你陷于困境。尤当你承认自己被骗，但又不得不妥协， 会让你倍感痛苦。虽然绝大多数异教都不会让信徒走向死亡但还是会对信徒造成伤害。因为异教拒绝给予他们思考、言论 和结社的自由，异教会阻碍信徒的心理和情感发展,这对孩子们来说是一个尤为严重的问题，它会夺走孩子们正常成长中重大事件。尽管如此，很多异教信徒最终还是 能找到办法走出来，不管是通过他们个人的觉醒，家庭和朋友的帮助，还是因为异教由于内部压力 或丑闻而土崩瓦解。现仍有很多异教团体隐藏的很深，因为一些异教的信条， 不管有多么地荒谬都受到宗教自由的保护。但当它们的活动牵涉到骚扰、威胁、非法活动、或者虐待时，法律有权进行干预。要相信任何事情都不应该 以你的家庭和朋友作为代价，如果有人告诉你可以 通过牺牲自己的情感关系或者忠诚来换取上上善道，他们很有可能是为了自身利益 而选择利用你。

**P475 2017-06-01 Why don't perpetual motion machines ever work - Netta Schramm**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=475)

Around 1159 A.D., a mathematician called Bhaskara the Learned sketched a design for a wheel containing curved reservoirs of mercury. He reasoned that as the wheels spun, the mercury would flow to the bottom of each reservoir, leaving one side of the wheel perpetually heavier than the other. The imbalance would keep the wheel turning forever. Bhaskara's drawing was one of the earliest designs for a perpetual motion machine, a device that can do work indefinitely without any external energy source. Imagine a windmill that produced the breeze it needed to keep rotating. Or a lightbulb whose glow provided its own electricity. These devices have captured many inventors' imaginations because they could transform our relationship with energy. For example, if you could build a perpetual motion machine that included humans as part of its perfectly efficient system, it could sustain life indefinitely. There's just one problem. They don't work. Ideas for perpetual motion machines all violate one or more fundamental laws of thermodynamics, the branch of physics that describes the relationship between different forms of energy. The first law of thermodynamics says that energy can't be created or destroyed. You can't get out more energy than you put in. That rules out a useful perpetual motion machine right away because a machine could only ever produce as much energy as it consumed. There wouldn't be any left over to power a car or charge a phone. But what if you just wanted the machine to keep itself moving? Inventors have proposed plenty of ideas. Several of these have been variations on Bhaskara's over-balanced wheel with rolling balls or weights on swinging arms. None of them work. The moving parts that make one side of the wheel heavier also shift its center of mass downward below the axle. With a low center of mass, the wheel just swings back and forth like a pendulum, then stops. What about a different approach? In the 17th century, Robert Boyle came up with an idea for a self-watering pot. He theorized that capillary action, the attraction between liquids and surfaces that pulls water through thin tubes, might keep the water cycling around the bowl. But if the capillary action is strong enough to overcome gravity and draw the water up, it would also prevent it from falling back into the bowl. Then there are versions with magnets, like this set of ramps. The ball is supposed to be pulled upwards by the magnet at the top, fall back down through the hole, and repeat the cycle. This one fails because like the self-watering pot, the magnet would simply hold the ball at the top. Even if it somehow did keep moving, the magnet's strength would degrade over time and eventually stop working. For each of these machines to keep moving, they'd have to create some extra energy to nudge the system past its stopping point, breaking the first law of thermodynamics. There are ones that seem to keep going, but in reality, they invariably turn out to be drawing energy from some external source. Even if engineers could somehow design a machine that didn't violate the first law of thermodynamics, it still wouldn't work in the real world because of the second law. The second law of thermodynamics tells us that energy tends to spread out through processes like friction. Any real machine would have moving parts or interactions with air or liquid molecules that would generate tiny amounts of friction and heat, even in a vacuum. That heat is energy escaping, and it would keep leeching out, reducing the energy available to move the system itself until the machine inevitably stopped. So far, these two laws of thermodynamics have stymied every idea for perpetual motion and the dreams of perfectly efficient energy generation they imply. Yet it's hard to conclusively say we'll never discover a perpetual motion machine because there's still so much we don't understand about the universe. Perhaps we'll find new exotic forms of matter that'll force us to revisit the laws of thermodynamics. Or maybe there's perpetual motion on tiny quantum scales. What we can be reasonably sure about is that we'll never stop looking. For now, the one thing that seems truly perpetual is our search.

**P475 2017-06-01 Why don't perpetual motion machines ever work - Netta Schramm**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=475)

翻译人员: Xi Zhang 校对人员: Haocun Yu大约公元1159年的时候，有一位叫做婆什迦罗智者的数学家，构想出了一种带有很多弯形水银蓄池的轮子。他觉得随着轮子的转动，每个池子里的水银会流到池底，导致轮子的一端总是比另一端更重一点，这种力矩的不平衡会让轮子永远地转下去。婆什迦罗的设想是最早期的永动机构想之一，一种不依赖外界能量来源 而能永远工作下去的机器。想象一个可以不断鼓出吹动自己的风的风车。或者一个可以为自己供电的灯泡。这些机器绞尽了许许多多发明家的脑汁因为它们可以改变我们和能量间的关系。比如说，如果我们能造出一个永动机它的永动系统包含了人类，那永生就不再是梦了。但只有一个问题，永动机是不可能的。所有有关永动机的想法都违背了至少一个热力学基本定律，热力学是描述不同形式能量之间关系的物理学分支。热力学第一定律是， 能量不会凭空产生或消失你不可能从机器里得到比你放进去更多的能量。这就排除了任何可行的的永动机的可能因为一台机器最多只能产生和它消耗的同样多的能量。不可能还有多余的能量 用来驱动车或者给手机充电。但是如果你只是想让机器自己不停地运行下去呢？发明家们想出了很多点子。有一些就是婆什迦罗非平衡轮的变型比如有着滚动的小球或者是悬挂着重物的杆子。但是没一种有用。移动的部分确实让轮子的一端更重一些但同时降低了轮子整体的重心到轮轴以下。在低重心下，轮子只会像钟摆一样前后摆动，最终停下来。换一种思路呢？在17世纪，罗伯特·波义尔想出了个点子，一种自己给自己浇水的壶。他理论上证明了毛细作用，一种液体和容器表面间的吸引力足以使水吸进毛细管，这样也许能使水不断的围绕壶循环。但是如果毛细作用大到足以克服重力并可以把水从管中提上来，那毛细作用也应该会阻止水再掉回到壶中。再后来，又有了一些和磁铁有关的永动机设想， 比如这套斜坡装置。小球应该会被顶端的磁铁吸引上斜坡，然后从洞中掉回底部，循环往复。这个装置也没能成功， 就像之前所说的能给自己浇水的水壶，磁铁只可能把小球吸在顶部不动。即使小球能不断运动，磁铁的磁力也会随着时间流逝而消退，最终停止运行。对于所有的这些机器， 如果想要保持运动它们必然需要产生一些额外的能量将整个系统推过停止点，这就违反了热力学第一定律。有一些永动机看上去会一直运行下去，但事实上，它们总归会从外界获取额外的能量。即使工程师们能够以某种方式造出了不违反第一定律的永动机，由于第二定律 它仍旧不可能实现。热力学第二定律告诉我们能量总是通过某些方式趋于散失，比如摩擦。任何现实生活中的机器都有着移动的部件或者是与气体及液体分子的互相作用这就会产生微量的摩擦与热量，在真空中也不例外。那些热量就是能量损失，并且它一直在流失，不断地减少可供系统自身运动的能量直到机器不可避免地停下来。到目前为止， 这两条热力学定律已经排除了任何关于永动机的设想以及100%效率产能的可能。但是，这并不能绝对地说 我们将永远无法找到永动机，因为我们对整个宇宙的了解还是太少了。也许我们将找到一种新的奇异的物质存在形式让我们不得不重新审视热力学的定律。又或许在极小的量子尺度会有永动机的存在。我们能确定的是 我们永远不会停止寻找。现在，唯一看上去“永动”的，是我们的搜寻。

**P476 2017-06-07 Can you solve the fish riddle - Steve Wyborney**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=476)

You are the cargo director on the maiden voyage of the S.S. Buoyant, and you've agreed to transport several tanks containing the last specimens of a critically endangered fish species to their new aquarium. Unfortunately, as you're passing through shark-infested waters, the boat is battered by a fierce storm, throwing your precious cargo overboard. And to make matters worse, no one seems certain just how many fish tanks are missing. Fortunately, you have a rescue sub at your disposal, but only enough fuel for one trip to the ocean floor. You need to know where the tanks are so you can gather them all in one quick pass. Not a single fish can be lost. You decide to scan the three sectors of the ocean floor where the cargo could have landed. Thermal imaging shows 50 organisms in the area, and you quickly realize that that number includes both your fish and some ravenous sharks. You flip on the sonar to get a better look. The image for Sector Alpha shows four tanks and two sharks, the image for Sector Beta shows two tanks and four sharks, and the image for Sector Gamma is blank. Your sonar has malfunctioned, and you're going to have to go with the info you have. You check the shipping notes, but all you learn is that each tank had the same number of fish inside. The cargo hold had space for anywhere from 1 to 13 total tanks. And finally, the old captain tells you that this area has the odd property that no two sectors can have the same number of sharks, but every sector will have at least one, and no more than seven. There's no time to waste. The tanks won't withstand the pressure much longer. As you descend in the sub, you review everything you know. How many fish tanks do you need to find in Sector Gamma? Hurry, the fate of an entire species depends on you. Pause here if you want to figure it out for yourself. Answer in: 3 Answer in: 2 Answer in: 1 At first, it seems like there are just too many missing pieces of information. After all, you don't know how many fish or how many tanks there are, let alone how many fish are in each one. But then you remember the best way to compare multiple pieces of partial information - a table. Since we know there are thirteen tanks at most, and we already see six tanks in Sectors Alpha and Beta, we know the total number of tanks must be between 6 and 13. We also know that each sector has a different amount of sharks with no more than seven in each one. Since there are two in Sector Alpha and four in Sector Beta, Sector Gamma can have 1, 3, 5, 6, or 7 sharks. What about the number of endangered fish? Out of the 50 total organisms in all three sectors, we know at least seven are sharks, leaving a maximum of 43 fish inside all the tanks. And the more sharks we find in Sector 3, the fewer fish there are to save. Now, remember that the fish are equally distributed across all the tanks. Why is that important? Because it means that one of the possible values for the total amount of fish must be divisible by one of the possible values for the total amount of tanks. And looking at the table, we can see that the only combination that works is 39 fish divided between 13 tanks with three fish in each. With sharks swarming around, you quickly pilot the sub through the first two sectors before retrieving the remaining seven tanks in Sector Gamma. You've saved the species and taken an impromptu dive. All in all, not a bad day, unless you happen to be a hungry shark.

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翻译人员: Lipeng Chen 校对人员: Lyra Wang你身为S.S. Buoyant货船首航的船长，同意运送装载着濒危鱼类的数个鱼缸到它们新的水族馆。不幸的是，在你穿过鲨鱼聚集的水域时，货船遇上了猛烈的风暴， 宝贵的鱼缸被扔下了船体。更糟糕的是，没人确定少了多少个鱼缸。幸运的是，你手头有一个救援潜艇，但燃料只够去一次海底。你需要知道鱼缸在哪里，才能一次性的全部收集好它们。不能丢下任何一个鱼缸。你决定扫描鱼缸可能掉在海底的三个区域。热感图像显示区域内有50个生命体，你立刻意识到这个数字既包括了你的鱼，也包括了凶猛的鲨鱼。你转向雷达，获得更好的图像。Alpha区域的图像显示有四个水箱和两条鲨鱼，Beta区域的图像显示有两个水箱和四条鲨鱼，Gamma区域的图像一片空白。你的雷达坏了，你只能使用现有的信息。你查了查货运记录，只知道每个鱼缸内有着相同数目的鱼。货船可以容纳1到13个鱼缸。最后，老船长告诉你这片区域有着奇怪的特性，没有两个区域可以有相同数目的鲨鱼，但是每个区域至少会有一条鲨鱼，不会超过七条。没有时间可以浪费了。鱼缸不能长时间的承受压力。当你乘着潜艇下潜时， 你回顾所有你知道的东西。你需要在Gamma区域找到多少个鱼缸？快点，整个物种的命运取决于你。如果你想要自己搞清楚，在这里暂停。答案：3秒答案：2秒答案：1秒首先，好像遗漏了好多信息。毕竟，你不知道有多少个鱼缸，更不要说每个鱼缸里有多少条鱼了。但是你想起了比较部分信息的最好办法是用一个表格。既然我们知道最多有13个鱼缸，而且我们已经在Alpha和Beta区域看到了6个鱼缸，那么我们就知道总的鱼缸数目一定在6到13之间。我们还知道每个区域有不同数目的鲨鱼，而且每个区域最多不会超过7条。既然Alpha区域有2条，Beta区域有4条，那么Gamma区域可以有1、3、5、6或7条鲨鱼。有多少条濒危的鱼呢？在三个区域内50个生命体之中，我们知道至少有7条鲨鱼，那么所有鱼缸里至多有43条鱼。如果在Gamma区域内的鲨鱼越多， 鱼的数量就越小。记住，所有鱼缸里的鱼的数目是相等的。为什么这很重要？因为这意味着可能的鱼的总条数，必须可以被可能的鱼缸数目整除。看表格，我们可以发现唯一符合的组合只有39条鱼，分装在13个鱼缸内， 每个鱼缸里有三条。鲨鱼在旁边游动，你先迅速的救下了前两个区域的鱼，后救回了Gamma区域的7个鱼缸。你拯救了这个物种，潜水放松了下。总的来说，不是糟糕的一天， 除非你正好是条饥饿的鲨鱼。

**P477 2017-06-07 The power of creative constraints - Brandon Rodriguez**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=477)

Imagine you're asked to invent something new. It could be whatever you want made from anything you choose in any shape or size. That kind of creative freedom sounds so liberating, doesn't it? Or does it? If you're like most people, you'd probably be paralyzed by this task. Without more guidance, where would you even begin? As it turns out, boundless freedom isn't always helpful. In reality, any project is restricted by many factors, such as the cost, what materials you have at your disposal, and unbreakable laws of physics. These factors are called creative constraints, and they're the requirements and limitations we have to address in order to accomplish a goal. Creative constraints apply across professions, to architects and artists, writers, engineers, and scientists. In many fields, constraints play a special role as drivers of discovery and invention. During the scientific process in particular, constraints are an essential part of experimental design. For instance, a scientist studying a new virus would consider, "How can I use the tools and techniques at hand to create an experiment that tells me how this virus infects the body's cells? And what are the limits of my knowledge that prevent me from understanding this new viral pathway?" In engineering, constraints have us apply our scientific discoveries to invent something new and useful. Take, for example, the landers Viking 1 and 2, which relied on thrusters to arrive safely on the surface of Mars. The problem? Those thrusters left foreign chemicals on the ground, contaminating soil samples. So a new constraint was introduced. How can we land a probe on Mars without introducing chemicals from Earth? The next Pathfinder mission used an airbag system to allow the rover to bounce and roll to a halt without burning contaminating fuel. Years later, we wanted to send a much larger rover: Curiosity. However, it was too large for the airbag design, so another constraint was defined. How can we land a large rover while still keeping rocket fuel away from the Martian soil? In response, engineers had a wild idea. They designed a skycrane. Similar to the claw machine at toy stores, it would lower the rover from high above the surface. With each invention, the engineers demonstrated an essential habit of scientific thinking - that solutions must recognize the limitations of current technology in order to advance it. Sometimes this progress is iterative, as in, "How can I make a better parachute to land my rover?" And sometimes, it's innovative, like how to reach our goal when the best possible parachute isn't going to work. In both cases, the constraints guide decision-making to ensure we reach each objective. Here's another Mars problem yet to be solved. Say we want to send astronauts who will need water. They'd rely on a filtration system that keeps the water very clean and enables 100% recovery. Those are some pretty tough constraints, and we may not have the technology for it now. But in the process of trying to meet these objectives, we might discover other applications of any inventions that result. Building an innovative water filtration system could provide a solution for farmers working in drought-stricken regions, or a way to clean municipal water in polluted cities. In fact, many scientific advances have occurred when serendipitous failures in one field address the constraints of another. When scientist Alexander Fleming mistakenly contaminated a Petri dish in the lab, it led to the discovery of the first antibiotic, penicillin. The same is true of synthetic dye, plastic, and gunpowder. All were created mistakenly, but went on to address the constraints of other problems. Understanding constraints guides scientific progress, and what's true in science is also true in many other fields. Constraints aren't the boundaries of creativity, but the foundation of it.

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翻译人员: Lipeng Chen 校对人员: Jack Zhang试想一下假如有人让你发明一样东西。它可以是任何你想要的东西，你可以用任何材料去制作，可以把它做成任何形状或大小。这种创造自由听起来很让人感觉到解放，不是吗？但真的是这样吗？如果你像大部分人那样， 你或许会对这任务感到无所适从。在没有更多指引的情况下， 你知道从哪里开始着手吗？事实证明，无限的自由并不总是有用的。在现实生活中， 任何设计都会受到诸多因素的限制，比如说成本，手头上有什么材料可供你自由支配，还有不会被打破的物理定律。这些因素都被称为创造性约束，这些因素都是要求和限制条件，要想完成目标我们就必须面对它们。创造性约束适用于各类职业，如建筑家和艺术家，作家，工程师，和科学家。在许多领域中，约束作为探索和发明的驱动因素，都扮演着一个特别的角色。尤其是在科学进程中，约束条件是实验设计中必不可少的一部分。例如，一位正在研究一种新病毒的科学家会思考，“我应该怎样利用手中现有的工具和技术，去进行一个能够告诉我 这个病毒是怎样感染人体细胞的实验呢？我现有的知识中有哪些局限性会阻碍我，去理解这个新型病毒性路径？”在工程领域中，约束条件能让我们把科学发现应用到新颖有用的事物的创造中。举一个例子，着陆器维京1号和2号，它们需要依靠推进器才能安全着落于火星表面。问题是？那些推进器会在火星表面留下外来的化学物质，污染土壤样本。一个新的约束条件因而产生。我们怎样使探测器在登陆火星的同时，又不会把地球的化学物质带到火星上呢？在下一个探路者任务中就用到一个气囊系统，这个系统可以让探测车弹跳和停止行驶，同时不需要燃烧污染性燃料。多年后，我们想要发射 一个更大的探测车：好奇号。但对于气囊设计而言，好奇号实在太大了，因而另一个约束条件也得以明确。我们怎么让一个大型探测车 着落的同时，火箭燃料又能远离火星土壤呢？作为回应，工程师们有一个疯狂的想法。他们设计出一个空中起重机。它跟玩具店里的抓娃娃机很相像，可以让位于星球表面高空中的探测车降落。每一个发明，工程师们都展示出一种科学思维的必要习惯——就是解决方法要意识到现有技术的限制，这样才可以促使技术的发展。有时候这样的过程需要重复多次，就像，“我怎样做出一个更好的 降落伞让探测车着陆？”有时候，这样的过程是革新性的，像是在现有最好的降落伞都起不了作用的情况下， 怎样实现我们的目标。在这两种情况下，约束条件指导决策，确保我们达成每一个目标。这里还有一个尚待解决的火星问题。那就是我们想把需要水 维系生命的宇航员送到火星上。他们需要依赖一个可以让水保持纯净的过滤系统，而且这个系统能让水100%回收利用。这些都是相当严苛的约束条件，现在我们的技术也许还不能实现上述情况。但在尝试实现这些目标的过程中，我们可能会发现这些发明的其他用途。建造一个创新性的水过滤系统可以为工作在干旱地区的农民们服务，或者为水污染城市过滤干净城市用水。实际上，很多科技发展都是在一个领域的偶然失败下，需要解决另一个约束条件中产生的。科学家亚历山大·弗莱明正是因为不小心污染了实验室里的一个培养皿，才会发现世界上第一种抗生素，即青霉素。同样的情况发生在合成染料，塑料，还有火药的发明过程中。它们都是在偶然情况下被发明出来的，但同时是因解决其他问题的 约束条件而发展下去的。理解约束能引导科技进程，这不但适用于科学还适用于很多其他领域。约束不是创造的障碍，而是创造的源泉。

**P478 2017-06-21 Who built Great Zimbabwe And why - Breeanna Elliott**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=478)

Stretched across a tree-peppered expanse in southern Africa lies the magnificent ruins of Great Zimbabwe, a medieval stone city of astounding wealth and prestige. Located in the present-day country of Zimbabwe, it's the sight of the largest known settlement ruins in Sub-Saharan Africa, second on the continent only to the pyramids of Egypt. But the history of this city is shrouded in controversy, defined by decades of dispute about who built it and why. Its name comes from the Shona word madzimbabwe, meaning big house of stone for its unscalable stone walls that reach heights of nearly ten meters and run for a length of about 250 meters. For its grandeur and historical significance, it was named a UNESCO World Heritage site in 1986. Back in the 14th and 15th centuries, it was a thriving city. Spread across nearly eight square-kilometers, Great Zimbabwe was defined by three main areas: the Hill Complex, where the king lived; the Great Enclosure, reserved for members of the royal family; and the Valley Complex, where regular citizens lived. Rulers were both powerful economic and religious leaders for the region. At its highest point, the city had a bustling urban population of 18,000 people and was one of the major African trade centers at the time. What enabled this growth was Great Zimbabwe's influential role in an intercontinental trade network. Connected to several key city-states along the East African Swahili Coast, it was part of the larger Indian Ocean trade routes. The city generated its riches by controlling the sources and trade of the most prized items: gold, ivory, and copper. With this mercantile power, it was able to extend its sphere of influence across continents, fostering a strong Arab and Indian trader presence throughout its zenith. Archaeologists have since pieced together the details of this history through artifacts discovered on site. There were pottery shards and glassworks from Asia, as well as coins minted in the coastal trading city of Kilwa Kisiwani over 1,500 miles away. They also found soapstone bird figures, which are thought to represent each of the city's rulers, and young calf bones, only unearthed near the royal residence, show how the diet of the elite differed from the general population. These clues have also led to theories about the city's decline. By the mid-15th century, the buildings at Great Zimbabwe were almost all that remained. Archaeological evidence points to overcrowding and sanitation issues as the cause, compounded by soil depletion triggered by overuse. Eventually, as crops withered and conditions in the city worsened, the population of Great Zimbabwe is thought to have dispersed and formed the nearby Mutapa and Torwa states. Centuries later, a new phase of Great Zimbabwe's influence began to play out in the political realm as people debated who had built the famous city of stone. During the European colonization of Africa, racist colonial officials claimed the ruins couldn't be of African origin. So, without a detailed written record on hand, they instead relied on myths to explain the magnificence of Great Zimbabwe. Some claimed it proved the Bible story of the Queen of Sheba who lived in a city of riches. Others argued it was built by the Ancient Greeks. Then, in the early 20th century after extensive excavation at the site, the archaeologist David Randall-MacIver presented clear evidence that Great Zimbabwe was built by indigenous peoples. Yet, at the time, the country's white minority colonial government sought to discredit this theory because it challenged the legitimacy of their rule. In fact, the government actively encouraged historians to produce accounts that disputed the city's African origins. Over time, however, an overwhelming body of evidence mounted, identifying Great Zimbabwe as an African city built by Africans. During the 1960s and 70s, Great Zimbabwe became an important symbol for the African Nationalist movement that was spreading across the continent. Today, the ruins at Great Zimbabwe, alluded to on the Zimbabwean flag by a soapstone bird, still stand as a source of national pride and cultural value.

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翻译人员: Liyu Liu 校对人员: Lipeng Chen穿过非洲南部广阔的茂盛森林，你会看到宏伟的大津巴布韦遗迹，这是中世纪时期一座 汇聚惊人财富和威望的石城。它坐落位于今天的津巴布韦，这是非洲撒哈拉沙漠 以南地区已知的最大居住遗址，在非洲大陆上仅次于埃及金字塔。但这座城市的历史却笼罩着争议，数十年间围绕着是谁以及 为什么建造这一城市而争议不断。这座城市的名字源自修纳语 Madzimbabwe，意思是石制的大房子，源于其无法攀越的，近10米高的石墙，它的长度大约有250米。鉴于遗址的宏伟壮观和其历史重要性，联合国科教文组织在1986年 将其列入世界文化遗产。早在14到15世纪， 大津巴布韦是一座十分繁荣兴旺的城市。其疆域延伸至八平方公里，大津巴布韦主要由三个主要区域构成：分别是山丘建筑群， 那里是国王居住的地方；卫城则为王室成员所拥有；以及一般公民居住的山谷建筑群。统治者同时是这个区域中 权威的经济和宗教领袖。在它的鼎盛时期，这座城市有18000的活跃人口，它还是当时非洲主要贸易中心之一。这座城市得以发展的原因是大津巴布韦，在洲际贸易网络中扮演着极具有影响力的角色。连接东非斯瓦西里海岸几个重要城邦，大津巴布韦是庞大印度洋 贸易航线的一个重要组成。通过对珍贵资源的来源和贸易的控制，这座城市获取了巨大的财富：金子，象牙，和铜币。有了这样的商业力量，大津巴布韦得以跨越大陆扩展其影响范围，在鼎盛时期促进了 强大的阿拉伯和印度贸易商的出现。考古学家通过在遗迹上发现的文物的研究，逐步拼凑起大津巴布韦历史的细节。发现的文物包括来自 亚洲的陶制品的碎片和玻璃制品，以及远在1500里以外的沿海贸易城邦 基尔瓦基斯瓦尼铸造的硬币。考古学家也发现了鸟形象的皂石雕刻，这些鸟石像被认为是 每个城市的统治者的代表。同时仅在皇室居所附近发掘出许多腓骨，这个发现说明了上层人物 和一般民众饮食的不同。这些迹象也引出了有关这座城市衰败的理论。到了15世纪中期，大津巴布韦的建筑基本上 就是现在所留存下来的这些。考古证据将城市衰败的原因指向人口过密和公共卫生问题，对土地过度使用所导致的 土壤贫瘠问题令情况更加恶化。最终，因为庄稼枯萎和城市境况的每况愈下，人们认为大津巴布韦的人口被分散开，并形成了附近的穆塔帕和托瓦帝国。几个世纪以后，大津巴布韦开始在政治领域显示出其巨大影响力。人们不断争论是谁建立起 这样宏伟著名的势头之城。在欧洲殖民非洲期间，种族主义殖民地官员声称 该遗址不可能起源于非洲。因为缺少详细的文字记录，他们转而用神话故事来 解释大津巴布韦的宏伟建筑。一部分人认为这证实了圣经中示巴女王，曾生活在一座财富之城的故事。另一部分人则认为 大津巴布韦是古希腊人建立的。随后在20世纪早期，随着遗址的大量挖掘，考古学家 David Randall-MacIver找到明确的证据证明大津巴布韦是原住民所建。然而在当时，这个国家的少数白人的 殖民政府却在诋毁这一理论，因其挑战了他们统治的合法性。事实上，政府还在积极鼓励历史学家来撰写文章质疑这座城市的非洲起源说法。随着时间的推移，一个压倒性的证据出现了，证实大津巴布韦是一座 由非洲人民建立的非洲城市。在上个世纪60和70年代，大津巴布韦成为了 非洲民族主义运动的一个重要象征，这一象征传遍了整个非洲大陆。今天，津巴布韦的国旗上代表着 大津巴布韦遗址的皂石神鸟像，仍被视作民族骄傲和文化价值的来源。

**P479 2017-06-23 Can you find the next number in this sequence - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=479)

These are the first five elements of a number sequence. Can you figure out what comes next? Pause here if you want to figure it out for yourself. Answer in: 3 Answer in: 2 Answer in: 1 There is a pattern here, but it may not be the kind of pattern you think it is. Look at the sequence again and try reading it aloud. Now, look at the next number in the sequence. 3, 1, 2, 2, 1, 1. Pause again if you'd like to think about it some more. Answer in: 3 Answer in: 2 Answer in: 1 This is what's known as a look and say sequence. Unlike many number sequences, this relies not on some mathematical property of the numbers themselves, but on their notation. Start with the left-most digit of the initial number. Now, read out how many times it repeats in succession followed by the name of the digit itself. Then move on to the next distinct digit and repeat until you reach the end. So the number 1 is read as "one one" written down the same way we write eleven. Of course, as part of this sequence, it's not actually the number eleven, but 2 ones, which we then write as 2 1. That number is then read out as 1 2 1 1, which written out we'd read as one one, one two, two ones, and so on. These kinds of sequences were first analyzed by mathematician John Conway, who noted they have some interesting properties. For instance, starting with the number 22, yields an infinite loop of two twos. But when seeded with any other number, the sequence grows in some very specific ways. Notice that although the number of digits keeps increasing, the increase doesn't seem to be either linear or random. In fact, if you extend the sequence infinitely, a pattern emerges. The ratio between the amount of digits in two consecutive terms gradually converges to a single number known as Conway's Constant. This is equal to a little over 1.3, meaning that the amount of digits increases by about 30% with every step in the sequence. What about the numbers themselves? That gets even more interesting. Except for the repeating sequence of 22, every possible sequence eventually breaks down into distinct strings of digits. No matter what order these strings show up in, each appears unbroken in its entirety every time it occurs. Conway identified 92 of these elements, all composed only of digits 1, 2, and 3, as well as two additional elements whose variations can end with any digit of 4 or greater. No matter what number the sequence is seeded with, eventually, it'll just consist of these combinations, with digits 4 or higher only appearing at the end of the two extra elements, if at all. Beyond being a neat puzzle, the look and say sequence has some practical applications. For example, run-length encoding, a data compression that was once used for television signals and digital graphics, is based on a similar concept. The amount of times a data value repeats within the code is recorded as a data value itself. Sequences like this are a good example of how numbers and other symbols can convey meaning on multiple levels.

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翻译人员: Liyu Liu 校对人员: Lipeng Chen这些是一个数列最开始的五个数字。你能想出下一个数字是什么吗？如果你想要自己先想清楚的话 就在这里暂停一下。答案倒数 3答案倒数 2答案倒数 1这个数列有一个规律，然而这个规律可能不是你所想的那样。重新再看一下这个数列。并尝试读出声来。现在，让我们来看这一数列的下一个数字。3，1，2，2，1，1如果你需要多思考一下的话 可以再暂停一下。答案倒数 3答案倒数 2答案倒数 1这就是所谓的外观数列，和其它的数字数列不同，这个数列的规律并不依靠于 数字自身的的数学属性，而是数字的表示法。从初始数字的最左数位开始读起。现在读出它连续重复的次数，然后再读出这一数字。下一个数位的读法也是依此类推。直到读完最后一位。所以数字1读作“一个一”，和我们写数字十一的方法一样。自然，作为这个数列的一部分，11并不是真正的数字十一，而是“两个一”，因此我们又写作21。而这个数字读出来是1 2 1 1，而1211写出来又可读作 一个一、一个二、二个一，以此类推。这个数列最初是由数学家 John Conway 所发现，他注意到了这一数列一些很有趣的属性。比如从数字22开始， 这一数列会生成的“二个二”的无穷循环。但如果我们从其他数字开始的话，这个数列就会以一些特殊的方式展开。请注意，虽然这些数字的位数数量在不断增长，这些增长似乎并不是线性的或随机的。事实上，如果你把这个数列无限扩大，规律就会浮现出来。相邻两个数字的数位数量之间的比例，会逐渐趋近 一个被称为“Conway常数”的数字。这一数字会比1.3稍大一点，也就是说，数列中每生成下一项数字，数位的数量大约增长30%。那么，那些数字本身如何呢？这就更加有趣了。除了22这一无限循环的数列，每一个可能的数列最终会 被分解成不同的数位字符串。不论这些字符串以怎样的顺序出现，它们都会不断延续下去。Conway 分析了92个字符串，所有的字符串只包含数字1、2和 3以及其他两个变化的字符串，它们以大于或等于4的数字结尾。无论从哪一个数字开始这一数列，数列最终都会包含以上这些字符串的组合。大于或等于4的数字 只出现在两个变化字符串的末尾，如果出现的话。除了作为一个工整有序的数字谜题之外，外观数列也被应用到实际中。以游程编码为例，它从前被运用到电视信号和 数码图像的数据压缩上。游程编码也是建立在一个相似的概念上，在编码中， 数据出现的次数被记作数据值。这样的数列就是一个很好的例子，表现数字和其他符号是 怎样在多层次方面传达含义的。

**P480 2017-06-28 How do drugs affect the brain - Sara Garofalo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=480)

Most people will take a pill, receive an injection, or otherwise take some kind of medicine during their lives, but most of us don't know anything about how these substances actually work. How can various compounds impact the way we physically feel, think, and even behave? For the most part, this depends on how a drug alters the communication between cells in the brain. There are a number of different ways that can happen. But before it gets into the brain, any drug must first reach the bloodstream on a journey that can take anywhere from seconds to hours, depending on factors like how it's administered. The slowest method is to take a drug orally because it must be absorbed by our digestive system before it takes effect. Inhaling a drug gets it into the bloodstream faster. And injecting a drug intravenously works quickly too because it pumps the chemicals directly into the blood. Once there, the drug quickly reaches the gates of its destination, the brain. The entrance to this organ is guarded by the blood-brain barrier, which separates blood from the nervous system to keep potentially dangerous substances out. So all drugs must have a specific chemical composition which gives them the key to unlock this barrier and pass through. Once inside, drugs start to interfere with the brain's normal functioning by targeting its web of neurons and synapses. Neurons are brain cells that have a nucleus, dendrites, and an axon. Synapses are structures placed along the dendrites or the axon which allow the exchange of electrochemical signals between neurons. Those signals take the form of chemicals called neurotransmitters. Each neurotransmitter plays different roles in regulating our behaviors, emotions, and cognition. But they all work in one of two ways. They can either inhibit the receiving neuron, limiting its activity, or excite it, creating a new electrochemical signal that spreads throughout the network. Any leftover neurotransmitter usually gets degraded or reabsorbed into the transmitting neuron. A drug's effectiveness stems from its ability to manipulate these synaptic transmissions at different phases of the process. That results in an increase or a decrease in the amount of neurotransmitters being spread. For instance, common antidepressants, like SSRIs, stop the reabsorption of serotonin, a neurotransmitter that modulates our moods. This effectively pushes more of it into the neural network. Meanwhile, painkillers, like morphine, raise levels of serotonin and noradrenaline, which regulate energy, arousal, alertness, and pleasure. Those same neurotransmitters also affect endorphin receptors, reducing pain perception. And tranquilizers works by increasing the production of GABA to inhibit neural activity putting the person in a relaxed or sedated state. What about illegal or elicit drugs? These have powerful impacts on the brain that we're still trying to understand. Crystal meth, an amphetamine, induces a long-lasting release of dopamine, a neurotransmitter linked with the perception of reward and pleasure. It also activates noradrenaline receptors, which increases the heart rate, dilates pupils, and triggers the body's fight or flight response. Cocaine blocks the reuptake of dopamine and serotonin, pushing more into the network where they boost energy, create feelings of euphoria, and suppress appetites. And hallucinogenic drugs have some of the most puzzling effects. Substances like LSD, mescaline, and DMT all block the release of serotonin, which regulates mood and impulsivity. They also have an impact on the neural circuits involved in perception, learning, and behavioral regulation, which may explain why these drugs have such powerful impacts. Even if some of these effects sound exciting, there are reasons why some of these drugs are highly controlled and often illegal. Drugs have the power to alter the brain's chemistry, and repeated use can permanently rewire the neural networks that support our ability to think, make decisions, learn, and remember things. There's a lot we still don't know about drugs and their effects, both the good and the bad. But those we do know about are the ones we've studied closely, and turned into effective medicines. As our knowledge grows about drugs and the brain, the possibilities will also increase for treating the many medical problems that puzzle researchers today.

**P480 2017-06-28 How do drugs affect the brain - Sara Garofalo**

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翻译人员: Liyu Liu 校对人员: Jenny Yang大多数人一生中都会吃药丸、接受注射或者以一些其他方式摄入药物。但是大多数人并不清楚这些物质 到底是如何作用的。各种化合物如何 影响我们身体的感知、思考、甚至行为？多数情况下，这取决于药物如何改变大脑细胞间的交流。这有很多种情况。但在进入大脑前，任何药物必须首先进入血液，这一过程花费时间 从几秒到几小时不等，取决于各种因素， 诸如进药的方式。最慢的方式是口服药物，因为药物生效前，它必须先被人体的消化系统吸收。吸入给药能更快的让药物进入血液。通过静脉注射药物的方法 也同样会很快作用，因为这种方法把化学药剂 直接注入血液中。一旦进入血液， 药物会很快抵达目的地——大脑。而大脑的入口被血脑屏障所保卫，它将血管从神经系统里分离开来，把可能有害的物质阻挡在外。因此，所有的药物必须具备 特殊的化学成分，来帮助它们开启血脑屏障并通过。一旦进入大脑， 药物就会作用于神经元网络和突触，开始介入大脑正常机能。神经元是具有细胞核、 树突和轴突的脑细胞。突触是一种沿着树突 或轴突分布的构造，允许电化学信号在神经元之间的传递。那些以化学物质呈现的信号 被称作神经递质。每一个神经递质的职责都不同， 分别调节我们的行为、情绪和认知。但它们的运作方式只有两种。它们能抑制接受信号的神经元，限制其活动，或者让神经元兴奋，产生能传遍整个神经元网络的 新的电化学信号。而剩下的神经递质会退化，或者被重新吸收，进入传递神经元。药物的效用是基于其在不同阶段对突触传播的掌控能力。这会导致被传递的神经递质数量的上升或下降。比方说，常见的抗抑郁药物， 诸如SSRI（五羟色胺再摄取抑制剂），会抑制对五羟色胺的重新吸收，五羟色胺是一种能够控制 人们情绪的神经递质。这能有效帮助更多五羟色胺 进入神经网络。同时，如吗啡等的止痛药会提升人体内五羟色胺 和去甲肾上腺素的水平，能够调节能量、兴奋、机智和愉悦。这些神经递质也会影响内啡肽接受器，减少对疼痛的感知。镇静剂则是通过增加对GABA （γ-氨基丁酸）的生产来抑制神经活动，让人处于放松的、镇静的状态。那么非法药物又是如何作用的呢？这些药物对大脑有着极强的影响， 我们仍在尝试解开这一谜题。冰毒是一种苯丙胺（中枢神经兴奋剂），会导致多巴胺的持续释放，多巴胺是一种与感知奖励 和快乐有关的神经递质。它也会激发去甲肾上腺素接受器，导致心率上升、瞳孔扩张，并触发人体的应激反应。可卡因阻碍了多巴胺 和五羟色胺的再吸收，让更多的药物进入神经网络，提升精力，使人产生极度兴奋的情绪，并抑制食欲。引起幻觉的药物都具有一些 让人十分费解的效果。诸如LSD（麦角二乙酰胺）、麦司卡林和DMT（二甲基色胺）这样的物质都会阻碍五羟色胺的释放，而五羟色胺会调节人们的情绪和冲动。这些物质也对感知、学习和行为调节的神经回路产生影响，这也许可以解释为什么 这些药物有如此强烈的影响。即使一些影响听起来很刺激，这些药物被严格控制并被 视作违法药物是有原因的。药物具有改变大脑内 化学环境的力量，并且长期使用药物会永久性的 影响神经网络的工作，这些神经网络能够协助我们进行思考、做出决定、学习和记忆。仍有许多我们未知的 有关药物及其影响的信息，无论是优点还是弊端。但是我们所知的那些 是我们进行了细致研究，并制成有效的药物的。随着我们对药物和 大脑相关知识的了解更加深入，治疗许多困扰今天研究者的疾病的可能性也随之提升。

**P481 2017-06-29 How to spot a misleading graph - Lea Gaslowitz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=481)

A toothpaste brand claims their product will destroy more plaque than any product ever made. A politician tells you their plan will create the most jobs. We're so used to hearing these kinds of exaggerations in advertising and politics that we might not even bat an eye. But what about when the claim is accompanied by a graph? Afterall, a graph isn't an opinion. It represents cold, hard numbers, and who can argue with those? Yet, as it turns out, there are plenty of ways graphs can mislead and outright manipulate. Here are some things to look out for. In this 1992 ad, Chevy claimed to make the most reliable trucks in America using this graph. Not only does it show that 98% of all Chevy trucks sold in the last ten years are still on the road, but it looks like they're twice as dependable as Toyota trucks. That is, until you take a closer look at the numbers on the left and see that the figure for Toyota is about 96.5%. The scale only goes between 95 and 100%. If it went from 0 to 100, it would look like this. This is one of the most common ways graphs misrepresent data, by distorting the scale. Zooming in on a small portion of the y-axis exaggerates a barely detectable difference between the things being compared. And it's especially misleading with bar graphs since we assume the difference in the size of the bars is proportional to the values. But the scale can also be distorted along the x-axis, usually in line graphs showing something changing over time. This chart showing the rise in American unemployment from 2008 to 2010 manipulates the x-axis in two ways. First of all, the scale is inconsistent, compressing the 15-month span after March 2009 to look shorter than the preceding six months. Using more consistent data points gives a different picture with job losses tapering off by the end of 2009. And if you wonder why they were increasing in the first place, the timeline starts immediately after the U.S.'s biggest financial collapse since the Great Depression. These techniques are known as cherry picking. A time range can be carefully chosen to exclude the impact of a major event right outside it. And picking specific data points can hide important changes in between. Even when there's nothing wrong with the graph itself, leaving out relevant data can give a misleading impression. This chart of how many people watch the Super Bowl each year makes it look like the event's popularity is exploding. But it's not accounting for population growth. The ratings have actually held steady because while the number of football fans has increased, their share of overall viewership has not. Finally, a graph can't tell you much if you don't know the full significance of what's being presented. Both of the following graphs use the same ocean temperature data from the National Centers for Environmental Information. So why do they seem to give opposite impressions? The first graph plots the average annual ocean temperature from 1880 to 2016, making the change look insignificant. But in fact, a rise of even half a degree Celsius can cause massive ecological disruption. This is why the second graph, which show the average temperature variation each year, is far more significant. When they're used well, graphs can help us intuitively grasp complex data. But as visual software has enabled more usage of graphs throughout all media, it's also made them easier to use in a careless or dishonest way. So the next time you see a graph, don't be swayed by the lines and curves. Look at the labels, the numbers, the scale, and the context, and ask what story the picture is trying to tell.

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翻译人员: HE TIANKAN 校对人员: Lipeng Chen一个牙膏品牌声称他们的产品 可以比以往任何的产品除掉更多的牙菌斑。一位政客告诉人们 他们的计划会制造最多的就业机会。我们已经太习惯在广告和政治宣传中听到这些夸大其词了，以至于有时我们根本不把这些东西放在眼里。但是假如这些说法同时伴随着一个图表呢？毕竟，图表并不是主观意见，它呈现的只是冰冷确切的数字， 谁又能来质疑这些冷冰冰的数字呢？然而，事实是，图表可以通过很多方法误导人们并完全地操纵人们的想法。下面便是一些图表误导人们的方式。在这则1992年的广告中， 雪弗兰利用这张图表声称他们制造了全美最耐用的卡车。这张图表不仅显示雪弗兰过去的十年间卖出的卡车有98%目前仍在使用中，图表还暗示他们的卡车比丰田要耐用一倍。事实看上去就是如此， 直到你仔细观察纵坐标上对应的数值，你才会发现丰田（十年间卖出的）卡车的使用率为96.5%左右。该图表的问题在于 纵坐标的范围仅仅是95到100.如果范围是从0到100， 图表会是这个样子。这便是图表误传数据的最普遍方法之一，也就是扭曲某一坐标的尺度。将y轴的某一小部分放大可使两个被比较的事物之间 难以察觉的差距被夸张放大。这个方法对于柱状图来说尤其起效。因为我们总是假设柱状图的长度与数值是成比例对应的。另一方面，x轴的间距也是可以被扭曲的，这种扭曲通常发生在 呈现某事物随着时间改变的线形图上。这张图标呈现的是美国2008年 到2010年的失业情况，其使用了两种方法操纵x轴。首先，x轴的间距是不一致的。2009年3月之后的15个月的跨度被压缩使其看起来比之前的6个月还短。如果使用一致的数据点， 我们将会看到一张截然不同的图表，其中的失业情况在2009年年底之后逐渐减弱。如果你对图表前一部分的 失业情况为何会加重感到不解，其原因是该图表中时间线的起点正是金融海啸之后美国开始财政崩溃之后的时刻。这种技巧被称为“计划性选择”。也就是通过别有用心地选择一个时间段来排除该时间段之外发生的某一事件的影响。而选择某些特定的数据点 可以掩盖该时间段内的重要变化。即使图表本身没有任何错误，省略某些相关的数据点 也会让人留下错误的印象。统计每年观看超级碗观众人数的表格让人们以为超级碗的人气火爆。但事实上它统计的并不是观众人数的成长。事实上，超级碗的收视率是保持稳定的，因为虽然球迷的数量在增加，但是每名观众的收视占有率却并没有增加。最后，在不知道图表呈现的重点的情况下，人们很难从其中获得有用的信息。以下的两幅图利用了国家环境信息中心提供的同一组海洋温度的数据。然而为什么它们却看起来完全相反呢？第一幅图描绘了1880年到2016年的年平均海洋温度。虽然温度的变化看起来并不明显，但是，即使是半摄氏度的温度上升也可能导致严重的生态问题。这也就是为什么呈现了年平均温度波动的第二张图表重要性远大于第一张。如果使用得当，图表可以帮助我们 更直观地了解复杂的数据。但是可视化软件一方面大大 增加了图表在各种媒体上的应用，另一方面粗心大意和刻意误导也变得更加频繁。因此，下一次在遇到图表时， 不要被直线和曲线的走向误导。仔细看一看单位、数值、间距以及该图表的背景，问问自己这张图标到底要传递什么信息。

**P482 2017-06-29 What causes kidney stones - Arash Shadman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=482)

The biggest kidney stone on record weighed more than a kilogram and was 17 centimeters in diameter. The patient didn't actually swallow a stone the size of a coconut. Kidney stones form inside the body, but unfortunately, they're extremely painful to get out. A kidney stone is a hard mass of crystals that can form in the kidneys, ureters, bladder, or urethra. Urine contains compounds that consist of calcium, sodium, potassium, oxalate, uric acid, and phosphate. If the levels of these particles get too high, or if urine becomes too acidic or basic, the particles can clump together and crystallize. Unless the problem is addressed, the crystals will gradually grow over a few weeks, months, or even years, forming a detectable stone. Calcium oxalate is the most common type of crystal to form this way, and accounts for about 80% of kidney stones. Less common kidney stones are made of calcium phosphate, or uric acid. A slightly different type of stone made of the minerals magnesium ammonium phosphate, or struvite, can be caused by bacterial infection. And even rarer stones can result from genetic disorders or certain medications. A kidney stone can go undetected until it starts to move. When a stone travels through the kidney and into the ureter, its sharp edges scratch the walls of the urinary tract. Nerve endings embedded in this tissue transmit excruciating pain signals through the nervous system. And the scratches can send blood flowing into the urine. This can be accompanied by symptoms of nausea, vomiting, and a burning sensation while urinating. If a stone gets big enough to actually block the flow of urine, it can create an infection, or back flow, and damage the kidneys themselves. But most kidney stones don't become this serious, or even require invasive treatment. Masses less than five millimeters in diameter will usually pass out of the body on their own. A doctor will often simply recommend drinking large amounts of water to help speed the process along, and maybe taking some pain killers. If the stone is slightly larger, medications like alpha blockers can help by relaxing the muscles in the ureter and making it easier for the stone to get through. Another medication called potassium citrate can help dissolve the stones by creating a less acidic urine. For medium-sized stones up to about ten millimeters, one option is pulverizing them with soundwaves. Extracorporeal shock wave lithotripsy uses high-intensity pulses of focused ultrasonic energy aimed directly at the stone. The pulses create vibrations inside the stone itself and small bubbles jostle it. These combined forces crush the stone into smaller pieces that can pass out of the body more easily. But zapping a stone with sound doesn't work as well if it's simply too big. So sometimes, more invasive treatments are necessary. A rigid tube called a stent can be placed in the ureter to expand it. Optical fibers can deliver laser pulses to break up the stone. Stones can also be surgically removed through an incision in the patient's back or groin. What about just avoiding kidney stones in the first place? For people prone to them, their doctor may recommend drinking plenty of water, which dilutes the calcium oxalate and other compounds that eventually build up into painful stones. Foods like potato chips, spinach, rhubarb, and beets are high in oxalate, so doctors might advise limiting them. Even though calcium is often found in stones, calcium in foods and beverages can actually help by binding to oxalate in the digestive tract before it can be absorbed and reach the kidneys. If you do end up with a kidney stone, you're not alone. Data suggests that rates are rising, but that world record probably won't be broken any time soon.

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翻译人员: Mengyu Zheng 校对人员: Hongmeng Yang记载在册最大的肾结石 重量超过了一公斤，而直径高达17厘米。这位病人并不是吞下了 一块椰子大小的石头。肾结石是在人体内部形成的，然而糟心的是，要把 它们取出来非常痛苦。肾结石是一块坚硬的结晶，在肾脏、尿管、膀胱、或者尿道中形成。尿液中的一些物质含有钙、钠、钾、草酸盐、尿酸、还有磷。如果这些微粒的含量过高，或者尿液变得过酸或过碱，这些微粒就很容易 聚集在一起，然后结晶。如果不及时扼制，随着时间流逝，结晶将会一周周、 一月月、甚至一年年继续变大。直到慢慢形成了可检测到的石头。草酸钙是这个过程中最常见的结晶，大约80%的肾结石的成分是草酸钙。由磷酸钙或者尿酸造成的 肾结石则不太常见。另一种稍有不同的结石是由磷酸铵镁构成的，也叫鸟粪石。细菌感染是此类肾结石 产生的罪魁祸首。除此之外，更为罕见的 肾结石由遗传疾病或是某些特殊的药物造成。肾结石可能在它开始移动后 才会被检测出来。当结石从肾脏移动到尿管里的时候，它尖利的边缘会擦伤尿道壁。薄壁中包裹着的神经末梢会通过神经系统输送剧烈疼痛的信号。此外，擦伤还会导致 血液进入尿液，造成血尿并常伴随着恶心、呕吐、排尿有烧灼感等症状。当结石长大到直接堵塞了尿液流通，就会出现尿路感染 或者尿液倒流的症状，并对肾脏自身造成伤害。但是大多数肾结石不会变得这么严重，大多数肾结石并没有严重到 需要进行手术的程度。那些直径不超过五毫米的结石通常能自行排出。医生通常会建议病人多喝水以加快结石的排出，或服用止痛片来缓解疼痛。如果结石稍微有点大，就需要 药物的帮助，比如受体阻断剂。它可以帮助松弛尿道输尿管的肌肉，使结石更顺利地通过。另外一种药物叫做柠檬酸钾。它可以通过降低尿液酸性 来帮助溶解结石。对于不超过十毫米的中等结石，可以选择用声波将其碾碎。体外震波碎石术通过超声波 产生高强度冲击波聚焦后直接对准体内的结石。冲击波会在结石内部产生震动，以及受挤压的微气泡。这些力量合在一起能够将结石击碎，从而更易于排出。然而如果结石的尺寸过大，使用声波碎石的方法就可能不起作用。这时候就需要进行侵入性治疗。比如放置硬质管道支架来扩张尿道。光纤可以输送激光脉冲来打碎结石。此外，还可以在病人的后背或腹股沟 制造切口，伸入手术用具，使结石通过手术被取出。那么如何在肾结石产生前 就加以预防呢？对容易产生结石的人们来说，医生会建议他们大量喝水，稀释体内的草酸钙，以及其他会产生痛苦的结石的物质。有些食物，比如薯片，菠菜，大黄，还有甜菜，都是草酸含量很高的。所以医生建议控制这类食物的摄入。虽然钙是结石的常见成分，但食物和饮料里的钙 其实有助于预防肾结石。这是因为它们会和消化道里的草酸结合，使其无法直接被吸收并进入肾脏。如果你已经有了肾结石， 也不要感到孤单无助。数据表明肾结石的发病率一直在升高，当然，世界最大肾结石的记录 在短时间内应该还是不会被打破。

**P483 2017-07-10 How does caffeine keep us awake - Hanan Qasim**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=483)

Over 100,000 metric tons of caffeine are consumed around the world every year. That's equivalent to the weight of 14 Eiffel Towers. Most of this caffeine is consumed in coffee and tea, but it's also ingested in some sodas, chocolate, caffeine pills, and even beverages labeled decaf. Caffeine helps us feel alert, focused, happy, and energetic, even if we haven't had enough sleep. But it can also raise our blood pressure, and make us feel anxious. It's the world most widely used drug. So how does it keep us awake? Caffeine evolved in plants where it serves a few purposes. In high doses, as it's found in the leaves and seeds of certain species, it's toxic to insects. But when they consume it in lower doses, as it's found in nectar, it can actually help them remember and revisit flowers. In the human body, caffeine acts as a stimulant for the central nervous system. It keeps us awake by blocking one of the body's key sleep-inducing molecules, a substance called adenosine. Your body needs a constant supply of energy, which it gets by breaking down a high-energy molecule called ATP. In the process, it liberates adenosine, ATP's chemical backbone. Neurons in your brain have receptors perfectly tailored to this molecule. When adenosine docks to these receptors, it activates a cascade of biochemical reactions that cause neurons to fire more sluggishly and slow the release of important brain-signaling molecules. In other words, you get sleepy. Caffeine is what's called an adenosine receptor antagonist. That means it derails this process of slowing your neurons down by blocking adenosine receptors. Caffeine and adenosine have a similar molecular structure, close enough that caffeine can wedge into the adenosine receptors, but not close enough to activate them. To summarize, adenosine inhibits your neurons. Caffeine inhibits the inhibitor, so it stimulates you. Caffeine can also boost positive feelings. In some neurons, the adenosine receptors are linked to receptors for another molecule called dopamine. One of dopamine's roles in the brain is to promote feelings of pleasure. When adenosine docks in one of these paired receptors, that can make it harder for dopamine to fit in its own spot, interrupting its mood-lifting work. But when caffeine takes adenosine's place, it doesn't have the same effect, and dopamine can slide in. There's evidence that caffeine's effects on adenosine and dopamine receptors can have long-term benefits, too, reducing the risk of diseases like Parkinson's, Alzheimer's, and some types of cancer. Caffeine can also ramp up the body's ability to burn fat. In fact, some sports organizations think that caffeine gives athletes an unfair advantage and have placed limits on its consumption. From 1972 until 2004, Olympic athletes had to stay below a certain blood-caffeine concentration to compete. Of course, not all of caffeine's effects are so helpful. It might make you feel better and more alert, but it can also raise your heart rate and blood pressure, cause increased urination or diarrhea, and contribute to insomnia and anxiety. Plus, the foods and beverages caffeine is found in have their own impacts on your body that have to be taken into account. Your brain can adapt to regular consumption of caffeine. If your adenosine receptors are perpetually clogged, your body will manufacture extra ones. That way, even with caffeine around, adenosine can still do its job of signaling the brain to power down. That's why you may find you need to consume more and more caffeine to feel as alert. There are more and more adenosine receptors to block. It's also why if you suddenly quit caffeine, you may experience an unpleasant withdrawal. With plenty of receptors and no competition, adenosine can work overtime, causing symptoms like headaches, tiredness, and depressed moods. But in a few days, the extra adenosine receptors will disappear, your body will readjust, and you'll feel just as alert as ever, even without an infusion of the world's most popular stimulant.

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翻译人员: xiao gu 校对人员: fuyu you全世界每年会消耗10万多吨咖啡因。相当于14个埃菲尔铁塔的重量。大部分的咖啡因存在于咖啡和茶中。但也存在于碳酸饮料，巧克力，咖啡因片剂，甚至标注了无咖啡因的饮料中。咖啡因帮助我们保持清醒， 专注，快乐和充满能量，甚至在我们睡眠不足时也如此。但它也能使血压升高，产生焦虑。咖啡因是世界上最广泛使用的药物。那么它是如何使我们保持清醒呢？咖啡因从植物中的物质进化而来。咖啡因在某些植物叶片 和种子中含量很高，能够使昆虫中毒。但当昆虫只从花蜜中 摄取低剂量的蜂蜜时，有助于昆虫记住并偏好这类花朵。在人体中，咖啡因是 中枢神经系统的兴奋剂，通过抑制人体睡眠诱导因子， 一种叫腺苷的物质使我们保持清醒。身体需要通过分解一种叫ATP的高能分子来得到持续的能量供应。在这个过程中将释放ATP的化学主链，腺苷。大脑中的神经元就存在 腺苷分子的高特异性受体。当腺苷与这些受体结合，将激活一系列生化反应，促使神经元活动减弱，从而减缓脑部重要信号分子的释放。就是说，你犯困了。咖啡因是腺苷受体拮抗剂，能够通过结合腺苷受体阻断使神经元反应变慢的过程。咖啡因和腺苷有类似的分子结构，咖啡因能正好嵌入腺苷受体，但不会激活它们。总之，腺苷抑制了神经元，咖啡因则抑制了这种抑制剂， 所以能刺激你保持清醒。咖啡因也能促进积极的感受。在某些神经元中，腺苷受体和多巴胺受体连接在一起。多巴胺可以让人感到快乐。当腺苷结合自身受体后，便能够阻碍多巴胺嵌入受体位点，打断其改善心情的作用。当咖啡因代替了腺苷的位置多巴胺就能正常与受体结合。有证据表明，咖啡因 作用于腺苷和多巴胺时也会产生长期的积极作用，比如降低如帕金森，阿尔兹海默症 和一些癌症的患病风险。咖啡因也能促进身体燃烧脂肪。实际上，运动组织认为咖啡因会让运动员更加兴奋，因此会限制运动员的咖啡因摄入量。从1972到2004年，奥委会规定赛时 运动员的血液咖啡因含量必须保持低水平。当然，咖啡因也不是只有好处。它可能让你感觉良好，保持惊醒，同时也会让你心跳加速，血压升高，导致尿量增多和腹泻，产生失眠和焦虑。此外，也要考虑食物和饮料中咖啡因对身体的影响。大脑能接受一定的咖啡因摄入量，如果你的腺苷受体不断被占用，身体就会额外产生新的腺苷受体。这就意味着，即使摄入了咖啡因，新生成的腺苷任依然能让大脑反应变慢。这就是为什么你要消耗 越来越多的咖啡因来保持清醒。因为身体会产生越来越多的腺苷。这就是为什么你突然停止摄入咖啡因，愉快的感觉就会消失。大量腺苷受体没有了竞争者，腺苷就会过度发挥作用，导致头疼，疲惫情绪低落。不过几天后，过量的腺苷受体就会消失，你的身体恢复了，你会像以前一样清醒，即使没有这个世界上最流行的兴奋剂。

**P484 2017-07-13 The left brain vs. right brain myth - Elizabeth Waters**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=484)

Behold the human brain, it's lumpy landscape visibly split into a left and right side. This structure has inspired one of the most pervasive ideas about the brain, that the left side controls logic and the right, creativity. And yet, this is a myth unsupported by scientific evidence. So how did this misleading idea come about, and what does it get wrong? It's true that the brain has a right and a left side. This is most apparent with the outer layer, or the cortex. Internal regions, like the striatum, hypothalamus, thalamus, and brain stem appear to be made from continuous tissue, but in fact, they're also organized with left and right sides. The left and the right sides of the brain do control different body functions, such as movement and sight. The brain's right side controls the motion of the left arm and leg and vice versa. The visual system is even more complex. Each eye has a left and right visual field. Both left visual fields are sent to the right side of the brain, and both right fields are sent to the left side. So the brain uses both sides to make a complete image of the world. Scientists don't know for sure why we have that crossing over. One theory is it began soon after animals developed more complex nervous systems because it gave the survival advantage of quicker reflexes. If an animal sees a predator coming from its left side, it's best off escaping to the right. So we can say that vision and movement control are two systems that rely on this left-right structure, but problems arise when we over-extend that idea to logic and creativity. This misconception began in the mid-1800s when two neurologists, Broca and Wernicke, examined patients who had problems communicating due to injuries. The researchers found damage to the patients' left temporal lobes, so they suggested that language is controlled by the left side of the brain. That captured the popular imagination. Author Robert Louis Stevenson then introduced the idea of a logical left hemisphere competing with an emotional right hemisphere represented by his characters Dr. Jekyll and Mr. Hyde. But this idea didn't hold up when doctors and scientists examined patients who were missing a hemisphere or had their two hemispheres separated. These patients showed a complete range of behaviors, both logical and creative. Later research showed that one side of the brain is more active than the other for some functions. Language is more localized to the left and attention to the right. So one side of the brain may do more work, but this varies by system rather than by person. There isn't any evidence to suggest that individuals have dominant sides of the brain, or to support the idea of a left-right split between logic and creativity. Some people may be particularly logical or creative, but that has nothing to do with the sides of their brains. And even the idea of logic and creativity being at odds with each other doesn't hold up well. Solving complex math problems requires inspired creativity and many vibrant works of art have intricate logical frameworks. Almost every feat of creativity and logic carries the mark of the whole brain functioning as one.

**P484 2017-07-13 The left brain vs. right brain myth - Elizabeth Waters**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=484)

翻译人员: Ying Lu 校对人员: Lipeng Chen仔细看人类的大脑，很明显能看到它分成左右两个区块。这个结构促成了一个有关大脑的 广为流传的说法，那就是左脑负责逻辑，右脑负责创意。这个谜题尚未得到科学证据的支撑。因此这个误导性的说法是如何产生的呢？有什么错误呢？大脑确实分为左和右两个部分。这在大脑外部或者大脑皮层是最清晰可见的。内部结构，例如纹状体，下丘脑，丘脑，和脑干似乎都是由连续不断的组织组成，然而事实上， 它们也由左和右两部分构成。大脑的左右两部分确实分管不同的身体功能，例如行动和视觉，右脑控制左臂和左腿的运动，反之亦然。视觉系统则要复杂很多。每一只眼睛都具有左和右两个视觉区。两个左视觉区的信息都传送到右脑，两个右视觉区的信息则由左脑处理。因此大脑使用两个部分 才能看到一个完整的世界。科学家不知道为什么我们会如此关联。一个理论是在动物进化出 更复杂的神经系统不久后产生，因为这给了快速反应的生存优势。如果一个动物看到捕食者从左侧接近，最好是向右逃脱。因为我们说视觉和行动管理是两个系统都依附于这个左右结构，但是当我们将此想法拓展到 逻辑和创意就出问题了。这个谬误始于19世纪中叶当 Broca 和 Wernicke 两位神经病学家，诊查因受伤而产生沟通问题的病人之时。研究人员发现这些病人左颞叶受损，因此他们认为语言由左脑控制。这激发了大众的想象力。作家罗伯特·路易斯·史蒂文森介绍有关控制逻辑的左半脑与掌管情绪的右半脑一决高下的理念并由杰克尔医生和海德先生 两个角色来呈现。但是当医生和科学家检查那些失去半脑或者大脑两个部分无任何连接的病人时，这个想法无法得到验证。这些病人有着各种行为举止，既有逻辑的又有创意的。之后的研究表明，对于某些功能而言，大脑中一部分会比另一部分更为活跃。语言更多集中在左脑注意力则在右脑。因此大脑的其中一部分会承担更多的工作，但是这些不确定性是根据系统的不同， 而不是人。没有任何证据能表明我们大脑有主导的一部分，或者左右半脑分管逻辑和创意的说法。有些人可能极有逻辑性或者创造力，但是这和他们大脑的左右部分无关。即便逻辑和创意之间存在矛盾的观点也无法得到支持。解决复杂数学问题需要具有灵感的创造力很多富有生命力的艺术作品 也需要复杂的逻辑框架。几乎每一个创意和逻辑的创举都需要全脑像一个整体来运转才能完成。

**P485 2017-07-18 When is water safe to drink - Mia Nacamulli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=485)

Take a look at the water in this glass. Refreshing, hydrating, and invaluable to your survival. Before you take a sip, though, how do you know that the water inside is free from disease-causing organisms and pollutants? One out of ten people in the world can't actually be sure that their water is clean and safe to drink. Why is that? Inadequate sanitation, poor protection of drinking water sources, and improper hygiene often lead to sewage and feces-contaminated water. That's the ideal breeding ground for dangerous bacteria, viruses, and parasites. And the effects of these pathogens are staggering. Diarrheal disease from unsafe water is one of the leading causes of death around the world for children under five. And according to a U.N. report from 2010, microbial water-borne illnesses killed more people per year than war. Proper treatment processes, though, can address these threats. They usually have three parts: sedimentation, filtration, and disinfection. Once water has been collected in a treatment facility, it's ready for cleaning. The first step, sedimentation, just takes time. The water sits undisturbed, allowing heavier particles to sink to the bottom. Often, though, particles are just too small to be removed by sedimentation alone and need to be filtered. Gravity pulls the water downward through layers of sand that catch leftover particles in their pores, prepping the water for its final treatment, a dose of disinfectant. Chemicals, primarily forms of chlorine and ozone, are mixed in to kill off any pathogens and to disinfect pipes and storage systems. Chlorine is highly effective in destroying water's living organisms, but its use remains government-regulated because it has potentially harmful chemical byproducts. And if an imbalance of chlorine occurs during the disinfection process, it can trigger other chemical reactions. For example, levels of chlorine byproducts, like trihalomethanes, could skyrocket, leading to pipe corrosion and the release of iron, copper, and lead into drinking water. Water contamination from these and other sources including leaching, chemical spills, and runoffs, has been linked to long-term health effects, like cancer, cardiovascular and neurological diseases, and miscarriage. Unfortunately, analyzing the exact risks of chemically contaminated water is difficult. So while it's clear that disinfectants make us safer by removing disease-causing pathogens, experts have yet to determine the full scope of how the chemical cocktail in our drinking water really impacts human health. So how can you tell whether the water you have access to, whether from a tap or otherwise, is drinkable? Firstly, too much turbidity, trace organic compounds, or high-density heavy metals like arsenic, chromium, or lead, mean that the water is unsuitable for consumption. A lot of contaminants, like lead or arsenic, won't be obvious without tests, but some clues, like cloudiness, brown or yellow coloration, a foul odor, or an excessive chlorine smell can indicate the need to investigate further. Water testing kits can go a step further and confirm the presence of many different contaminants and chemicals. With many types of contamination, there are ways of treating water where it's used instead of close to its source. Point-of-use treatment has actually been around for thousands of years. Ancient Egyptians boiled away many organic contaminants with the sun's heat. And in Ancient Greece, Hippocrates designed a bag that trapped bad tasting sediments from water. Today, point-of-use processes usually involve ionization to lower mineral content. They also use adsorption filtration, where a porous material called activated carbon strains the water to remove contaminants and chemical byproducts. While it's not always an effective long-term solution, point-of-use treatment is portable, easy to install, and adaptable. And in regions where large-scale systems are unavailable, or where water has been contaminated further along its journey, these systems can mean the difference between life and death. Clean water remains a precious and often scarce commodity. There are nearly 800 million of us who still don't have regular access to it. The good news is that continued developments in water treatment, both on a large and small scale, can alleviate a lot of unsafe conditions. Implementing proper systems where they're needed and paying careful attention to the ones already in place will fulfill one of the most basic of our human needs.

**P485 2017-07-18 When is water safe to drink - Mia Nacamulli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=485)

翻译人员: Yi Fan 校对人员: Lipeng Chen我们来看一下这杯子里的水。清爽又补水， 对生存至关重要。但是，在喝之前，如何确定水里没有致病微生物以及污染物呢？这世界上10人中有1人无法确定自己喝的水是否干净又安全。为什么？卫生系统不完备，水源保护缺失，以及不正确的卫生规范常常会导致污水 或者受排泄物污染的水产生。这对一些有危害的细菌，病毒，和寄生虫来说是一个绝佳的繁殖地。这些病原体对人体的影响是令人震惊的。不安全的水所导致的腹泻是全世界5岁以下儿童群体中的一大死因。一份联合国2010年报告显示，每年，以水为传播媒介的微生物疾病 造成的死亡人数甚至超过战争。但是，一些正确处理水的步骤 可以让我们躲过这些威胁。这其中包括三部分：沉淀，过滤，以及消毒。一旦水被收集在处理设备中，就可以开始净水了。第一步，沉淀， 这只需要时间。水被静置， 使较重的颗粒沉淀到水池底部。但很多情况下，这些颗粒都太小了，通过沉淀无法完全去除，需要进一步过滤。重力使得水向下流过一层层沙子，这些剩余的颗粒 便被留在了沙子的孔隙中，为净水的最后一步做好了准备。最后一步，消毒，使用主要由氯气和臭氧等化学物质构成的消毒剂，杀灭所有的病原体，消毒水管和储水系统。氯气可以有效杀灭水中的微生物，但是氯气的使用仍然受到政府的管制，因为它会产生具有潜在危害的化学副产品。一旦在消毒过程中 氯气使用过多或过少，这就会引发别的化学反应。例如，氯的副产品三卤甲烷，其含量会剧增， 从而腐蚀水管，铁、铜等元素会被释放进饮用水中。水污染还会在这样或那样的源头产生，包括农药渗流，化学物质排放，以及各种径流污染，这些水污染与一些长期健康危害有关，比如说癌症，心血管疾病以及精神损伤，还有流产。不幸的是，想要分析出 喝了这被化学物质污染的水将会带来哪些确切危害， 是很困难的。尽管消毒可以把致病病原体都消灭，让我们喝的水更安全，专家们还没有能够确定饮用水中的化学物质可以在多大程度上影响我们的健康。那么，如何分辨身边现有的水是否适合饮用呢？首先，浑浊度过高，微量有机化合物过多，或者含有高浓度的砷、铬、铅等重金属，意味着它不适合饮用。许多污染物，例如铅和砷，不通过测试是看不出来的，但是有一些小线索， 比如说浑浊，液体呈棕色或黄色，散发难闻的气味，或者明显的氯气味，告诉我们这时需要进一步测试。水污染测试用具可以帮助我们证实各种污染物 和化学物质的存在。面对各种污染，人们很多时候选择在 用水环节净化而非从水源地着手。这种在用水环节净的方法 已经存在几千年了。古埃及人用太阳照射的热量 蒸发掉水中很多有机污染物。在古希腊，希波克拉底 设计出了一种过滤袋，把水中的异味沉淀物留在袋子里。现如今，在用水环节净水， 通常使用的是电离法，以此来降低水中矿物质含量。或者用吸附过滤法，有一种叫活性炭的孔状材料，它可以过滤出水中的污染物 和化学副产品。尽管这不是一种有效的长期策略，但是它轻便，安装方便， 并且适应各种环境。有些地区没有大规模的净水系统，或者水在运输过程中就被污染了，那么这时候，这些轻便的净水设施 就可以决定着人们的生死。干净的水至今依然是一种宝贵又稀有的资源。地球上有8亿人还不能每天喝上干净的水。好消息是不断进步的水处理技术，无论是大范围的还是小范围的，已经可以减缓 很大一部分不安全的因素。在有需要的地方配置净水系统，对已投入使用的净水系统进行维护，这简单的两件事就可以满足 我们人类最基本的需求之一了。

**P486 2017-07-18 Will we ever be able to teleport - Sajan Saini**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=486)

Is teleportation possible? Could a baseball transform into something like a radio wave, travel through buildings, bounce around corners, and change back into a baseball? Oddly enough, thanks to quantum mechanics, the answer might actually be yes. Sort of. Here's the trick. The baseball itself couldn't be sent by radio, but all the information about it could. In quantum physics, atoms and electrons are interpreted as a collection of distinct properties, for example, position, momentum, and intrinsic spin. The values of these properties configure the particle, giving it a quantum state identity. If two electrons have the same quantum state, they're identical. In a literal sense, our baseball is defined by a collective quantum state resulting from its many atoms. If this quantum state information could be read in Boston and sent around the world, atoms for the same chemical elements could have this information imprinted on them in Bangalore and be carefully directed to assemble, becoming the exact same baseball. There's a wrinkle though. Quantum states aren't so easy to measure. The uncertainty principle in quantum physics implies the position and momentum of a particle can't be measured at the same time. The simplest way to measure the exact position of an electron requires scattering a particle of light, a photon, from it, and collecting the light in a microscope. But that scattering changes the momentum of the electron in an unpredictable way. We lose all previous information about momentum. In a sense, quantum information is fragile. Measuring the information changes it. So how can we transmit something we're not permitted to fully read without destroying it? The answer can be found in the strange phenomena of quantum entanglement. Entanglement is an old mystery from the early days of quantum physics and it's still not entirely understood. Entangling the spin of two electrons results in an influence that transcends distance. Measuring the spin of the first electron determines what spin will measure for the second, whether the two particles are a mile or a light year apart. Somehow, information about the first electron's quantum state, called a qubit of data, influences its partner without transmission across the intervening space. Einstein and his colleagues called this strange communcation spooky action at a distance. While it does seem that entanglement between two particles helps transfer a qubit instantaneously across the space between them, there's a catch. This interaction must begin locally. The two electrons must be entangled in close proximity before one of them is transported to a new site. By itself, quantum entanglement isn't teleportation. To complete the teleport, we need a digital message to help interpret the qubit at the receiving end. Two bits of data created by measuring the first particle. These digital bits must be transmitted by a classical channel that's limited by the speed of light, radio, microwaves, or perhaps fiberoptics. When we measure a particle for this digital message, we destroy its quantum information, which means the baseball must disappear from Boston for it to teleport to Bangalore. Thanks to the uncertainty principle, teleportation transfers the information about the baseball between the two cities and never duplicates it. So in principle, we could teleport objects, even people, but at present, it seems unlikely we can measure the quantum states of the trillion trillion or more atoms in large objects and then recreate them elsewhere. The complexity of this task and the energy needed is astronomical. For now, we can reliably teleport single electrons and atoms, which may lead to super-secured data encryption for future quantum computers. The philosophical implications of quantum teleportation are subtle. A teleported object doesn't exactly transport across space like tangible matter, nor does it exactly transmit across space, like intangible information. It seems to do a little of both. Quantum physics gives us a strange new vision for all the matter in our universe as collections of fragile information. And quantum teleportation reveals new ways to influence this fragility. And remember, never say never. In a little over a century, mankind has advanced from an uncertain new understanding of the behavior of electrons at the atomic scale to reliably teleporting them across a room. What new technical mastery of such phenomena might we have in 1,000, or even 10,000 years? Only time and space will tell.

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翻译人员: Lipeng Chen 校对人员: 芷蘅 张无线传输会成为可能吗？一个棒球是否有可能转变成一道电波，穿过高楼，弹过转角，再变回原样吗？可能有些奇怪，多亏了量子力学， 答案可能确实是“是”。可能吧。秘密在此。棒球本身不能被电波传输，但是它的所有信息可以。在量子物理中，原子和电子被解释成一族特性的集合，譬如，位置，动量，以及特征自旋。这些特性的值确定了一个粒子，给了它量子态特征。如果两个电子有相同的量子态，那么它们就是相同的。字面意义上，棒球可以由形成它的原子的一系列量子态所确定。如果可以再波士顿读取这量子态信息，并且将它发往全世界，那么在班加罗尔，拥有相同化学元素的原子可以接收，刻入这些信息，被小心的组装，变成一模一样的棒球。但这有一个问题。量子态不容易测量。量子物理中的测不准原理说明不能同时测量一个粒子的位置和动量。测量电子准确位置的最简单方法需要散布光的粒子，即光子，并在显微镜下收集光子。但是这种散布以一种 不可预测方式改变了电子的动量。我们失去了之前关于动量的全部信息。某种意义上来说， 量子信息是脆弱的。测量这种信息会改变它。所以我们如何传输那些不能完全被我们读取的东西而不毁坏它呢？可以在量子缠结的奇怪现象中找到答案。自量子物理形成以来，量子缠结就是古老的谜题，而且仍没有完全解释。缠结两个电子的自旋可以形成超过距离的影响。测量第一个电子的自旋决定第二个电子会测出什么样的自旋，不论这两个粒子是距离一英里还是一光年。然而，第一个电子的量子态信息，即一个量子位的数据，可以不通过中介传递影响另一个电子。爱因斯坦和他的同事称这种奇怪的通信为鬼魅似的远距作用。尽管似乎两粒子之间的缠结会于空间中在它们之间 立刻传输一个量子位，但这中间有个问题。这种交互必须在很近的发生。两个电子必须很近的进行缠结，然后其中一个才可以移到新的地方。本身来看，量子缠结不是无线传输。为了完成无线传输，我们需要数字信息来 帮助在接收端解读量子位。测量第一个粒子产生了两比特数据。这些数字比特必须通过传统渠道运输，受制于光速，电波，微波，还可能有光纤。当我们为获得数字信息测量了一粒子，我们便破坏了它的量子信息，这意味着棒球必须在波士顿消失，才能被无线传输到班加罗尔。多亏了测不准原理，在两城市间可以无线传输棒球的信息，而且还不会重复它。所以理论上说，我们可以无线传输物体， 甚至人类，但是目前未知，我们还不太可能 测量大型物体里面千千万万的原子的量子态，并且在别处复制它们。这项任务的复杂程度和 所需能量是天文级的。现在，我们可以有保障的 无线传输单个电子和原子，这会形成将来量子计算机的超级安全数据加密。量子传输的哲学内涵是微妙的。无线传输的物体不像有形物体一样在空间中传输，也不像无形信息一样在空间中传输。它看上去两者皆有。量子物理给我们提供了一个 奇怪的全新视角，即我们的宇宙中所有的物质 都是脆弱信息的集合。而量子无线传输展示了新的方法 来影响这种脆弱性。记住，永远不要说永不。通过一个多世纪，人类已经由在原子层面上对于电子行为不太确定的认识，发展到可以在房间里可靠的无线传输它们。在1000年，甚至10000年里，我们会见证对这种现象什么样的技术运用？只有时间和空间会揭开答案。

**P487 2017-07-20 What happens when you have a concussion - Clifford Robbins**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=487)

Each year in the United States, players of sports and recreational activities receive between 2.5 and 4 million concussions. How dangerous are all those concussions? The answer is complicated, and lies in how the brain responds when something strikes it. The brain is made of soft fatty tissue, with a consistency something like jello. Inside its protective membranes and the skull's hard casing, this delicate organ is usually well-shielded. But a sudden jolt can make the brain shift and bump against the skull's hard interior, and unlike jello, the brain's tissue isn't uniform. It's made of a vast network of 90 billion neurons, which relay signals through their long axons to communicate throughout the brain and control our bodies. This spindly structure makes them very fragile so that when impacted, neurons will stretch and even tear. That not only disrupts their ability to communicate but as destroyed axons begin to degenerate, they also release toxins causing the death of other neurons, too. This combination of events causes a concussion. The damage can manifest in many different ways including blackout, headache, blurry vision, balance problems, altered mood and behavior, problems with memory, thinking, and sleeping, and the onset of anxiety and depression. Every brain is different, which explains why people's experiences of concussions vary so widely. Luckily, the majority of concussions fully heal and symptoms disappear within a matter of days or weeks. Lots of rest and a gradual return to activity allows the brain to heal itself. On the subject of rest, many people have heard that you're not supposed to sleep shortly after receiving a concussion because you might slip into a coma. That's a myth. So long as doctors aren't concerned there may also be a more severe brain injury, like a brain bleed, there's no documented problem with going to sleep after a concussion. Sometimes, victims of concussion can experience something called post-concussion syndrome, or PCS. People with PCS may experience constant headaches, learning difficulties, and behavioral symptoms that even affect their personal relationships for months or years after the injury. Trying to play through a concussion, even for only a few minutes, or returning to sports too soon after a concussion, makes it more likely to develop PCS. In some cases, a concussion can be hard to diagnose because the symptoms unfold slowly over time. That's often true of subconcussive impacts which result from lower impact jolts to the head than those that cause concussions. This category of injury doesn't cause noticable symptoms right away, but can lead to severe degenerative brain diseases over time if it happens repeatedly. Take soccer players, who are known for repeatedly heading soccer balls. Using a technique called Diffusion Tensor Imaging, we're beginning to find out what effect that has on the brain. This method allows scientists to find large axon bundles and see how milder blows might alter them structurally. In 2013, researchers using this technique discovered that athletes who had headed the ball most, about 1,800 times a year, had damaged the structural integrity of their axon bundles. The damage was similar to how a rope will fail when the individual fibers start to fray. Those players also performed worse on short-term memory tests, so even though no one suffered full-blown concussions, these subconcussive hits added up to measurable damage over time. In fact, researchers know that an overload of subconcussive hits is linked to a degenerative brain disease known as Chronic Traumatic Encephalopathy, or CTE. People with CTE suffer from changes in their mood and behavior that begin appearing in their 30s or 40s followed by problems with thinking and memory that can, in some cases, even result in dementia. The culprit is a protein called tau. Usually, tau proteins support tiny tubes inside our axons called microtubules. It's thought that repeated subconcussive hits damage the microtubules, causing the tau proteins to dislodge and clump together. The clumps disrupt transport and communication along the neuron and drive the breakdown of connections within the brain. Once the tau proteins start clumping together, they cause more clumps to form and continue to spread throughout the brain, even after head impacts have stopped. The data show that at least among football players, between 50 and 80% of concussions go unreported and untreated. Sometimes that's because it's hard to tell a concussion has occurred in the first place. But it's also often due to pressure or a desire to keep going despite the fact that something's wrong. This doesn't just undermine recovery. It's also dangerous. Our brains aren't invincible. They still need us to shield them from harm and help them undo damage once it's been done.

**P487 2017-07-20 What happens when you have a concussion - Clifford Robbins**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=487)

翻译人员: 芷蘅 张 校对人员: Lipeng Chen每年在美国，参加体育或者娱乐性活动的运动员中有250-400万的人会经历脑震荡。脑震荡有多大危险？答案很复杂，而且取决于你的大脑对撞击作出的反应。大脑由一些像果冻粘度一样的 柔软的脂肪组织构成。在保护性的薄膜和坚硬的颅骨内部，这一脆弱的器官可以被很好的保护。但是突然的撞击会让大脑变化，对着头颅内部撞击，而且不像果冻，大脑组织并不是完全一样。它巨大的网络由900亿神经元构成，神经元通过轴突传递信号并在大脑中交流，并控制我们整个身体。细长的结构使他们非常脆弱，所以当受到影响时，神经元会伸长甚至撕裂。这不仅扰乱他们交流的能力，而且受损的轴突开始退化，并且释放毒素使其他神经元死亡。这一系列事件会引起脑震荡。损伤会表现在很多地方，包括暂时失忆，头痛，视线模糊，平衡问题，情绪和行为转化，记忆、思考以及睡眠问题，还有焦虑和抑郁的开始。每个大脑都是不一样的，也解释了人们脑震荡后不同的结果。幸运的是大多数脑震荡是可以痊愈的，在几天或者几周之后症状就会消失。充足的休息和逐渐运动会让大脑自己痊愈。对于休息这一说，很多人听说在脑震荡对之后一段时间，由于容易昏迷，最好不要睡觉。这是虚构的。只要医生没说有更严重的大脑损伤，比如脑溢血，脑震荡之后睡觉就是没问题的。有时，脑震荡患者会经历脑震荡后综合症，或PCS。这样的患者在伤后几个月甚至几年会出现持续头痛，学习障碍，和一些甚至影响到他们个人关系的行为问题。在脑震荡期间想要运动，即使是几分钟，或者想立刻重回运动场，会更容易产生PCS。有些情况，脑震荡会很难诊断，因为他们的症状出现的太慢。这种震荡影响时常发生，并且大多来自的头部撞击相对产生脑震荡的撞击影响较小。这样的伤不会立刻产生明显的症状，但是如果经常发生，时间久了会产生退行性的大脑疾病。就比方说头部经常遭球撞击的足球运动员。用一项叫弥散张量成像的技术，我们可以知道对它大脑的影响。这个方法可以让科学家看到大束轴突以及轻微的波动会如何改变它们。2013年，研究人员用这项技术发现一年被球撞过约1800次的运动员，大脑中轴突束已经完全被损坏。这种损伤就好比一根所有纤维都开始磨损的绳子。这些运动员在短期记忆测试中表现得也不好，即使现在没人有完全型脑震荡，但是一直以来的撞击也会积累损伤。事实上，研究发现过多震荡型撞击和退行性脑疾病即慢性创伤脑疾病，或CTE有很大联系。患有CTE的人在30或40岁开始会出现情绪和行为变化，紧接着就是思考和记忆问题，很多情况下，甚至导致痴呆。这个起因就是一种叫tau的蛋白。通常，tau蛋白要支撑称为微管 即存在于轴突中的小管。我们认为重复性震荡撞击会损伤微管，致使tau蛋白聚成一起。这中断了沿着神经元的运输和交流，也驱使中断大脑内部的联系。一旦tau蛋白开始聚集成簇，将会引起更多簇的形成，并且延伸致整个大脑，即使头部影响已经停止。数据显示在足球运动员中，至少50%-80%的脑震荡没有上报或者治疗。有时因为脑震荡发生的第一时间，很难分辨出。但也由于运动员的压力或者想继续前进的欲望，而忽略了受伤的事实。这不仅减慢了恢复，而且很危险。我们的大脑并不是无敌的。它们需要我们保护它不受伤害，如果受伤就需要我们帮助它进行恢复。

**P488 2017-07-24 Will the ocean ever run out of fish - Ayana Elizabeth Johnson and Jen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=488)

Fish are in trouble. The cod population off Canada's East Coast collapsed in the 1990s, intense recreational and commercial fishing has decimated goliath grouper populations in South Florida, and most populations of tuna have plummeted by over 50%, with the Southern Atlantic bluefin on the verge of extinction. Those are just a couple of many examples. Overfishing is happening all over the world. How did this happen? When some people think of fishing, they imagine relaxing in a boat and patiently reeling in the day's catch. But modern industrial fishing, the kind that stocks our grocery shelves, looks more like warfare. In fact, the technologies they employ were developed for war. Radar, sonar, helicopters, and spotter planes are all used to guide factory ships towards dwindling schools of fish. Long lines with hundreds of hooks or huge nets round up massive amounts of fish, along with other species, like seabirds, turtles, and dolphins. And fish are hauled up onto giant boats, complete with onboard flash freezing and processing facilities. All of these technologies have enabled us to catch fish at greater depths and farther out at sea than ever before. And as the distance and depth of fishing have expanded, so has the variety of species we target. For example, the Patagonian toothfish neither sounds nor looks very appetizing. And fishermen ignored it until the late 1970s. Then it was rebranded and marketed to chefs in the U.S. as Chilean sea bass, despite the animal actually being a type of cod. Soon it was popping up in markets all over the world and is now a delicacy. Unfortunately, these deep water fish don't reproduce until they're at least ten years old, making them extremely vulnerable to overfishing when the young are caught before they've had the chance to spawn. Consumer taste and prices can also have harmful effects. For example, shark fin soup is considered such a delicacy in China and Vietnam that the fin has become the most profitable part of the shark. This leads many fishermen to fill their boats with fins leaving millions of dead sharks behind. The problems aren't unique to toothfish and sharks. Almost 31% of the world's fish populations are overfished, and another 58% are fished at the maximum sustainable level. Wild fish simply can't reproduce as fast as 7 billion people can eat them. Fishing also has impacts on broader ecosystems. Wild shrimp are typically caught by dragging nets the size of a football field along the ocean bottom, disrupting or destroying seafloor habitats. The catch is often as little as 5% shrimp. The rest is by-catch, unwanted animals that are thrown back dead. And coastal shrimp farming isn't much better. Mangroves are bulldozed to make room for shrimp farms, robbing coastal communities of storm protection and natural water filtration and depriving fish of key nursery habitats. So what does it look like to give fish a break and let them recover? Protection can take many forms. In national waters, governments can set limits about how, when, where, and how much fishing occurs, with restrictions on certain boats and equipment. Harmful practices, such as bottom trawling, can be banned altogether, and we can establish marine reserves closed to all fishing to help ecosystems restore themselves. There's also a role for consumer awareness and boycotts to reduce wasteful practices, like shark finning, and push fishing industries towards more sustainable practices. Past interventions have successfully helped depleted fish populations recover. There are many solutions. The best approach for each fishery must be considered based on science, respect for the local communities that rely on the ocean, and for fish as wild animals. And then the rules must be enforced. International collaboration is often needed, too, because fish don't care about our borders. We need to end overfishing. Ecosystems, food security, jobs, economies, and coastal cultures all depend on it.

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翻译人员: Lipeng Chen 校对人员: Yolanda Zhang鱼类有麻烦了。加拿大东海岸的鳕鱼数量在 上世纪九十年代呈现断崖式下降，过渡的娱乐性和商业性捕鱼使得南佛罗里达的石斑鱼几乎绝迹，金枪鱼的数量暴跌了超过50%，特别是南大西洋蓝鳍金枪鱼 已处在灭绝边缘。这些只是许许多多例子中的一小部分。在世界各地，过度捕鱼都屡见不鲜。这是怎么发生的呢？有些人想到捕鱼，脑海中浮现的是悠闲地在船上， 慢悠悠地收起钓鱼线的场景。但是现代工业化的捕鱼—— 货架上的鱼就是这么来的——看上去更像是打仗。事实上，他们使用的技术 本就为战争而生。雷达，声呐，直升机，以及侦察机，它们都将商业捕鱼船， 引向日益减少的鱼儿。有着几百个钩子的鱼线， 或是巨大的捕鱼网，围住大量的鱼儿，还有其他生物，比如海鸟，海龟和海豚。鱼儿被捞到巨大的捕鱼船上，即刻便完成了速冻和处理。相比以前，所有这些技术都让 我们能够捕捞生活在海洋中更深以及更远的鱼类。随着捕鱼距离和深度的扩大，我们瞄准了更多的鱼类。比如，犬牙鱼听上去、看上去都不好吃。上世纪七十年代末之前， 渔民们都忽略了它。然后它被重新包装， 对美国的厨师宣传成海鲈鱼，尽管这种鱼实际上是一种鳕鱼。很快，它就出现在了全世界的市场上，而现在更是成了公认的美味。不幸的是，这些深海鱼直到至少十岁才会繁衍后代，这使得它们对过度捕捞极端敏感脆弱，小鱼在有机会产卵前就被捉住了。消费者的口味和价格 也会产生负面影响。比如，鲨鱼鱼翅汤在 中国和越南被认为是一种美味，所以鱼鳍变成了鲨鱼 利润最高的一部分。这让许多渔民把他们的船装满了鱼鳍，而把上百万死鲨留在了海里。这些问题不仅仅针对犬牙鱼和鲨鱼。全世界大约31%的鱼类 都在遭受过度捕捞，另外58%在以最高临界数量被捕捞着。野生鱼类不能跟上70亿人 吃它们的速度进行繁衍。捕鱼也对更大的生态系统造成了影响。野生虾类通常要在海底 拖着足球场般大小的网进行捕捞，这改变或破坏了海底的生物栖息地。而捕捞上来的只有5%是虾。剩下的都是顺带被捞上来的， 无用的生物被扔回去时都已经死掉了。近海虾类养殖也不见得更好。红树林被铲平， 为虾类养殖开辟空间，这让海边生物失去了抵抗风暴的保护， 失去了自然的水过滤系统，也剥夺了鱼类至关重要的生存家园。那么要如何给鱼类一个喘息的机会， 让它们逐渐恢复数量呢？保护可以有很多形式。在国家水域， 政府可以设定限制，规定如何、何时、何地、 多少鱼可以被捕捞，限制某些渔船和设备。有害的操作，比如海底拖网， 可以一并被禁止，我们还可以建立海洋保护区， 对所有捕鱼业关闭，帮助生态系统自我修复。消费者得节约意识 和对浪费的抵制也不容小视，比如鱼翅，这会迫使捕鱼业朝着 更加可持续的方向发展。过去的干预成功地帮助了 鱼类恢复数量。有许多解决方案。对于每种捕鱼业最佳的方案， 必须基于科学考虑，尊重依靠海洋的生态群体，尊重作为野生动物的鱼类。法规必须加强执行。同样，也需要国际间的合作，因为鱼类活动不以我们的国界为界线。我们必须停止过度捕捞。生态系统，食品安全，工作，经济，以及海岸文化都取决于此。

**P489 2017-07-26 Explore cave paintings in this 360° animated cave - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=489)

In 1879, amateur archaeologist Marcelino Sanz de Sautuola and his young daughter Maria explored a dark cave in Northern Spain. When Maria wondered off by herself, she made an amazing discovery. They were standing inside a site of ancient art, the walls and roofs decorated with prehistoric paintings and engravings, ranging from 19,000 to 35,000 years old. Similar marks of our ancestors have been preserved in caves all over the world. The oldest we've found were made up to 40,000 years ago. What do these images tell us about the ancient human mind and the lives of their creators? These early artists mixed minerals, clay, charcoal, and ochre with spit or animal fat to create paint. They drew with their hands and tools, like pads of moss, twigs, bones, and hair. In many instances, their images follow the contours of the cave to create depth and shade. The most common depictions are of geometric shapes, followed by large mammals, like bison, horses, mammoths, deer, and boars. Human figures appear rarely, as well as occasional hand prints. Some have theorized that these artworks are the creation of hunters, or of holy men in trance-like states. And we've found examples created by men, women, and even children. And why did they create this art? Perhaps they were documenting what they knew about the natural world, like modern scientists, or marking their tribal territory. Maybe the images were the culmination of sacred hunting rituals or spiritual journeys. Or could they be art for art's sake, the sheer joy and fulfillment of creation? As with many unsolved mysteries of the ancient world, we may never know for sure, barring the invention of a time machine, that is. But while the answers remain elusive, these images are our earliest proof of human communication, testifying to the human capacity for creativity thousands of years before writing. They are a distinct visual language that imagines the world outside the self, just like modern art forms, from graffiti and painting to animated virtual-reality caves.

**P489 2017-07-26 Explore cave paintings in this 360° animated cave - Iseult Gillespie**

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翻译人员: Nika Wang 校对人员: Di SUN1879年，业余考古学家 Marcelino Sanz de Sautuola和他年幼的女儿玛丽亚 在西班牙北部一个漆黑的洞穴探险。当玛丽亚在洞穴里穿行时， 她有了个惊人的发现。她们正站在一座古老艺术品中，墙面和屋顶都以 史前壁画和雕刻为装饰，距今估计有19000年至35000年历史，与古人在世界各地洞穴中 留下来的壁画类似。目前发现最古老的有40000年历史。这些壁画透露了古人什么样的心态，和他们的创造者怎样的生活？这些早期的艺术家们将矿物、陶土、 木炭、 赭石与唾液或动物脂肪混合制成颜料。他们用手和一些工具来作画， 比如几片苔藓，细树枝，骨头和头发。在多数情况下， 这些画按洞穴轮廓构图来创造深度和阴影。最常见的为几何图形，其次是大型哺乳类的图案， 比如美洲野牛、马、猛犸象、鹿和公猪。画中很少出现人类以及手印。一些人推测这些壁画出自猎人，或是在通灵状态的圣人之手。目前所发现的壁画 作者有男有女，甚至孩童。但他们为何要作画？可能他们想把已知的 自然环境记录下来，像现代科学家一样，或是在划分部族领土。也许那些图案是神圣的狩猎仪式或宗教庆典的高潮。又或是为创作而创作， 纯粹为了开心和享受创造的满足感？和其他古老的世界未解谜团一样，除非有时光机，否则我们可能永远都不知道答案。虽然解释有很多种，但这些图案是我们所拥有的 最古老的人类沟通证据，证明了早于文字好几千年人类的创造力。它们是独特的视觉语言， 勾勒了想象中的外在世界，一如现代艺术，从街头涂鸦、油画 到虚拟实境的洞穴。

**P490 2017-08-01 The myth of Cupid and Psyche - Brendan Pelsue**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=490)

"Beauty is a curse," Psyche thought as she looked over the cliff's edge where she'd been abandoned by her father. She'd been born with the physical perfection so complete that she was worshipped as a new incarnation of Venus, the goddess of love. But real-life human lovers were too intimidated even to approach her. When her father asked for guidance from the Oracle of Apollo, the god of light, reason, and prophecy. He was told to abandon his daughter on a rocky crag where she would marry a cruel and savage serpent-like winged evil. Alone on the crag, Psyche felt Zephyr the West Wind gently lifting her into the air. It set her down before a palace. "You are home," she heard an unseen voice say. "Your husband awaits you in the bedroom, if you dare to meet him." She was brave enough, Psyche told herself. The bedroom was so dark that she couldn't see her husband. But he didn't feel serpent-like at all. His skin was soft, and his voice and manner were gentle. She asked him who he was, but he told her this was the one question he could never answer. If she loved him, she would not need to know. His visits continued night after night. Before long, Psyche was pregnant. She rejoiced, but was also conflicted. How could she raise her baby with a man she'd never seen? That night, Psyche approached her sleeping husband holding an oil lamp. What she found was the god Cupid who sent gods and humans lusting after each other with the pinpricks of his arrows. Psyche dropped her lamp, burning Cupid with hot oil. He said he'd been in love with Psyche ever since his jealous mother, Venus, asked him to embarrass the young woman by pricking her with an arrow. But taken with Psyche's beauty, Cupid used the arrow on himself. He didn't believe, however, that gods and humans could love as equals. Now that she knew his true form, their hopes for happiness were dashed, so he flew away. Psyche was left in despair until the unseen voice returned and told her that it was indeed possible for her and Cupid to love each other as equals. Encouraged, she set out to find him. But Venus intercepted Psyche and said she and Cupid could only wed if she completed a series of impossible tasks. First, Psyche was told to sort a huge, messy pile of seeds in a single night. Just as she was abandoning hope, an ant colony took pity on her and helped with the work. Successfully passing the first trial, Psyche next had to bring Venus the fleece of the golden sheep, who had a reputation for disemboweling stray adventurers, but a river god showed her how to collect the fleece the sheep had snagged on briars, and she succeeded. Finally, Psyche had to travel to the Underworld and convince Proserpina, queen of the dead, to put a drop of her beauty in a box for Venus. Once again, the unseen voice came to Psyche's aide. It told her to bring barley cakes for Cerberus, the guard dog to the Underworld and coins to pay the boatman, Charon to ferry her across the river Styx. With her third and final task complete, Psyche returned to the land of the living. Just outside Venus's palace, she opened the box of Proserpina's beauty, hoping to keep some for herself. But the box was filled with sleep, not beauty, and Psyche collapsed in the road. Cupid, now recovered from his wounds, flew to his sleeping bride. He told her he'd been wrong and foolish. Her fearlessness in the face of the unknown proved that she was more than his equal. Cupid gave Psyche amborsia, the nectar of the gods, making her immortal. Shortly after, Psyche bore their daughter. They named her Pleasure, and she, Cupid, and Psyche, whose name means soul, have been complicating people's love lives ever since.

**P490 2017-08-01 The myth of Cupid and Psyche - Brendan Pelsue**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=490)

翻译人员: xiao gu 校对人员: Jingjing ZOU赛克从悬崖边缘眺望，心想着，“美貌是一种诅咒”， 这正是她被父亲遗弃的地方。她天生美貌，被当成爱神维纳斯的化身 受到人们的崇拜。然而现实是，人类因为 害怕而不敢向她示爱。她的父亲请求集光明之神， 真理之神，预言之神于一身的先知阿波罗指明方向，被告知要把女儿遗弃在悬崖边上，赛克将嫁给残忍、野蛮、 长着翅膀的人面蛇身的恶魔。独自在悬崖边，西风温柔的将她托起在空中。把她带到一座宫殿前。她听到一个声音说： “你回家了，你丈夫正在卧室等你， 如果你有胆量去见他。”塞克鼓励自己要坚强。卧室很黑，她看不清丈夫的模样，但是感觉不像蛇妖。他的皮肤是那么光滑， 声音温柔又绅士。她问到：“你是谁？”男人说，“我永远不会回答这个问题。如果你爱我，就不需要知道我是谁。“他每晚都来赴约。不久，塞克怀孕了。她兴奋不已，但也很矛盾。自己如何能和一个从未见面的男子 一起养育一个孩子？一天晚上，塞克手拿油灯 靠近熟睡的丈夫。发现他竟然是爱神丘比特，正是他用箭来唤醒人或神的爱意。塞克打翻了油灯， 热油烫醒了丘比特。他回答道，因为他的母亲 维纳斯嫉妒塞克的美貌，想让他用箭来捉弄塞克。但是自己爱上了塞克的美貌， 把剑刺向了自己。但他并不相信， 人和神之间会有平等的爱情。如今塞克已经知道了真相， 幸福的希望从此破灭了，于是他飞走了。塞克绝望极了，直到 她听到一个声音响起，告诉她，她和丘比特之间平等的爱情是可能的。她受到鼓舞，想要找到丘比特。但是维纳斯从中作梗，要求塞克 完成一系列不可能的任务，他们才可以结婚。首先，塞克要在一个晚上 整理好一大堆杂乱的种子。就在她要放弃希望时，蚂蚁军团可怜她，并帮助了她，于是她成功完成了第一个任务。第二个任务是，得到 金羊的羊毛献给维纳斯，据说金羊以取出流浪者的肠子为乐，然而一个河神告诉她如何得到被荆棘钩住的金羊毛，她又成功了。最后，她需要去到冥地，说服冥后普鲁塞庇娜，把她的美貌放一滴在盒子里， 献给维纳斯。神秘的声音再次来到塞克身边，交代她带上大麦蛋糕给地狱看门犬，并付给冥河的船夫夏恩 一些金钱，把她送到对岸。她第三个任务也完成了。塞克活着回到了人间。在维纳斯的宫殿外，她打开了 普鲁塞庇娜装着美貌的盒子，希望能给自己留下一些。但是盒子里面装的 不是美貌，而是睡眠，塞克倒地昏睡不醒。丘比特从伤害中恢复过来， 飞到他的新娘身边，告诉她自己多么愚蠢和错误。她对未知的无所畏惧已证明他们是平等的， 甚至她比丘比特更勇敢。丘比特给塞克喝下仙人饮用 的琼浆，让她长生不老。不久，塞克生下了他们的女儿，取名叫欢喜，于是，欢喜，丘比特和 冠以灵魂之神美誉的塞克从此也创造了人间复杂的爱。

**P491 2017-08-11 Cell membranes are way more complicated than you think - Nazzy Pakpou**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=491)

Cell membranes are structures of contradictions. These oily films are hundreds of times thinner than a strand of spider silk, yet strong enough to protect the delicate contents of life: the cell's watery cytoplasm, genetic material, organelles, and all the molecules it needs to survive. How does the membrane work, and where does that strength come from? First of all, it's tempting to think of a cell membrane like the tight skin of a balloon, but it's actually something much more complex. In reality, it's constantly in flux, shifting components back and forth to help the cell take in food, remove waste, let specific molecules in and out, communicate with other cells, gather information about the environment, and repair itself. The cell membrane gets this resilience, flexibility, and functionality by combining a variety of floating components in what biologists call a fluid mosaic. The primary component of the fluid mosaic is a simple molecule called a phospholipid. A phospholipid has a polar, electrically-charged head, which attracts water, and a non-polar tail, which repels it. They pair up tail-to-tail in a two layer sheet just five to ten nanometers thick that extends all around the cell. The heads point in towards the cytoplasm and out towards the watery fluid external to the cell with the lipid tails sandwiched in between. This bilayer, which at body temperature has the consistency of vegetable oil, is studded with other types of molecules, including proteins, carbohydrates, and cholesterol. Cholesterol keeps the membrane at the right fluidity. It also helps regulate communication between cells. Sometimes, cells talk to each other by releasing and capturing chemicals and proteins. The release of proteins is easy, but the capture of them is more complicated. That happens through a process called endocytosis in which sections of the membrane engulf substances and transport them into the cell as vesicles. Once the contents have been released, the vesicles are recycled and returned to the cell membrane. The most complex components of the fluid mosaic are proteins. One of their key jobs is to make sure that the right molecules get in and out of the cell. Non-polar molecules, like oxygen, carbon dioxide, and certain vitamins can cross the phospholipid bilayer easily. But polar and charged molecules can't make it through the fatty inner layer. Transmembrane proteins stretch across the bilayer to create channels that allow specific molecules through, like sodium and potassium ions. Peripheral proteins floating in the inner face of the bilayer help anchor the membrane to the cell's interior scaffolding. Other proteins in cell membranes can help fuse two different bilayers. That can work to our benefit, like when a sperm fertilizes an egg, but also harm us, as it does when a virus enters a cell. And some proteins move within the fluid mosaic, coming together to form complexes that carry out specific jobs. For instance, one complex might activate cells in our immune system, then move apart when the job is done. Cell membranes are also the site of an ongoing war between us and all the things that want to infect us. In fact, some of the most toxic substances we know of are membrane-breaching proteins made by infectious bacteria. These pore-forming toxins poke giant holes in our cell membranes, causing a cell's contents to leak out. Scientists are working on developing ways to defend against them, like using a nano-sponge that saves our cells by soaking up the membrane-damaging toxins. The fluid mosaic is what makes all the functions of life possible. Without a cell membrane, there could be no cells, and without cells, there would be no bacteria, no parasites, no fungi, no animals, and no us.

**P491 2017-08-11 Cell membranes are way more complicated than you think - Nazzy Pakpou**

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翻译人员: Liyu Liu 校对人员: Echo Yang细胞膜是一种矛盾的组织。这些油性膜比蜘蛛丝还要细百倍，但是足以保护细胞膜内 脆弱的生命内容物。像水一般的细胞质， 遗传物质，细胞器以及细胞生存所需要的所有分子。细胞膜是怎样工作的， 细胞膜的强度又是从何而来呢？首先，细胞膜容易让人联想到气球密闭的外皮，但细胞膜其实是一种更为复杂的组织。事实上，细胞膜一直 处于不断的变化之中，来回交换各种成分 来帮助细胞摄入食物，排除废物，让特殊的分子进出，和其他细胞交流，获取四周环境的信息，以及自我修复。细胞膜通过结合各种各样流动的成分得到这样的恢复力、适应性和功能性，生物学家称之为流动镶嵌。流动镶嵌的主要成分是一种被称为磷脂的简单分子。磷脂有一个极性的带电头部，具有亲水性，以及一个非极性的疏水尾部。它们尾尾组合配对 形成一个双层的结构，厚度仅有5到10纳米， 延展至整个细胞。磷脂的头部朝内指向细胞质，朝外面对细胞外部的液体夹杂在中间的是磷脂尾部。在体温下，这种双分子层有着 像植物油一样的密度，镶嵌了许多其他种类的分子，包括蛋白质，糖类，和胆固醇。胆固醇帮助保持细胞膜适当的流动性。它也有助于调节细胞间的交流。有时候，细胞通过释放和捕捉化学物质和蛋白质交流。释放蛋白质很简单，捕获蛋白质则更加复杂。这一过程被称为细胞内吞作用，是指部分细胞膜吞没物质并以囊泡的形式 将这些物质运输至细胞内。一旦囊泡内容物被释放出来，囊泡会被回收并返回细胞膜。蛋白质是流动镶嵌中最为复杂的成分。它们的主要工作之一是确保正确的分子进出细胞。非极性的分子， 比如氧，二氧化碳，和部分维生素可以轻松穿过磷脂双分子层。但是极性的荷电分子则 无法通过脂质内层。跨膜蛋白会横跨双分子层创造通路，让钠和钾离子之类的特定的分子通过。漂浮在双分子层内侧的周边蛋白质帮助将细胞膜固定到细胞内部支架。细胞膜内的其他蛋白质可以帮助 融合两个不同的双分子层。这可以为我们带来好处， 比如当精子使卵子受精。但是这也会伤害我们， 比如病毒进入细胞的时候。同时，部分蛋白质 会在流动镶嵌中移动。这些共同组成了 可以承担特殊任务的复合体。例如，一个复合体也许会 激活我们的免疫系统细胞，在工作完成时就会分离。细胞膜也是人类和所有入侵物持续战争的战场。事实上，一些我们所知道的 最具毒性的物质是由传染性的细菌制造的 能引起细胞膜破裂的蛋白质。这些成孔毒素会在 细胞膜上穿出巨大的洞，导致细胞内容物泄漏。科学家正致力研究 抵御这些毒素的方法，比如运用纳米海绵，通过吸取破坏细胞膜的有毒物质 来保护我们的细胞。流动镶嵌使得生命成为可能。没有细胞膜，细胞就无法形成，而没有细胞，就不会有细菌，没有寄生虫，没有霉菌，没有动物，也不会有我们的存在。

**P492 2017-08-14 Could we create dark matter - Rolf Landua**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=492)

85% of the matter in our universe is a mystery. We don't know what it's made of, which is why we call it dark matter. But we know it's out there because we can observe its gravitational attraction on galaxies and other celestial objects. We've yet to directly observe dark matter, but scientists theorize that we may actually be able to create it in the most powerful particle collider in the world. That's the 27 kilometer-long Large Hadron Collider, or LHC, in Geneva, Switzerland. So how would that work? In the LHC, two proton beams move in opposite directions and are accelerated to near the speed of light. At four collision points, the beams cross and protons smash into each other. Protons are made of much smaller components called quarks and gluons In most ordinary collisions, the two protons pass through each other without any significant outcome. However, in about one in a million collisions, two components hit each other so violently, that most of the collision energy is set free producing thousands of new particles. It's only in these collisions that very massive particles, like the theorized dark matter, can be produced. The collision points are surrounded by detectors containing about 100 million sensors. Like huge three-dimensional cameras, they gather information on those new particles, including their trajectory, electrical charge, and energy. Once processed, the computers can depict a collision as an image. Each line is the path of a different particle, and different types of particles are color-coded. Data from the detectors allows scientists to determine what each of these particles is, things like photons and electrons. Now, the detectors take snapshots of about a billion of these collisions per second to find signs of extremely rare massive particles. To add to the difficulty, the particles we're looking for may be unstable and decay into more familiar particles before reaching the sensors. Take, for example, the Higgs boson, a long-theorized particle that wasn't observed until 2012. The odds of a given collision producing a Higgs boson are about one in 10 billion, and it only lasts for a tiny fraction of a second before decaying. But scientists developed theoretical models to tell them what to look for. For the Higgs, they thought it would sometimes decay into two photons. So they first examined only the high-energy events that included two photons. But there's a problem here. There are innumerable particle interactions that can produce two random photons. So how do you separate out the Higgs from everything else? The answer is mass. The information gathered by the detectors allows the scientists to go a step back and determine the mass of whatever it was that produced two photons. They put that mass value into a graph and then repeat the process for all events with two photons. The vast majority of these events are just random photon observations, what scientists call background events. But when a Higgs boson is produced and decays into two photons, the mass always comes out to be the same. Therefore, the tell-tale sign of the Higgs boson would be a little bump sitting on top of the background. It takes billions of observations before a bump like this can appear, and it's only considered a meaningful result if that bump becomes significantly higher than the background. In the case of the Higgs boson, the scientists at the LHC announced their groundbreaking result when there was only a one in 3 million chance this bump could have appeared by a statistical fluke. So back to the dark matter. If the LHC's proton beams have enough energy to produce it, that's probably an even rarer occurrence than the Higgs boson. So it takes quadrillions of collisions combined with theoretical models to even start to look. That's what the LHC is currently doing. By generating a mountain of data, we're hoping to find more tiny bumps in graphs that will provide evidence for yet unknown particles, like dark matter. Or maybe what we'll find won't be dark matter, but something else that would reshape our understanding of how the universe works entirely. That's part of the fun at this point. We have no idea what we're going to find.

**P492 2017-08-14 Could we create dark matter - Rolf Landua**

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翻译人员: Ethan Ouyang 校对人员: Echo Yang宇宙中有 85% 的物质神秘莫测。我们不知道它们是什么， 所以我们称它们为“暗物质”。但是我们知道它们的存在，因为我们可观测它们作用在 众多星系与天体间的引力。虽然我们还无法直接观测暗物质，但是科学家推测， 人类也许可以用世上最强大的粒子对撞机来创造暗物质。那就是位于瑞士日内瓦， 长达 27 公里的大型强子对撞机，简称 LHC。那么它的工作原理是什么呢？在 LHC 里，两个质子向反方向运动，并被加速至接近光速。在四个撞击点上， 质子束相交， 质子相互碰撞。质子是由更小的夸克和胶子组成的。在一般情况下，两个质子穿过彼此不会产生重大影响。但有一百万分之一的概率，两个质子的强烈碰撞，会释放出爆炸级的碰撞能量，生成上千个新的粒子。理论上只有在这种碰撞中才会生成像暗物质那样的超大粒子。碰撞点的四周都有探测器，里面有约 1 亿个感应器，就像一个大型的 3D 照相机，可以收集那些新粒子的信息，包括它们的轨道，电荷，和能量。在处理完这些信息后， 电脑可以形成撞击图像。每条线都是不同粒子的轨迹，不同种类的粒子会标为不同的颜色。探测仪记录的数据可以 让科学家们判断这些粒子的种类，比如是光子还是电子。探测器每秒对撞击进行 大约十亿次的拍摄，以寻找极其稀有的超大粒子的踪迹。更加困难的是，我们寻找的粒子很可能极不稳定，以至于在到达探测器前 就衰变为常见的粒子。以希格斯玻色子为例，这个长期存在于理论上的粒子 直到 2012 年才被观测到。在一次特定碰撞中产生希格斯玻色子 的几率仅为百亿分之一。并且只存在了短短的一瞬，就发了生衰变。但科学家们研制出了理论模型 来确定寻找的对象。科学家一开始认为希格斯玻色子 会衰变为两个光子。所以他们起初只检测，包含两个光子的高能量事件。但有个问题。有无数种粒子的相互作用可以产生两个随机的光子。那么应该如何将希格斯玻色子 与其他物质进行区分？答案就是质量。探测器收集的数据让科学家 能够退一步思考，并检查产生两个光子的物质的质量。他们用这些数据制图，然后重复产生两个光子的过程。大多数情况下只能观察到 随机产生的光子，科学家们称之为背景事件。但当希格斯玻色子产生并 衰变为两个光子的时候，这两个光子的质量通常都是相同的。因此，辨识希格斯玻色子 出现的最好迹象，就是背景图上的一个小小的隆起。这样的隆起需要经过 数亿次的观测方能出现，而且也只有当隆起部分 显著的高出背景图时，这个结果才有意义。在希格斯玻色子的例子中，尽管要观测到背景图上的隆起，只有区区三百万分之一的几率， 可能仅仅是统计学上的巧合，LHC 的科学家们 还是得出了开创性的结论。那么回到暗物质上来。如果 LHC 的质子束有足够的 能量来制造暗物质，成功的几率将比希格斯玻色子还小。它将需要百万之四次方 的碰撞与理论模型相结合，方能初具雏形。而那正是 LHC 现在在做的事。通过生成堆积如山的数据，我们希望能在图像中找到更多的隆起，那些便是未知粒子，例如暗物质， 存在的最好证明。也许我们找到的未必是暗物质，而是其他的一些将会改变我们对整个宇宙 的看法的物质。那也是当前研究的乐趣之一。我们并不确定将会找到什么。

**P493 2017-08-14 TED-Ed is on Patreon! We need your help to revolutionize education...**

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**P493 2017-08-14 TED-Ed is on Patreon! We need your help to revolutionize education...**

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翻译人员: Liyu Liu 校对人员: Elsa Shen你了解你喜爱的这些 TED-Ed影片 吗?你了解这些帮助你学习新事物的 精美动画吗？这些经历对你是免费的， 但对我们来说成本真的非常昂贵。不过这没关系。我们的使命是去投资那些有思想的人，但是我们也需要得到你们的一些资助。为什么？因为你们对 TED-Ed 展示出的热爱已经充实了世界数百万的年轻人。如果你每月捐献一小部分给 Patreon 来扩大这份热爱，TED-Ed 就能充实数十亿的人。“如果让我用一个词来形容 TED-Ed 的体验的话，”“振奋。”“创新。”“好奇。”“有意义的。”“激励的。”“富有启发性的。”“哦这是两个词，除非你在中间 加上一个连字符：富有启发性的。”TED-Ed 动画由教育工作者编写，每天有超过两百万的人观看学习。“当我看到 TED-Ed 的时候， 感觉就像，‘就是这个，它是可行的’。”有了你们的支持，我们可以让更多的动画师和更多的老师合作，并且我们可以把影片内容 译制成多种语言。“当我看到它的时候，我的大脑就像… 大爆炸一样。”我们也会运用你们的资助来发展我们的 学生之声计划——TED-Ed Clubs，教导学生如何运用 TED 的演讲形式 来表达他们自己的思想。上千个 TED-Ed Clubs 已经在 超过 120 个国家成立，帮助我们邀请年轻一代来到 TED 的主讲台。“当你把所有东西传承给学生， 你给他们这样的舞台和权力，”“结果变得更好， 因为是他们自己在参与其中。”“谢谢。”“对我来说， 感觉就像有一个让我开始的动力。”“如果你想要支持年轻一代，”“你想要支持自己国家的教育者，”“那么这就是你想找寻的计划，”“或者说当提到使世界发生改变时，”“这就是我们都应该关注的模式。”点击了解我们 Patreon 的界面。 谢谢你们的支持！

**P494 2017-08-14 The rise and fall of the Berlin Wall - Konrad H. Jarausch**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=494)

In the early hours of August 13, 1961, East German construction workers flanked by soldiers and police began tearing up streets and erecting barriers throughout the city of Berlin and its surroundings. This night marked the beginning of one of history's most infamous dividing lines, the Berlin Wall. Construction on the wall continued for the next decade as it cut through neighborhoods, separated families, and divided not just Germany, but the world. To understand how we got to this point, we have to go back to World War II. America, Britain, and France joined forces with the Soviet Union against the Axis Powers. After they defeated Nazi Germany, each of the victorious nations occupied part of the country. The division was meant to be temporary, but the former allies found themselves at odds over their visions for post-war Europe. While Western powers promoted liberal market economies, the Soviet Union sought to surround itself with obedient Communist nations, including a weakened Germany. As their relations deteriorated, the Federal Republic of Germany was formed in the West while the Soviets established the German Democratic Republic in the East. The Soviet satellite countries restricted Western trade and movement, so a virtually impassable border formed. It became known as the Iron Curtain. In the former German capital of Berlin, things were particularly complicated. Although the city lay fully within the East German territory of the GDR, the post-war agreement gave the allies joint administration. So America, Britain, and France created a Democratic enclave in Berlin's western districts. While East Germans were officially banned from leaving the country, in Berlin, it was simply a matter of walking, or riding a subway, streetcar or bus, to the Western half, then traveling on to West Germany or beyond. This open border posed a problem for the East German leadership. They had staked a claim to represent the Communist resistance against Hitler and portrayed Western Germany as a continuation of the Nazi regime. While the U.S. and its allies poured money into West Germany's reconstruction, the Soviet Union extracted resources from the East as war reparations, making its planned economy even less competitive. Life in East Germany passed under the watchful eye of the Stasi, the secret police whose wiretaps and informants monitored citizens for any hint of disloyalty. While there was free health care and education in the East, the West boasted higher salaries, more consumer goods, and greater personal freedom. By 1961, about 3.5 million people, nearly 20% of the East German population, had left, including many young professionals. To prevent further losses, East Germany decided to close the border, and that's where the Berlin Wall came in. Extending for 43 kilometers through Berlin, and a further 112 through East Germany, the initial barrier consisted of barbed wire and mesh fencing. Some Berliners escaped by jumping over the wire or leaving from windows, but as the wall expanded, this became more difficult. By 1965, 106 kilometers of 3.6-meter-high concrete barricades had been added topped with a smooth pipe to prevent climbing. Over the coming years, the barrier was strengthened with spike strips, guard dogs, and even landmines, along with 302 watchtowers and 20 bunkers. A parallel fence in the rear set off a 100-meter area called the death strip. There, all buildings were demolished and the ground covered with sand to provide a clear line of sight for the hundreds of guards ordered to shoot anyone attempting to cross. Nevertheless, nearly 5,000 people in total managed to flee East Germany between 1961 and 1989. Some were diplomats or athletes who defected while abroad, but others were ordinary citizens who dug tunnels, swam across canals, flew hot air balloons, or even crashed a stolen tank through the wall. Yet the risk was great. Over 138 people died while attempting escape. Some shot in full view of West Germans powerless to help them. The wall stabilized East Germany's economy by preventing its work force from leaving, but tarnished its reputation, becoming a global symbol of Communist repression. As part of reconciliation with the East, the Basic Treaty of 1972 recognized East Germany pragmatically while West Germany retained its hope for eventual reunification. Although the Eastern regime gradually allowed family visits, it tried to discourage people from exercising these rights with an arduous bureaucratic process and high fees. Nonetheless, it was still overwhelmed by applications. By the end of the 1980's, the liberalization of other Eastern Bloc regimes caused mass demonstrations for free travel and demands for democracy. On the evening of November 9, 1989, East Germany tried to defuse tension by making travel permits easier to obtain. But the announcement brought thousands of East Berliners to the border crossing points in the wall, forcing the surprised guards to open the gates immediately. Rejoicing crowds poured into West Berlin as people from both sides danced atop the wall. And others began to demolish it with whatever tools they could find. Although the border guards initially tried to maintain order, it was soon clear that the years of division were at an end. After four decades, Germany was officially reunified in October 1990. And the Soviet Union fell soon after. Today, parts of the wall still stand as a reminder that any barriers we put up to impede freedom, we can also break down.

**P494 2017-08-14 The rise and fall of the Berlin Wall - Konrad H. Jarausch**

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翻译人员: Amy Chen 校对人员: Lipeng Chen1961年8月13日凌晨，被士兵和政策阻拦 在一侧的东德建筑工人们开始在柏林市和周边地区挖地建墙。这个夜晚标志着历史上 最声名狼藉的分界线的诞生，柏林墙。柏林墙的建造持续了十几年，它穿过社区，拆散家庭，它不仅分隔了德国， 更分裂了世界。为了理解这点，我们需要回顾一下第二次世界大战。美国，英国，法国联合苏维埃政府 反抗轴心国（日本，意大利，德国）。在他们打败了德国纳粹后，每个战胜国都夺取了 德国的部分地区。地区瓜分一开始只是短暂的，但是（美英法）前联盟发现它们对二战后的欧洲 有着不同的前景展望。西方势力主张市场自由经济，但是苏联政府希望各邦国 忠实地走社会主义道路，包括被削弱势力的德国。随着原联盟国关系的恶化，德意志联邦共和国在德国西边建立，苏联则在德国东侧 建立了德意志民主共和国。苏维埃政府限制西方贸易和人口迁徙，一道无形的不可逾越的墙因此形成。铁幕也由此而生。前德国首都柏林的情况尤为复杂。虽然柏林完全位于 德国东边的德意志民主共和国，但是战后条约规定 柏林由所有联盟国行政。因此，美英法在柏林西边地区建造了民主飞地。虽然东德人民 被正式禁止离开东德地区，但是在柏林的人民，只需要走路，坐地铁，电车或者巴士就能到达西德一侧，然后进入西德甚至其他地区旅游。这个开放的边界 给东德领导者带来了一个问题。他们进一步强化了共产主义主张， 强烈抵制希特勒，把西德描述成纳粹主义的延续。在美国和其联盟国 大量投资西德重建的时候，苏联政府则不断从东德获取资源 作为战后补偿，这使得（苏联的） 计划经济更缺乏竞争性。东德人民无不生活在 斯塔西的法眼下，这个秘密警察组织 利用窃听器和线人监视人民，以防任何一点的背叛。虽然东德有免费的医疗保健和教育，西德却有更高的工资，更多消费品，和更大的人身自由。到1961年，大约有350万人， 将近20%的东德人口逃离东德，包括年轻的专业人士。为了防止进一步的流失，东德政府决定封闭边境线， 这就是柏林墙开始的地方。柏林市内长达43公里，加上贯穿其他东德地区 长达112公里的柏林墙，一开始是由带刺铁丝网 和带有网孔的栅栏组成。仍有一些柏林人要么跳过铁丝网要么跳窗逃离东德。但是随着城墙的建立， 这种逃离方式变的更加困难。到1965年，106公里长， 3.6米高的混凝土城墙建成，城墙上方覆有顺滑的管道 来防止攀爬。在接下来的几年里，钉刺带，警卫犬，甚至地雷都被用来加强城墙的防御力，此外还有302个瞭望台和 20个地堡昼夜巡视。在城墙后面还有一个由平行的栅栏 围成的宽100米的死亡带。在那里，所有的建筑都被拆除， 地标被沙子覆盖，为成百上千的警卫提供清晰的视线，这些警卫被命令 枪杀任何一个想逃跑的人。尽管如此，1961到1989年间， 还有大约5000人成功逃离了东德。其中一些人是外交官或者运动员， 他们在出国的时候叛逃，但是剩下的都是普通百姓， 他们挖地道，游泳横穿运河，乘坐热气球，甚至开着偷来的坦克冲破界限。但是风险依然很高。超过138人在试图逃离时丧命。西德人民眼睁睁地望着那么被枪杀的 逃跑者，却爱莫能助。柏林墙防止了劳动力流失， 以此巩固了东德的经济，但是损毁了它的名誉，因此成为了共产主义 剥削的全球性象征。作为和东德和解的一部分，1972年的《基础条约》 在实际上承认了东德的存在，但是西德仍抱有最终统一的希望。虽然东边的政权逐渐允许亲属探望，但它用复杂的申请过程和高昂的费用试图阻拦人们行使这个权利。尽管如此，还是吸引了大批申请者。在80年代末，其他的东边区域政权的自由化导致了大规模的游行示威， 旨在寻求自由探视和民主。1989年11月9日晚上，东德试图通过简化旅游通证来 缓和紧张关系。但是通告却使成千上万的东柏林人民穿过重重障碍来到柏林墙，强迫被惊吓到的警卫立即打开大门。伴随着两边人民在城墙上欢呼，激动万分的人群纷纷涌入西柏林。还有一些人开始使用他们能找到的 任何工具来拆除城墙。虽然一开始警卫还试图维持秩序，但是很快他们明白 多年的东西隔离已经结束。四十年后，在1990年的10月， 德国正式统一。苏维埃政权随后很快没落。今天，部分城墙依旧挺立在那儿， 成为了一种警示，任何人为对自由设置的障碍，我们都能将其拆除。

**P495 2017-08-18 Is it possible to create a perfect vacuum - Rolf Landua and Anais Ras**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=495)

The universe is bustling with matter and energy. Even in the vast apparent emptiness of intergalactic space, there's one hydrogen atom per cubic meter. That's not the mention a barrage of particles and electromagnetic radiation passing every which way from stars, galaxies, and into black holes. There's even radiation left over from the Big Bang. So is there such thing as a total absence of everything? This isn't just a thought experiment. Empty spaces, or vacuums, are incredibly useful. Inside our homes, most vacuum cleaners work by using a fan to create a low-pressure relatively empty area that sucks matter in to fill the void. But that's far from empty. There's still plenty of matter bouncing around. Manufacturers rely on more thorough, sealed vacuums for all sorts of purposes. That includes vacuum-packed food that stays fresh longer, and the vacuums inside early light bulbs that protected filaments from degrading. These vacuums are generally created with some version of what a vacuum cleaner does using high-powered pumps that create enough suction to remove as many stray atoms as possible. But the best of these industrial processes tends to leave hundreds of millions of atoms per cubic centimeter of space. That isn't empty enough for scientists who work on experiments, like the Large Hadron Collider, where particle beams need to circulate at close to the speed of light for up to ten hours without hitting any stray atoms. So how do they create a vacuum? The LHC's pipes are made of materials, like stainless steel, that don't release any of their own molecules and are lined with a special coating to absorb stray gases. Raising the temperature to 200 degrees Celsius burns off any moisture, and hundreds of vacuum pumps take two weeks to trap enough gas and debris out of the pipes for the collider's incredibly sensitive experiments. Even with all this, the Large Hadron Collider isn't a perfect vacuum. In the emptiest places, there are still about 100,000 particles per cubic centimeter. But let's say an experiment like that could somehow get every last atom out. There's still an unfathomably huge amount of radiation all around us that can pass right through the walls. Every second, about 50 muons from cosmic rays, 10 million neutrinos coming directly from the Big Bang, 30 million photons from the cosmic microwave background, and 300 trillion neutrinos from the Sun pass through your body. It is possible to shield vacuum chambers with substances, including water, that absorb and reflect this radiation, except for neutrinos. Let's say you've somehow removed all of the atoms and blocked all of the radiation. Is the space now totally empty? Actually, no. All space is filled with what physicists call quantum fields. What we think of as subatomic particles, electrons and photons and their relatives, are actually vibrations in a quantum fabric that extends throughout the universe. And because of a physical law called the Heisenberg Principle, these fields never stop oscillating, even without any particles to set off the ripples. They always have some minimum fluctuation called a vacuum fluctuation. This means they have energy, a huge amount of it. Because Einstein's equations tell us that mass and energy are equivalent, the quantum fluctuations in every cubic meter of space have an energy that corresponds to a mass of about four protons. In other words, the seemingly empty space inside your vacuum would actually weigh a small amount. Quantum fluctuations have existed since the earliest moments of the universe. In the moments after the Big Bang, as the universe expanded, they were amplified and stretched out to cosmic scales. Cosmologists believe that these original quantum fluctuations were the seeds of everything we see today: galaxies and the entire large scale structure of the universe, as well as planets and solar systems. They're also the center of one of the greatest scientific mysteries of our time because according to the current theories, the quantum fluctuations in the vacuum of space ought to have 120 orders of magnitude more energy than we observe. Solving the mystery of that missing energy may entirely rewrite our understanding of physics and the universe.

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翻译人员: xiao gu 校对人员: Jenny Yang宇宙充满了物质和能量。即使星系间一片虚无，一立方米的空间内也存在一个氢原子。更不要说从恒星、星系到黑洞的大量粒子和电磁辐射，甚至还有大爆炸后留下的辐射。到底有没有真正空无一物的空间？这不仅仅是个思想实验。真空是十分有用的。家里的吸尘器通过利用风扇创造相对低压来吸入物质。但（吸尘器）里面不是真空。仍然有很多物质在里面跳动。制造商依赖封闭真空达到各种目的，包括真空包装食物，可以保存更久，早期灯泡利用真空来防止灯丝挥发。这些真空通常是运用了类似真空吸尘器的原理，通过高压泵的强大吸力去除尽可能多的杂质。但即使利用最好的工业流程，每立方厘米空间也会残留成亿的原子。这还远达不到科学家 对实验条件的要求，比如大型强子对撞机，离子束接近光速循环，要求在长达十小时中不会碰撞到杂质。如何创造这样的真空？大型强子对撞机由不锈钢构成，本身不释放任何分子，并且利用特殊涂层吸收杂质气体。200摄氏度的高温让一切水份瞬间蒸发，上百个真空泵用在两周时间里 去除气体和杂质，让对撞机的管道中可以 进行灵敏度极高的试验。就算这样，大型强子对撞机也不是绝对真空。即使是真空度最高的空间内，每立方厘米仍然有10万个粒子。让我们假设一个实验存在绝对真空，大量辐射仍然存在于我们周围，可以穿透墙壁。每秒50个介子来自宇宙射线，1000万个中微子来自大爆炸，3000万光子来自宇宙辐射背景，300万亿中微子来自太阳， 能够穿透你的身体。能够用来屏蔽真空的物质包括水，能够吸收和反射这些辐射，但不包括中微子。现在我们假设所有物质都被清除掉，并且屏蔽了所有辐射，这时的空间是绝对真空吗？并不是。所有空间都充满了物理学家 所谓的量子场。亚原子粒子，电子，光子和它们的亲戚们在量子场中震动，整个宇宙都是一样。根据海森堡原理这一物理定律，即使没有粒子掀起涟漪，震动也从未停止。最小的真空波动始终存在，这意味着它们蕴含着巨大能量。因为爱因斯坦方程认为 质量和能量守恒，每立方米空间的量子震动对应4个质子的能量。也就是说， 看似空无一物的空间也有轻微的重量。量子震动在宇宙早期就存在。当宇宙膨胀的大爆炸时刻，这些震动被放大， 并延伸到整个宇宙。宇宙学家认为这些原始的量子波动是我们今天看到的一切事物的起源：星系和整个大规模宇宙的结构，以及行星和太阳系。它们也是我们这个时代 最伟大的科学秘密，因为根据目前的理论，真空中量子震动应该比我们能观察的 还要多120个数量级。揭开能量丢失的秘密能够让我们对物理和宇宙有新的认识。

**P496 2017-08-18 Where do new words come from - Marcel Danesi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=496)

Every year, about 1,000 new words are added to the Oxford English Dictionary. Where do they come from, and how do they make it into our everyday lives? With over 170,000 words currently in use in the English language, it might seem we already have plenty. Yet, as our world changes, new ideas and inventions spring forth, and science progresses, our existing words leave gaps in what we want to express and we fill those gaps in several ingenious, practical, and occasionally peculiar ways. One way is to absorb a word from another language. English has borrowed so many words over its history that nearly half of its vocabulary comes directly from other languages. Sometimes, this is simply because the thing the word describes was borrowed itself. Rome and France brought legal and religious concepts, like altar and jury, to Medieval England, while trade brought crops and cuisine, like Arabic coffee, Italian spaghetti, and Indian curry. But sometimes, another language has just the right word for a complex idea or emotion, like naïveté machismo, or schadenfreude. Scientists also use classical languages to name new concepts. Clone, for example, was derived from the Ancient Greek word for twig to describe creating a new plant from a piece of the old. And today, the process works both ways, with English lending words like software to languages all over the world. Another popular way to fill a vocabulary gap is by combining existing words that each convey part of the new concept. This can be done by combining two whole words into a compound word, like airport or starfish, or by clipping and blending parts of words together, like spork, brunch, or internet. And unlike borrowings from other languages, these can often be understood the first time you hear them. And sometimes a new word isn't new at all. Obsolete words gain new life by adopting new meanings. Villain originally meant a peasant farmer, but in a twist of aristocratic snobbery came to mean someone not bound by the knightly code of chivalry and, therefore, a bad person. A geek went from being a carnival performer to any strange person to a specific type of awkward genius. And other times, words come to mean their opposite through irony, metaphor, or misuse, like when sick or wicked are used to describe something literally amazing. But if words can be formed in all these ways, why do some become mainstream while others fall out of use or never catch on in the first place? Sometimes, the answer is simple, as when scientists or companies give an official name to a new discovery or technology. And some countries have language academies to make the decisions. But for the most part, official sources like dictionaries only document current usage. New words don't originate from above, but from ordinary people spreading words that hit the right combination of useful and catchy. Take the word meme, coined in the 1970s by sociobiologist Richard Dawkins from the Ancient Greek for imitation. He used it to describe how ideas and symbols propagate through a culture like genes through a population. With the advent of the Internet, the process became directly observable in how jokes and images were popularized at lightning speed. And soon, the word came to refer to a certain kind of image. So meme not only describes how words become part of language, the word is a meme itself. And there's a word for this phenomenon of words that describe themselves: autological. Not all new words are created equal. Some stick around for millennia, some adapt to changing times, and others die off. Some relay information, some interpret it, but the way these words are created and the journey they take to become part of our speech tells us a lot about our world and how we communicate within it.

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翻译人员: xiao gu 校对人员: Yinchun Rui每年有1000个新词加到牛津英文字典。它们从哪里来？它们是如何融入我们的日常生活？目前在使用的英文单词有超过17万个，可能虽然看起来已经足够多了。但随着世界在变化，新的点子和新的发明不断涌现，科技在进步，现存的词汇已经不足于表达我们的想法，我们开始用一些巧妙的、实践中的、偶尔也有特别的方法来弥补。一种是从其他语言中吸收。历史上，英语一直从其他语言中吸收词汇，几乎一半的词汇都是外来的。有时，仅仅因为这个词所形容的东西本身就是外来的。罗马和法国给中世纪的英格兰带来了法律和宗教概念， 比如“祭坛” (altar) 和“陪审团” (jury)，随着交换农作物和美食，比如，阿拉伯的“咖啡” (coffee)，意大利的“面条” (spaghetti)，和印度的“咖喱” (curry)。有时，外来语言更容易表达复杂的思想或情感，比如，“天真” (naïveté)、“男子气概” (machismo)、或 “幸灾乐祸” (schadenfreude)。科学家也用传统语言命名新概念例如，克隆 (clone)，来自于古希腊词“枝杈”描述新枝从老枝中被创造出来。如今，这是双向的，英文向全世界的语言输出了 诸如“软件” (software) 这样的词语。另一个造词的流行方法是——通过组合存在的词，创造新概念。链接2个已知词汇形成一个合成词，比如，“机场” (airport)，“海星” (starfish)，或者剪切，混合部分词汇，如：“叉勺” (spork)，“早午餐” (brunch)，“互联网” (internet)。和其他外来词不同，这些词汇我们一见就能明白意思。有时新词根本就不是新的。过气的词汇获取了新的定义获得重生。“恶棍” (villain) 最初是指农夫，但是被贵族阶级曲解了，意味着没有骑士精神的人，实际就是指一个坏人。“极客” (geek) 来自于狂欢节上的表演者，意思发展成有怪癖的人，直到意为古怪的天才。有时，词汇正好相反，通过讽刺，隐喻，或者误用，比如说“sick”和“wicked”指的是令人惊叹。如果词汇通过以上所有方法被创造，为什么一些广为应用，另外一些被遗弃，或者完全没有使用？有时，答案是显而易见的，当科学家或公司给新发明或新技术定义了一个官方的名字。一些国家有专门的语言学术机构作出决定。但大部分情况下，官方来源比如字典，仅记录当前的词语含义。新词汇不是来自官方，而来通过普通人广为传播，广为使用。比如这个词“meme”，1970年代被社会学家理查德·道金斯创造出，来自于古希腊词模仿。用来描述想法和符号通过文化如何被传播，就像是人群的基因。随着互联网的到来，笑话和图像以闪电般的速度广为传播。很快，这个词被用来指表情包。“meme”不仅描述新词汇如何成为语言的一部分，“meme”也代表了自身。这类词汇自我描述的现象称为——同调。不是所有新词生来平等。一些存在很久，一些跟随时代变化，还有些消亡了。一些传递信息，一些解释信息，但词汇被创造的方式，以及它们成为我们日常对话的一部分，传达了我们这个世界以及 我们是如何交流的诸多信息。

**P497 2017-08-22 How does impeachment work - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=497)

For most jobs, it's understood that you can be fired, whether for crime, incompetence, or just poor performance. But what if your job happens to be the most powerful position in the country, or the world? That's where impeachment comes in. Impeachment isn't the same as actually removing someone from office. Like an indictment in criminal court, it's only the formal accusation that launches a trial, which could end in conviction or acquittal. Originating in the United Kingdom, impeachment allowed Parliament to vote for removing a government official from office even without the king's consent. Although this was an important check on royal power, the king couldn't be impeached because the monarch was considered the source of all government power. But for the founders of the American Republic, there was no higher authority beyond the people themselves. And so impeachment was adopted in the United States as a power of Congress applying to any civil officers, up to and including the president. Although demands for impeachment can come from any members of the public, only the House of Representatives has the power to actually initiate the process. It begins by referring the matter to a committee, usually the House Committee on Rules and the House Committee on the Judiciary. These committees review the accusations, examine the evidence, and issue a recommendation. If they find sufficient grounds to proceed, the House holds a separate vote on each of the specific charges, known as Articles of Impeachment. If one or more passes by a simple majority, the official is impeached and the stage is set for trial. The actual trial that follows impeachment is held in the Senate. Selected members of the House, known as managers, act as the prosecution, while the impeached official and their lawyers present their defense. The Senate acts as both judge and jury, conducting the trial and deliberating after hearing all the arguments. If it's the president or vice president being impeached, the chief justice of the Supreme Court presides. A conviction requires a supermajority of two-thirds and results in automatic removal from power. Depending on the original charges, it can also disqualify them from holding office in the future and open them to standard criminal prosecution. So what exactly can get someone impeached? That's a bit more complicated. Unlike in the United Kingdom, impeachment in the U.S. pits an elected legislature against other democratically elected members of government. Therefore, to prevent the process from being used as a political weapon, the Constitution specifies that an official can only be impeached for treason, bribery, or other high crimes and misdemeanors. That still leaves a lot of room for interpretation, not to mention politics, and many impeachment trials have split along partisan lines. But the process is generally understood to be reserved for serious abuses of power. The first official to be impeached was Tennesse Senator William Blount in 1797 for conspiring with Britain to cease the Spanish colony of Louisiana. Since then, the House has launched impeachment investigations about 60 times, but only 19 have led to actual impeachment proceedings. The eight cases that ended in a conviction and removal from office were all federal judges. And impeachment of a sitting president is even more rare. Andrew Johnson was impeached in 1868 for attempting to replace Secretary of War Edwin Stanton without consulting the Senate. Over a century later, Bill Clinton was impeached for making false statements under oath during a sexual harassment trial. Both were ultimately acquitted when the Senate's votes to convict fell short of the required two-thirds majority. And contrary to popular belief, Richard Nixon was never actually impeached for the Watergate scandal. He resigned before it could happen knowing he would almost certainly be convicted. Theoretically, the U.S. government is already designed to prevent abuses of power, limiting different branches through a system of checks and balances, term limits, and free elections. But impeachment can be seen as an emergency brake for when these safeguards fail.

**P497 2017-08-22 How does impeachment work - Alex Gendler**

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翻译人员: Liyu Liu 校对人员: Echo Yang对于大多数工作来说 ， 别人能解雇你，这很好理解无论是因为犯罪、缺乏能力、或者只是因为表现欠佳。但是，如果你的工作是 一个国家最有权势的职位呢？或者是全世界最有权势的职位呢？这就是弹劾的由来了。弹劾不只是简单的免除职务。就像刑事法庭上的起诉，弹劾只是引起审判的正式控告，它可能会以定罪或者宣告无罪结尾。弹劾起源于英国，它允许议会投票来免除政府官员的职务，甚至可以不需要国王的同意。虽然这是王权中一个很重要的手段，国王自身是不能够被弹劾的，因为君主被认为是所有政府权力的来源。但是对于美利坚合众国的开国元勋而言，没有什么权力是可以高过人民的。因此在美国，国会拥有弹劾的权力，适用于任何政府公职人员 ，上至总统。虽然弹劾的请求可以来自公众中的任意一员，但只有美国众议院有权真正开始这一过程。首先，把这一情况提交到委员会——通常为美国议会法案委员会和司法委员会。这些委员会会审查指控、调查证据并出具解决方案。如果他们找到足够的理由继续审议，议会会针对每一项具体的指控举行投票，这被称为弹劾条款。如果通过简单多数的方式 通过一项或多项指控，官员就会被弹劾， 并且准备接受审判。真正的审判是在弹劾之后， 由参议院举行。众议院选出的成员被称作检控干事， 他们作为检举方。而被弹劾的官员及其律师 则作为辩护方。参议院充当法官和陪审团，在听过所有辩护之后， 开展审判并讨论。如果是总统或者副总统被弹劾，最高法院的首席大法官会主持会议。需要三分之二的多数参议员通过才能定罪，定罪后会使被弹劾官员自动免职。取决于原始指控，审讯也可以判决取消他们未来供职的资格，并且对其开展标准刑事诉讼。所以，到底是什么可以弹劾一个人呢？这就更复杂一些了。和英国不同的是，在美国，弹劾会使选举产生的立法机关和其他民主选举的政府成员形成对立。因此 ，为了防止这一程序 被利用为政治武器，宪法规定了官员只能因以下原因被弹劾：叛国罪、受贿罪或者其他重罪和不检行为。但这仍然给辩护留下很多空间，更无须说政治了，并且许多弹劾审讯也以党派为界。但这一程序一般被认为是为严重权力滥用的案子所保留。第一位被弹劾的官员是 于1797年被弹劾的田纳西州参议员William Blount，原因是同英国密谋停止西班牙对路易斯安那州的殖民。此后 ，众议院发起了约60起的弹劾调查，但只有19起引发实际的弹劾程序。其中以定罪和免职的方式结束的8个案件，涉案的全是联邦法官。而对于在位总统的弹劾就更加罕见。安德鲁·约翰逊于1868年被弹劾，因其在没有和议会商议的情况下企图取代战争部长埃德温·斯坦顿。一个世纪之后，比尔·克林顿被弹劾，因其在性骚扰审判中 为宣誓证词作伪证。他们二人都最终被宣判无罪，因为参议院的投票比要求的 三分之二多数要少。和普遍观点不同的是，理查德·尼克松并未真正因为水门事件而被弹劾。他在可能遭受弹劾的前夕就辞职了，因为他知道自己几乎确定会被定罪。从理论上来说，美国政府的设计是为了防止权力滥用。通过三权分立体系、任期限制和自由选举 对不同的部门实行限制。但是当这些保障失效的时候，弹劾可以被视作紧急停止装置。

**P498 2017-08-22 The amazing ways plants defend themselves - Valentin Hammoudi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=498)

This is a tomato plant, and this is an aphid slowly killing the tomato plant by sucking the juice out of its leaves. The tomato is putting up a fight using both physical and chemical defenses to repel the attacking insects. But that's not all. The tomato is also releasing compounds that signal nearby tomato plants to release their own insect repellent. Plants are constantly under attack. They face threats ranging from microscopic fungi and bacteria, small herbivores, like aphids, caterpillars, and grasshoppers, up to large herbivores, like tortoises, koalas, and elephants. All are looking to devour plants to access the plentiful nutrients and water in their leaves, stems, fruits, and seeds. But plants are ready with a whole series of internal and external defenses that make them a much less appealing meal, or even a deadly one. Plants' defenses start at their surface. The bark covering tree trunks is full of lignin, a rigid web of compounds that's tough to chew and highly impermeable to pathogens. Leaves are protected by a waxy cuticle that deters insects and microbes. Some plants go a step further with painful structures to warn would-be predators. Thorns, spines, and prickles discourage bigger herbivores. To deal with smaller pests, some plants' leaves have sharp hair-like structures called trichomes. The kidney bean plant sports tiny hooks to stab the feet of bed bugs and other insects. In some species, trichomes also dispense chemical irritants. Stinging nettles release a mixture of histamine and other toxins that cause pain and inflammation when touched. For other plant species, the pain comes after an herbivore's first bite. Spinach, kiwi fruit, pineapple, fuchsia and rhubarb all produce microscopic needle-shaped crystals called raphides. They can cause tiny wounds in the inside of animals' mouths, which create entry points for toxins. The mimosa plant has a strategy designed to prevent herbivores from taking a bite at all. Specialized mechanoreceptor cells detect touch and shoot an electrical signal through the leaflet to its base causing cells there to release charged particles. The buildup of charge draws water out of these cells and they shrivel, pulling the leaflet closed. The folding movement scares insects away and the shrunken leaves look less appealing to larger animals. If these external defenses are breached, the plant immune system springs into action. Plants don't have a separate immune system like animals. Instead, every cell has the ability to detect and defend against invaders. Specialized receptors can recognize molecules that signal the presence of dangerous microbes or insects. In response, the immune system initiates a battery of defensive maneuvers. To prevent more pathogens from making their way inside, the waxy cuticle thickens and cell walls get stronger. Guard cells seal up pores in the leaves. And if microbes are devouring one section of the plant, those cells can self-destruct to quarantine the infection. Compounds toxic to microbes and insects are also produced, often tailor-made for a specific threat. Many of the plant molecules that humans have adopted as drugs, medicines and seasonings evolved as part of plants' immune systems because they're antimicrobial, or insecticidal. An area of a plant under attack can alert other regions using hormones, airborne compounds, or even electrical signals. When other parts of the plant detect these signals, they ramp up production of defensive compounds. And for some species, like tomatoes, this early warning system also alerts their neighbors. Some plants can even recruit allies to adopt a strong offense against their would-be attackers. Cotton plants under siege by caterpillars release a specific cocktail of ten to twelve chemicals into the air. This mixture attracts parasitic wasps that lay eggs inside the caterpillars. Plants may not be able to flee the scene of an attack, or fight off predators with teeth and claws, but with sturdy armor, a well-stocked chemical arsenal, a neighborhood watch, and cross-species alliances, a plant isn't always an easy meal.

**P498 2017-08-22 The amazing ways plants defend themselves - Valentin Hammoudi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=498)

翻译人员: xiao gu 校对人员: Lipeng Chen这是西红柿，这只蚜虫正通过叶片吮吸汁液缓慢的杀死西红柿。西红柿用物理和化学武器反击，来击退攻击者。但这不是全部。西红柿会释放信号给周围的西红柿，让它们释放自己的杀虫剂。植物总是被攻击。面临的威胁来自于：真菌、细菌，小草食动物：蚜虫、毛毛虫、蚂蚱，到大草食动物：乌龟、考拉、大象。动物都在寻找并吞噬植物以获得 它们叶片、茎、花和种子中的丰富的营养和水分。但植物有一系列从内到外的保护，让它们显不太可口，甚至有毒。植物防御从表面开始。覆盖树干的皮充满木质素，这是一种难以下咽并且病原体不可渗透的坚硬物质。叶片覆盖蜡状角质层，能阻止昆虫和微生物。有些植物更进一步， 形成能造成疼痛的结构，警告潜在的猎食者。刺，各种刺，让大型草食动物退缩。对于小害虫，一些植物叶片有尖锐的发状结构，称为表皮毛。四季豆用小挂钩来刺伤臭虫和其他昆虫的脚。某些种类的植物，表皮毛能释放化学刺激。刺荨麻释放组胺和毒素混合物，当触摸时，会引发疼痛和发炎。对于其他种类的植物， 食草动物咀嚼后会产生疼痛。菠菜、猕猴桃、菠萝、灯笼海棠、大黄，都会产生微小的称为针晶体的晶状物质。它们会在动物嘴巴中形成小伤口，可以让毒素进入。含羞草的策略则是完全阻止草食者吞食。传感细胞侦察到被触摸时，会从叶片释放电信号给根部，致使细胞释放带电粒子。电荷让水离开细胞，让叶片收缩，并卷曲关闭。这种卷曲运动会吓退昆虫，而且收缩的叶片对大型动物吸引力更小。如果这些外部防御都无用，植物免疫系统便开始启动。植物没有像动物一样有自己独立的免疫系统。相反，每个细胞都能侦察和防御入侵者。特别的接收器能识别可以显示危险微生物和昆虫存在的细胞。相对应的，免疫系统启动一系列的防御机制。为了阻止更多的病原体进入，蜡装角质层加厚，细胞壁增强。保护细胞封闭叶片中毛孔。如果微生物正在吞噬部分植物，细胞会通过自我毁灭来隔离感染。对付微生物和昆虫的合成毒素也会被生产出来，常常为特定的威胁量身定做。许多人类驯化为如毒品、药品、调味品的植物，它们的细胞已进化为免疫系统的一部分， 因为它们能够对抗微生物或者能够抗菌。遭受攻击的部分区域会通过释放荷尔蒙，挥发化合物，甚至电信号来提醒其他区域。当植物的其他部分探测到这些信号时，它们会加速生成防御性物质。对于某些品种，如西红柿，早期警告系统也能提醒其他西红柿。还有些植物甚至能招募盟友加入反对可能的攻击者的队列。当棉花被毛毛虫包围时，便会释放10到12种混合化学成分到空气中，这些混合物吸引着能产卵到毛毛虫体内的寄生蜂。植物不能受到攻击后就逃离现场，或用牙齿和爪子来反抗捕食者，但通过坚固的盔甲、丰富的化学武器、协作系统、以及跨物种联盟，植物不总是弱者。

**P499 2017-08-22 The science of smog - Kim Preshoff**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=499)

On July 26, 1943, Los Angeles was blanketed by a thick gas that stung people's eyes and blocked out the Sun. Panicked residents believed their city had been attacked using chemical warfare. But the cloud wasn't an act of war. It was smog. A portmanteau of smoke and fog, the word "smog" was coined at the beginning of the 20th century to describe the thick gray haze that covered cities such as London, Glasgow, and Edinburgh. This industrial smog was known to form when smoke from coal-burning home stoves and factories combined with moisture in the air. But the smog behind the LA panic was different. It was yellowish with a chemical odor. Since the city didn't burn much coal, its cause would remain a mystery until a chemist named Arie Haagen-Smit identified two culprits: volatile organic compounds, or VOCs, and nitrogen oxides. VOCs are compounds that easily become vapors and may contain elements, such as carbon, oxygen, hydrogen, chlorine, and sulfur. Some are naturally produced by plants and animals, but others come from manmade sources, like solvents, paints, glues, and petroleum. Meanwhile, the incomplete combustion of gas in motor vehicles releases nitrogen oxide. That's what gives this type of smog its yellowish color. VOCs and nitrogen oxide react with sunlight to produce secondary pollutants called PANs and tropospheric, or ground-level, ozone. PANs and ozone cause eye irritation and damage lung tissue. Both are key ingredients in photochemical smog, which is what had been plaguing LA. So why does smog affect some cities but not others? Both industrial and photochemical smog combine manmade pollution with local weather and geography. London's high humidity made it a prime location for industrial smog. Photochemical smog is strongest in urban areas with calm winds and dry, warm, sunny weather. The ultraviolet radiation from sunlight provides the energy necessary to breakdown molecules that contribute to smog formation. Cities surrounded by mountains, like LA, or lying in a basin, like Beijing, are also especially vulnerable to smog since there's nowhere for it to dissipate. That's also partially due to a phenomenon known as temperature inversion, where instead of warm air continuously rising upward, a pollution-filled layer of air remains trapped near the Earth's surface by a slightly warmer layer above. Smog isn't just an aesthetic eyesore. Both forms of smog irritate the eyes, nose, and throat, exacerbate conditions like asthma and emphysema, and increase the risk of respiratory infections like bronchitis. Smog can be especially harmful to young children and older people and exposure in pregnant women has been linked to low birth weight and potential birth defects. Secondary pollutants found in photochemical smog can damage and weaken crops and decrease yield, making them more susceptible to insects. Yet for decades, smog was seen as the inevitable price of civilization. Londoners had become accustomed to the notorious pea soup fog swirling over their streets until 1952, when the Great Smog of London shut down all transportation in the city for days and caused more than 4,000 respiratory deaths. As a result, the Clean Air Act of 1956 banned burning coal in certain areas of the city, leading to a massive reduction in smog. Similarly, regulations on vehicle emissions and gas content in the US reduced the volatile compounds in the air and smog levels along with them. Smog remains a major problem around the world. Countries like China and Poland that depend on coal for energy experience high levels of industrial smog. Photochemical smog and airborne particles from vehicle emissions affect many rapidly developing cities, from Mexico City and Santiago to New Delhi and Tehran. Governments have tried many methods to tackle it, such as banning cars from driving for days at a time. As more than half of the world's population crowds into cities, considering a shift to mass transit and away from fossil fuels may allow us to breathe easier.

**P499 2017-08-22 The science of smog - Kim Preshoff**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=499)

翻译人员: laffie chen 校对人员: Jiawei Ni1943年7月26日，大量气体笼罩着洛杉矶， 这气体不仅刺激人眼，还遮天蔽日。恐慌的群众觉得洛杉矶市正在 遭受一场化学武器袭击。其实并不是，这是雾霾，烟和雾的混合物。雾霾这个词在20世纪初被提出，用来形容城市中飘散的厚厚灰霾，在伦敦，格拉斯哥，和爱丁堡等城市中都很常见。工业雾霾由家庭火炉及工厂烧煤产生的烟与空气中的水蒸气混合而成。引起洛杉矶恐慌的雾霾却略有不同。它黄黄的，带有化学气味。不过城市里已经很少烧煤， 所以雾霾的形成一直是个谜，直到某天一位叫阿里·哈根斯密特的 化学家发现了两个元凶：挥发性有机化合物，简称VOCs和氮氧化物。VOCs 是一种很容易 变成蒸汽的化合物，也许包含很多化学元素，比如碳，氧，氢，氯，还有硫。其中有些由植物和动物产生，其它则来自工业产品，比如溶剂，油漆，胶水，还有石油。与此同时，机动车内 未完全燃烧的汽油也会释放氮氧化物。所以这种雾霾是黄色的。VOCs和氮氧化物与阳光结合会产生二次污染物，名为PANs， 以及对流层或者说是地表层的臭氧。PANs和臭氧会引起眼睛酸疼 并造成肺部组织严重损伤。两者都是流窜整个洛杉矶城的 光化学雾霾的关键组成部分。为什么其它城市 没有遭到雾霾的袭击呢？工业和光化学雾霾 与当地的天气、地理位置和人为污染有关。伦敦的高湿度使它变成了 工业雾霾的重灾区。光化学雾霾很容易出现在无风、干燥、温暖、阳光充足的城区。紫外线辐射为打破形成雾霾的分子提供了能量，如果城市被山环绕，比如洛杉矶或建在盆地中，比如北京，也非常容易生成雾霾， 因为没办法扩散出去。雾霾还与一种名为温度逆增的 自然现象有关，它是指暖空气持续上升，充满污染物的气层被上层 比较温暖的气层裹住，常年被困在地球表面。雾霾也不只是看上去让人不舒服。雾霾的两种形式都很刺激眼睛、鼻子和喉咙，也会加剧哮喘和肺气肿等疾病，还会增加呼吸道感染的可能性， 比如支气管炎。雾霾对于小孩和老人特别有害。如果被孕妇吸入， 可能会影响胎儿体重，或者引发潜在先天缺陷。光化学烟雾中发现的二级污染物会损害作物并降低产量，让它们无法抵御昆虫的侵害。几十年来，雾霾一直被认为是 人类文明前进的必然代价。伦敦人民已经开始习惯 浓稠的雾笼罩在街道上，浓稠的雾笼罩在街道上， 直到1952年，浓雾不仅让伦敦连续若干天 关闭了城中所有交通运输服务，还造成了4000多起 因呼吸疾病导致的死亡事件。于是，1956年颁布的清洁空气法案开始禁止在城市中的 某些区域燃烧煤炭，从此雾霾的影响显著消退。与此同时，美国对汽车排放量 和汽油成分做了明确规定，有效地减少了空气中有毒物质的浓度， 从而减轻了雾霾现象。如今，雾霾仍然是 全世界面临的主要问题。像中国和波兰这样依赖煤炭能源的国家正在经历严重的工业雾霾的侵袭。从汽车尾气中释放的 光化学雾霾和大气颗粒影响了许多飞速发展的城市。从墨西哥城到圣地亚哥，再到新德里和德黑兰。政府部门也尝试了 很多方法解决雾霾问题，比如无车日等等。随着全世界超过一半的人口 涌入城市生活，考虑使用公共交通，远离化石燃料，也许能使我们呼吸得轻松一些。

**P500 2017-08-24 How many ways are there to prove the Pythagorean theorem - Betty Fei**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=500)

What do Euclid, twelve-year-old Einstein, and American President James Garfield have in common? They all came up with elegant proofs for the famous Pythagorean theorem, the rule that says for a right triangle, the square of one side plus the square of the other side is equal to the square of the hypotenuse. In other words, a²+b²=c². This statement is one of the most fundamental rules of geometry, and the basis for practical applications, like constructing stable buildings and triangulating GPS coordinates. The theorem is named for Pythagoras, a Greek philosopher and mathematician in the 6th century B.C., but it was known more than a thousand years earlier. A Babylonian tablet from around 1800 B.C. lists 15 sets of numbers that satisfy the theorem. Some historians speculate that Ancient Egyptian surveyors used one such set of numbers, 3, 4, 5, to make square corners. The theory is that surveyors could stretch a knotted rope with twelve equal segments to form a triangle with sides of length 3, 4 and 5. According to the converse of the Pythagorean theorem, that has to make a right triangle, and, therefore, a square corner. And the earliest known Indian mathematical texts written between 800 and 600 B.C. state that a rope stretched across the diagonal of a square produces a square twice as large as the original one. That relationship can be derived from the Pythagorean theorem. But how do we know that the theorem is true for every right triangle on a flat surface, not just the ones these mathematicians and surveyors knew about? Because we can prove it. Proofs use existing mathematical rules and logic to demonstrate that a theorem must hold true all the time. One classic proof often attributed to Pythagoras himself uses a strategy called proof by rearrangement. Take four identical right triangles with side lengths a and b and hypotenuse length c. Arrange them so that their hypotenuses form a tilted square. The area of that square is c². Now rearrange the triangles into two rectangles, leaving smaller squares on either side. The areas of those squares are a² and b². Here's the key. The total area of the figure didn't change, and the areas of the triangles didn't change. So the empty space in one, c² must be equal to the empty space in the other, a² + b². Another proof comes from a fellow Greek mathematician Euclid and was also stumbled upon almost 2,000 years later by twelve-year-old Einstein. This proof divides one right triangle into two others and uses the principle that if the corresponding angles of two triangles are the same, the ratio of their sides is the same, too. So for these three similar triangles, you can write these expressions for their sides. Next, rearrange the terms. And finally, add the two equations together and simplify to get ab²+ac²=bc², or a²+b²=c². Here's one that uses tessellation, a repeating geometric pattern for a more visual proof. Can you see how it works? Pause the video if you'd like some time to think about it. Here's the answer. The dark gray square is a² and the light gray one is b². The one outlined in blue is c². Each blue outlined square contains the pieces of exactly one dark and one light gray square, proving the Pythagorean theorem again. And if you'd really like to convince yourself, you could build a turntable with three square boxes of equal depth connected to each other around a right triangle. If you fill the largest square with water and spin the turntable, the water from the large square will perfectly fill the two smaller ones. The Pythagorean theorem has more than 350 proofs, and counting, ranging from brilliant to obscure. Can you add your own to the mix?

**P500 2017-08-24 How many ways are there to prove the Pythagorean theorem - Betty Fei**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=500)

翻译人员: Lipeng Chen 校对人员: Jiawei Ni欧几里得，十二岁的爱因斯坦，以及美国总统詹姆斯·加菲尔德， 有什么共同点？他们都对毕达哥拉斯定理 （勾股定理）做出了精彩的证明，这个定理是说，对于一个直角三角形，一边的平方加上另一边的平方，等于斜边的平方。换句话说，a²+b²=c²。这是几何学中最基本的定理之一，也是实际应用的基础，比如建造稳定的建筑， 或对GPS点进行三角测量。这个定理以毕达哥拉斯命名，他是公元前6世纪的希腊哲学家和数学家，但是该定理在此之前的 1000多年就出现了。公元前1800年的巴比伦石板上列出了满足该定理的15组数字。一些历史学家认为， 古埃及勘测员利用譬如3，4，5的数组， 来形成直角。该理论认为勘测员可以伸展 一个被绳结分成12份的绳子，来形成边长为3，4，5的三角形。根据毕达哥拉斯的逆定理，这就可以形成一个直角三角形，因此，便可形成直角。已知最早的印度数学记录出现在公元前800至600年间，其说明穿过正方形对角线的绳子，可以产生比原来正方形 面积大一倍的正方形。这种关系源于毕达哥拉斯定理。但是我们怎么知道这个定理对平面上的每个直角三角形都成立，而不是一些数学家和勘测员所推测的呢？因为我们可以证明它。利用现有的数学定理和逻辑，我们可以证明该定理总是成立。经典证明是毕达哥拉斯自己做出的，他利用了一种名叫排列的证明方法。取四个全等的直角三角形， 两边分别长a和b，斜边长c。将它们排列， 使它们的斜边形成一个正方形。这个正方形的面积是c²。现在，重新将三角形排列成两个长方形，让各边形成一个小的正方形。这些正方形的面积分别为a²和b²。这就是关键。图形的总面积没有改变，三角形的面积没有改变。所以第一幅图中的空白部分，c²，必须等于另一幅图中的空白部分，a² + b²。另一种证明来自希腊数学家欧几里得，这种证明也被2000年后12岁的爱因斯坦提出。这种证明将一个直角三角形 分为两个部分，利用了如下定理， 如果两个三角形对应的角相同，那么它们的边的比例也是相同的。所以对这三个相似三角形，你可以写出它们的边的表达式。下一步，整理各项。最后，将两式相加，化简得到ab²+ac²=bc²,或a²+b²=c².还有一种用了曲面细分法，这是一种重复几何图案的 更加视觉化的证明。你能看出这是怎么办到的吗？如果你想花些时间思考一下， 请暂停视频。这是答案。深灰色正方形是a²，浅灰色正方形是b²。蓝色画出的正方形是c²。每个蓝色画出的正方形 正好包含了一个深灰色正方形和一个浅灰色正方形，再次证明了毕达哥拉斯定理。如果你真的想说服自己，你可以建个转台， 上面有三个相同深度的正方形盒子，它们考一个直角三角形相连。如果你在最大的正方形内装满水， 并转动转台，最大的正方形内的水会 正好装满另外两个小的正方形。毕达哥拉斯定理有超过350个证明， 还有更多，从及其聪明的，到有些难懂的。你能提出一个新的证明吗？

**P501 2017-08-29 The life cycle of a t-shirt - Angel Chang**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=501)

Consider the classic white t-shirt. Annually, we sell and buy two billion t-shirts globally, making it one of the most common garments in the world. But how and where is the average t-shirt made, and what's its environmental impact? Clothing items can vary a lot, but a typical t-shirt begins its life on a farm in America, China, or India where cotton seeds are sown, irrigated and grown for the fluffy bolls they produce. Self-driving machines carefully harvest these puffs, an industrial cotton gin mechanically separates the fluffy bolls from the seeds, and the cotton lint is pressed into 225-kilogram bales. The cotton plants require a huge quantity of water and pesticides. 2,700 liters of water are needed to produce the average t-shirt, enough to fill more than 30 bathtubs. Meanwhile, cotton uses more insecticides and pesticides than any other crop in the world. These pollutants can be carcinogenic, harm the health of field workers, and damage surrounding ecosystems. Some t-shirts are made of organic cotton grown without pesticides and insecticides, but organic cotton makes up less than 1% of the 22.7 million metric tons of cotton produced worldwide. Once the cotton bales leave the farm, textile mills ship them to a spinning facility, usually in China or India, where high-tech machines blend, card, comb, pull, stretch, and, finally, twist the cotton into snowy ropes of yarn called slivers. Then, yarns are sent to the mill, where huge circular knitting machines weave them into sheets of rough grayish fabric treated with heat and chemicals until they turn soft and white. Here, the fabric is dipped into commercial bleaches and azo dyes, which make up the vivid coloring in about 70% of textiles. Unfortunately, some of these contain cancer-causing cadmium, lead, chromium, and mercury. Other harmful compounds and chemicals can cause widespread contamination when released as toxic waste water in rivers and oceans. Technologies are now so advanced in some countries that the entire process of growing and producing fabric barely touches a human hand. But only up until this point. After the finished cloth travels to factories, often in Bangladesh, China, India, or Turkey, human labor is still required to stitch them up into t-shirts, intricate work that machines just can't do. This process has its own problems. Bangladesh, for example, which has surpassed China as the world's biggest exporter of cotton t-shirts, employs 4.5 million people in the t-shirt industry, but they typically face poor conditions and low wages. After manufacture, all those t-shirts travel by ship, train, and truck to be sold in high-income countries, a process that gives cotton an enormous carbon footprint. Some countries produce their own clothing domestically, which cuts out this polluting stage, but generally, apparel production accounts for 10% of global carbon emissions. And it's escalating. Cheaper garments and the public's willingness to buy boosted global production from 1994 to 2014 by 400% to around 80 billion garments each year. Finally, in a consumer's home, the t-shirt goes through one of the most resource-intensive phases of its lifetime. In America, for instance, the average household does nearly 400 loads of laundry per year each using about 40 gallons of water. Washing machines and dryers both use energy, with dryers requiring five to six times more than washers. This dramatic shift in clothing consumption over the last 20 years, driven by large corporations and the trend of fast fashion has cost the environment, the health of farmers, and driven questionable human labor practices. It's also turned fashion into the second largest polluter in the world after oil. But there are things we can do. Consider shopping secondhand. Try to look for textiles made from recycled or organic fabrics. Wash clothes less and line dry to save resources. Instead of throwing them away at the end of their life, donate, recycle, or reuse them as cleaning rags. And, finally, you might ask yourself, how many t-shirts and articles of clothing will you consume over your lifetime, and what will be their combined impact on the world?

**P501 2017-08-29 The life cycle of a t-shirt - Angel Chang**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=501)

翻译人员: dottie zhao 校对人员: Qinyang Zeng回想一下经典的白色T恤。每年，全球会买卖20亿件T恤，使其成为世界上 最常见的服装单品。不过T恤都是在哪里， 以及如何制作出来的，对环境又有怎样的影响呢?服装种类繁多，差别迥异，但一件经典的T恤是在美国， 中国或印度的农场里诞生的。在那里，棉花的种子通过播种，灌溉 生长，生产出了蓬松的棉铃。随后，自动收割机开始收割它们，工业棉机械设备 将这些蓬松的棉铃与种子分开，并将棉绒压制成225公斤的棉包。种植棉花需要大量的水和农药。生产每件T恤平均要消耗 2700公升的水，足以填满30多个浴缸。同时，棉花的生长对 杀虫剂和农药的需求，也远超世界上任何其他作物。这些污染物有致癌性，会危害工作人员的健康，并损害生态系统。一些T恤由无农药和 杀虫剂的有机棉制成，但天然有机棉的产量少之又少，不到全球2270万吨 棉产量的百分之一。一旦棉包离开农场，纺织厂就会将它们送到纺纱厂，这些工厂通常位于中国和印度，在那里，高科技机器进行混合，梳棉，精梳，拉扯，延伸等操作，最后，将棉花拧成白色的纱绳， 就是我们所说的银条。然后，纱绳送被到纺织作坊，在那里，大型的环形针织机将它们编织成 粗糙的灰色织物，再经过高温和化学处理， 直到它们变白，质感柔软。下一步，通过将织物浸入 漂白剂和染料，可以将70%的纺织品 染成鲜艳的颜色。然而，其中一些染料 会含有致癌的镉，铅，铬，和汞元素。其他有害化合物和化学品 会作为有毒废水流入河流和海洋，造成严重的污染。如今对于一些技术先进的国家，在整个生产织物的过程中几乎不需要手工操作。但是仍有一点不足。在成品布料被送往工厂的路上，通常是在孟加拉国，中国， 印度，或土耳其等国家，仍需手工将它们缝合成T恤，这种复杂的工作 机器根本做不了。这个过程本身也存在问题。例如，孟加拉国已经超越了中国， 成为最大的棉T恤出口国，在T恤行业雇用了450万人，但他们的工作环境恶劣，报酬极低。制造环节完成后，所有这些T恤 通过船，火车和卡车被运往高收入国家出售，这个运送过程给棉 留下了巨大的碳足迹。因此，一些国家选择 在自己的国家生产服装，取消了这个污染阶段，但实际上，服装生产 占据了全球碳排放量的10％。该数字仍然在急速攀升。大多数消费者喜欢 购买便宜的服装，使其全球产量从1994年 到2014年增加了400％，达到了年产量800亿件。最后，在消费者的家中，T恤经历了其生命周期中 最耗费资源的过程。例如，在美国，一般家庭每年 需要用400次洗衣机，每次需要消耗大约40加仑的水。洗衣机和烘干机都要用到能源，而烘干机的耗电量 是洗衣机的五到六倍。在过去的20年，服装消费 发生了巨大的改变，大公司引领的快速时尚潮流破坏了环境，危害了农民的健康，对劳动力的压榨更是饱受诟病。时尚业成了除了石油以外， 世界上最大的污染来源。但是，我们可以改变这一现状。考虑购买二手衣物。试着寻找由回收或有机织物 制成的纺织品。减少洗衣次数，自然晒干， 从而节约资源。与其把它们扔掉 或者一直存放着，不如进行捐赠，回收或再利用， 例如作为清洁抹布。最后，你可能会问自己，在你的一生中，要消耗 多少件T恤和其他衣物，如果把它们加起来， 会对世界造成怎样的影响？

**P502 2017-08-30 Are you a body with a mind or a mind with a body - Maryam Alimardani**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=502)

Look at your hand. How do you know it's really yours? It seems obvious, unless you've experienced the rubber hand illusion. In this experiment, a dummy hand is placed in front of you and your real hand is hidden behind a screen. Both are simultaneously stroked with a paint brush. No matter how much you remind yourself the dummy hand isn't yours, you eventually start to feel like it is, and inevitably flinch when it's threatened with a knife. That may just be a temporary trick, but it speaks to a larger truth: our bodies, the physical, biological parts of us, and our minds, the thinking, conscious aspects, have a complicated, tangled relationship. Which one primarily defines you or your self? Are you a physical body that only experiences thoughts and emotions as a result of biochemical interactions in the brain? That would be a body with a mind. Or is there some non-physical part of you that's pulling the strings but could live outside of your biological body? That would be a mind with a body. That takes us to an old question of whether the body and mind are two separate things. In a famous thought experiment, 16th-century philosopher René Descartes pointed out that even if all our physical sensations were just a hallucinatory dream, our mind and thoughts would still be there. That, for him, was the ultimate proof of our existence. And it led him to conclude that the conscious mind is something separate from the material body that forms the core of our identity. The notion of a non-physical consciousness echoes the belief of many religions in an immaterial soul for which the body is only a temporary shell. If we accept this, another problem emerges. How can a non-physical mind have any interaction with the physical body? If the mind has no shape, weight, or motion, how can it move your muscles? Or if we assume it can, why can your mind only move your body and not others? Some thinkers have found creative ways to get around this dilemma. For example, the French priest and philosopher Nicolas Malebranche claimed that when we think about reaching for a fork, it's actually god who moves our hand. Another priest philosopher named George Berkeley concluded that the material world is an illusion, existing only as mental perceptions. This question of mind versus body isn't just the domain of philosophers. With the development of psychology and neuroscience, scientists have weighed in, as well. Many modern scientists reject the idea that there's any distinction between the mind and body. Neuroscience suggests that our bodies, along with their physical senses, are deeply integrated with the activity in our brains to form what we call consciousness. From the day we're born, our mental development is formed through our body's interaction with the external world. Every sight, sound, and touch create new maps and representations in the brain that eventually become responsible for regulating our experience of self. And we have other senses, besides the typical five, such as the sense of balance and a sense of the relative location of our body parts. The rubber hand illusion, and similar virtual reality experiments, show that our senses can easily mislead us in our judgment of self. They also suggest that our bodies and external sensations are inseparable from our subjective consciousness. If this is true, then perhaps Descartes' experiment was mistaken from the start. After all, if we close our eyes in a silent room, the feeling of having a body isn't something we can just imagine away. This question of mind and body becomes particularly interesting at a time when we're considering future technologies, such as neural prosthetics and wearable robots that could become extended parts of our bodies. Or the slightly more radical idea of mind uploading, which dangles the possibility of immortal life without a body by transferring a human consciousness into a computer. If the body is deeply mapped in the brain, then by extending our sense of self to new wearable devices, our brains may eventually adapt to a restructured version with new sensory representations. Or perhaps uploading our consciousness into a computer might not even be possible unless we can also simulate a body capable of delivering physical sensations. The idea that our bodies are part of our consciousness and vice versa also isn't new. It's found extensively in Buddhist thought, as well as the writings of philosophers from Heidegger to Aristotle. But for now, we're still left with the open question of what exactly our self is. Are we a mind equipped with a physical body as Descartes suggested? Or a complex organism that's gained consciousness over millions of years of evolution thanks to a bigger brain and more neurons than our distant ancestors? Or something else entirely that no one's yet dreamt up?

**P502 2017-08-30 Are you a body with a mind or a mind with a body - Maryam Alimardani**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=502)

翻译人员: Jiawei Ni 校对人员: Tianyu Qiao看看你的手，你怎么知道这就是你的手呢？答案看似明显，除非你有 体验过“橡胶手错觉”。这个实验是放一只假手在你面前，然后把你的真手藏在隔板后面。两边同时被刷子抚摸。无论你如何提醒自己那只假手不是你的，你最终都会觉得它属于你，所以当它快被刀子刺中时你一定会退缩。可能这只是个暂时的伎俩， 但却证明了一个更大的事实：我们的身体在生理上属于我们，和我们的思维，思考能力和意识有着复杂而纠结的关系。哪一个更能定义你呢？你是只有通过大脑内的生化相互作用才能感受到想法和情绪的身体吗？这是有着思维的身体。或是有一些非生理的部分在幕后操纵，但这些部分在你的生物身体之外？这就是有着身体的思维。这让我们回归到一个古老的问题，究竟身体和思维是不是两样不同的东西？在一个著名的思想实验中，16世纪的哲学家笛卡儿指出，即使我们所有的身体感觉都只是幻想，我们的思维和想法依然存在。对他来说，这也是我们存在的最终证明。由此，他总结出，意识是与构成我们身份核心的物质身体相分离的东西。非生理意识的概念与许多宗教信奉非物质的灵魂，认为身体只是一个临时躯壳的信仰相呼应。但如果我们接受了这个概念， 另一个问题就出现了。非生理的思维如何 和生理上的身体互动？如果思维没有形， 重量或动作，它如何使肌肉运动？假设它可以，为什么你的思维只能 控制你的而不能控制其他人的身体呢？有些思想家找到了一些 有创意的方法来回答这个问题。比如，法国神父兼哲学家 尼古拉斯‧马勒伯朗士认为，当我们考虑伸手拿一个叉子时，其实是神在移动我们的手。另一名叫乔治·贝克莱的神父及哲学家总结出，物质世界只是一个幻像，仅作为精神观念存在。这个心灵与身体的问题 不仅存在于哲学领域。随着心理学和神经科学的发展，科学家也开始重视这个问题。很多现代科学家反对心灵和身体之间有区别的想法。神经科学表明， 我们的身体以及身体的感觉与我们大脑中的活动密切相关，从而形成我们所谓的意识。从我们出生那天起，我们的心理发展便是通过身体与外部世界互动而形成的。每一次视觉，听觉和触觉的接触 都会在大脑中创造出新的地图和代表物，最终使我们能调节自我体验。除了最典型的五感以外， 我们还有其他感觉，比如平衡感以及对我们身体相对位置的感觉。橡胶手错觉和类似的虚拟现实实验显示，在对自我的判断中， 我们的感觉很容易误导我们。这些实验也表明我们的身体和外在感觉与我们的主观意识是分不开的。如果这是真的，那么可能 笛卡儿的实验从一开始就是错误的。毕竟，如果在一个 安静的房间里闭上眼睛，我们并不能让心灵从躯体中脱离。心灵和身体的这个问题 在考虑到未来科技时会变得特别有趣，比如神经假肢和可穿戴机器人，这类可以作为我们身体延展部分的东西。又或者更激进的，思想上传，也就是通过将人的意识转移到电脑中创造出无需身体便能获得永生的可能。如果身体深深映射在大脑中，那么通过将自己的感觉 延展到新型的可穿戴设备，我们的大脑最终可能会用新的感官表现来适应这个重组的版本。也许将我们的意识上传到 电脑是不太可能的，除非我们还能模拟一个 能够传递生理感觉的身体。身体是意识的一部分 和意识是身体的一部分的想法都不是什么新鲜事。它们不单在佛教思想中广泛存在，从海德格尔到亚里士多德 等哲学家的著作中也能找到。但现在，我们仍有一个未解决的问题，那就是自我究竟为何物？我们是否像笛卡儿所说的 是个配备了身体的思维？还是个通过数百万年的进化而获得意识的复杂生物体?毕竟我们的大脑比远古祖先的 要大，也有更多的神经元，或是其他完全没有人想到过的东西呢？

**P503 2017-08-30 Should we get rid of standardized testing - Arlo Kempf**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=503)

The first standardized tests that we know of were administered in China over 2,000 years ago during the Han dynasty. Chinese officials used them to determine aptitude for various government posts. The subject matter included philosophy, farming, and even military tactics. Standardized tests continued to be used around the world for the next two millennia, and today, they're used for everything from evaluating stair climbs for firefighters in France to language examinations for diplomats in Canada to students in schools. Some standardized tests measure scores only in relation to the results of other test takers. Others measure performances on how well test takers meet predetermined criteria. So the stair climb for the firefighter could be measured by comparing the time of the climb to that of all other firefighters. This might be expressed in what many call a bell curve. Or it could be evaluated with reference to set criteria, such as carrying a certain amount of weight a certain distance up a certain number of stairs. Similarly, the diplomat might be measured against other test-taking diplomats, or against a set of fixed criteria, which demonstrate different levels of language proficiency. And all of these results can be expressed using something called a percentile. If a diplomat is in the 70th percentile, 70% of test takers scored below her. If she scored in the 30th percentile, 70% of test takers scored above her. Although standardized tests are sometimes controversial, they're simply a tool. As a thought experiment, think of a standardized test as a ruler. A ruler's usefulness depends on two things. First, the job we ask it to do. Our ruler can't measure the temperature outside or how loud someone is singing. Second, the ruler's usefulness depends on its design. Say you need to measure the circumference of an orange. Our ruler measures length, which is the right quantity, but it hasn't been designed with the flexibility required for the task at hand. So, if standardized tests are given the wrong job, or aren't designed properly, they may end up measuring the wrong things. In the case of schools, students with test anxiety may have trouble performing their best on a standardized test, not because they don't know the answers, but because they're feeling too nervous to share what they've learned. Students with reading challenges may struggle with the wording of a math problem, so their test results may better reflect their literacy rather than numeracy skills. And students who were confused by examples on tests that contain unfamiliar cultural references may do poorly, telling us more about the test taker's cultural familiarity than their academic learning. In these cases, the tests may need to be designed differently. Standardized tests can also have a hard time measuring abstract characteristics or skills, such as creativity, critical thinking, and collaboration. If we design a test poorly, or ask it to do the wrong job, or a job it's not very good at, the results may not be reliable or valid. Reliability and validity are two critical ideas for understanding standardized tests. To understand the difference between them, we can use the metaphor of two broken thermometers. An unreliable thermometer gives you a different reading each time you take your temperature, and the reliable but invalid thermometer is consistently ten degrees too hot. Validity also depends on accurate interpretations of results. If people say results of a test mean something they don't, that test may have a validity problem. Just as we wouldn't expect a ruler to tell us how much an elephant weighs, or what it had for breakfast, we can't expect standardized tests alone to reliably tell us how smart someone is, how diplomats will handle a tough situation, or how brave a firefighter might turn out to be. So standardized tests may help us learn a little about a lot of people in a short time, but they usually can't tell us a lot about a single person. Many social scientists worry about test scores resulting in sweeping and often negative changes for test takers, sometimes with long-term life consequences. We can't blame the tests, though. It's up to us to use the right tests for the right jobs, and to interpret results appropriately.

**P503 2017-08-30 Should we get rid of standardized testing - Arlo Kempf**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=503)

翻译人员: Jiawen Wei 校对人员: Jessica Lee我们所知的第一场标准化考核是在2000多年前由中国的汉朝举办的。当时汉朝的官员依据这些考核 来为政府职位挑选人才。考试的科目包括哲学，农业，甚至军事策略。标准化考核在之后的 两千年中被世界各地所采用，时至今日，它们仍然 被广泛应用于方方面面，从法国消防员的台阶攀爬考核，到加拿大外交官的语言考核，再到学校的学生。有些标准化考核的成绩仅仅和其他参加考试的考生成绩相关。其他考试则依据预定的标准 来评判考生的表现所以消防员的台阶攀爬测试可以通过和其他消防员比较攀爬时长来进行评估。考核结果可以用我们大家 所说的钟形曲线来展现。或者可以依据预设的 标准为参考来进行评估，比如携带指定的负重向上攀爬特定距离及特定的台阶数。同样的，外交官考核的成绩可以 通过和其他考生互相比较来评估，或者根据能够展现语言掌握程度而设立的标准进行评估。而所有这些考核成绩都可以通过 一种被称为百分位数的形式来展现。例如，一位外交官的成绩是第70个 百分位数，即高于70%的考生。而如果她的成绩是第30个百分位数， 就是低于70%的考生。尽管标准化考核有时也会引起争议，它们也仅仅只是一种工具而已。把标准化考核想像成一把尺。而让尺发挥作用取决于两个因素。首先，是我们想让它发挥的功能。我们不能用尺来测量室外的温度，或者某个人唱歌的分贝。其次，尺的设计决定了它的作用。比如你想要测量一个橙子的圆周长，我们的尺正是用来测量长度的，但是它的设计并不能满足 当前任务所需的弹性。所以当标准化考核 被赋予了错误的功能，或者考核的设计失当，它们最终可能会得出错误的测试结果。例如在学校中，有考试焦虑症的学生 可能无法在标准化考核中展现全部实力，这并不是因为他们不知道答案，而是因为他们太紧张 而无法分享自己所学的知识。有阅读障碍的学生可能无法理解一道数学题的题意，所以他们的考试成绩 也许更好的反馈了他们的读写能力，而不是数学能力。而有些学生对于试题中涉及的他们所不熟悉的文化背景感到困惑，因而表现不佳。这些最终会更多的向我们展示 考生对于文化的熟悉程度，而非他们的学术能力。以上事例中的考核也许需要重新设计。标准化考核在测试抽象的特性或者技能比如创造力，批判性思维 和协同合作性上也无法发挥应有的作用。如果我们没有正确的设计考核机制或者赋予考核错误的作用，或者将考核应用于不恰当的领域，考核的结果就可能并不可信或者无效。可信度和有效性是理解标准化考核的两个重要概念。为了理解这两者间的不同之处，我们可以用两个破损的温度计做比喻。一个不可靠的温度计会在每次测量的时候得到不同的读数，而一个可靠但是结果无效的 温度计的读数会始终偏高10度。有效性也取决于对于结果准确的解读。如果人们想将考核的结果推广到 超出其本身所代表的意义，那这个考核的有效性就出现了问题。正如我们不能期望用尺来 测量出大象的重量或者它早饭吃了什么，我们也无法期待仅仅通过标准化考核 就能知道某个人有多聪明，外交官是否能机智的化解困境，或者消防员会有多勇敢。所以标准化考核也许能够 帮助我们在短时间内对一大群人有大概的了解，但是这些考核通常无法告诉我们 关于某一个人的很多特点。很多社会学家担心考核成绩太过笼统并且通常会为考生带来负面的变化，有时候甚至是长期或者 影响终生的变化。然而我们不能抱怨考核本身，因为这取决于我们如何去 将正确的考核用在正确的领域，并且正确的解读考核的结果。

**P504 2017-09-07 Why do we harvest horseshoe crab blood - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=504)

During the warmer months, especially at night during the full moon, horseshoe crabs emerge from the sea to spawn. Waiting for them are teams of lab workers who capture the horseshoe crabs by the hundreds of thousands, take them to labs, harvest their cerulean blood, then return them to the sea. Oddly enough, we capture horseshoe crabs on the beach because that's the only place we know we can find them. A female horseshoe crab lays as many as 20 batches of up to 4,000 eggs on her annual visit to the beach. When the eggs hatch, the juvenile horseshoe crabs often stay near shore, periodically shedding their shells as they grow. Once they leave these shallow waters, they don't return until they reach sexual maturity ten years later. Despite our best efforts, we don't know where they spend those years. Though we've spotted the occasional horseshoe crab as deep as 200 meters below the ocean's surface, we only see large groups of adults when they come ashore to spawn. Horseshoe crab blood contains cells called amebocytes that protect them from infection by viruses, fungi, and bacteria. Amebocytes form gels around these invaders to prevent them from spreading infections. This isn't unusual. All animals have protective immune systems. But horseshoe crab amebocytes are exceptionally sensitive to bacterial endotoxins. Endotoxins are molecules from the cell walls of certain bacteria, including E. coli. Large amounts of them are released when bacterial cells die, and they can make us sick if they enter the blood stream. Many of the medicines and medical devices we rely on can become contaminated, so we have to test them before they touch our blood. We do have tests called Gram stains that detect bacteria, but they can't recognize endotoxins which can be there even when bacteria aren't present. So scientists use an extract called LAL produced from harvested horseshoe crab blood to test for endotoxins. They add LAL to a medicine sample, and if gels form, bacterial endotoxins are present. Today, the LAL test is used so widely that millions of people who've never seen a horseshoe crab have been protected by their blood. If you've ever had an injection, that probably includes you. How did horseshoe crabs end up with such special blood? Like other invertebrates, the horseshoe crab has an open circulatory system. This means their blood isn't contained in blood vessels, like ours. Instead, horseshoe crab blood flows freely through the body cavity and comes in direct contact with tissues. If bacteria enters their blood, it can quickly spread over a large area. Pair this vulnerability with the horseshoe crab's bacteria-filled ocean and shoreline habitats, and it's easy to see why they need such a sensitive immune response. Horseshoe crabs survived mass extinction events that wiped out over 90% of life on Earth and killed off the dinosaurs, but they're not invincible. And the biggest disruptions they've faced in millions of years come from us. Studies have shown that up to 15% of horseshoe crabs die in the process of having their blood harvested. And recent research suggests this number may be even higher. Researchers have also observed fewer females returning to spawn at some of the most harvested areas. Our impact on horseshoe crabs extends beyond the biomedical industry, too. Coastal development destroys spawning sites, and horseshoe crabs are also killed for fishing bait. There's ample evidence that their populations are shrinking. Some researchers have started working to synthesize horseshoe crab blood in the lab. For now, we're unlikely to stop our beach trips, but hopefully, a synthetic alternative will someday eliminate our reliance on the blood of these ancient creatures.

**P504 2017-09-07 Why do we harvest horseshoe crab blood - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=504)

翻译人员: xiao gu 校对人员: Sylvia He在天气温暖的季节，尤其是月圆之夜，鲎从海里游上沙滩产卵。等待它们的是若干组 实验室的研究员，他们捕获成百上千的鲎，带回实验室，采集鲎的深蓝色血液，再把它们放回大海。奇怪的是， 我们在海边抓鲎，因为这是据我们所知 唯一能找到它们的地方。雌鲎每年在海边能产多至 20 批，每批多至 4000 个卵，这些卵孵化后，幼鲎通常留在近海处定期蜕壳。它们一旦离开浅海，就会在 10 年后，性成熟时才返回。人们经过努力研究，却仍然 不知道它们在此期间如何生活。虽然我们也偶然在海平面下 200 米处 发现过一两个鲎，通常在成年鲎返回海滩时， 我们才能找到成群的鲎。鲎血中含有使它们免受病毒、真菌和细菌感染的阿米巴样细胞。这种细胞和入侵者反应后会分泌可防止感染扩散的凝胶。这很寻常，所有动物都有免疫系统。但是鲎的阿米巴样细胞 对于细菌内毒素特别敏感。内毒素来自某些细菌的细胞壁，包括大肠杆菌。细菌死亡时大量释放内毒素，进入血液内的内毒素会使我们生病。我们依赖的大量药品 和医疗器械可能被污染，所以在使用前，我们需要用革兰氏染色试验 来测试细菌的存在，但是革兰氏染色不能识别内毒素。即使没有细菌， 内毒素仍有可能存在。所以科学家使用一个叫 LAL 的鲎血提取物来测试内毒素。他们把 LAL 加入样本中， 如果凝胶形成，说明样本中存在细菌内毒素。如今，LAL 测试被广泛使用，即使成千上万的人 从来没有见过鲎，他们也受益于鲎血。如果你曾经接受过药物注射， 你可能就是其中之一。鲎为什么会有这么特殊的血液呢？像其他无脊椎动物一样，鲎有开放循环系统。和人类不同， 它们的血液 没有封闭在血管中。相反，鲎血在体腔中自由流动，直接抵达身体组织。如果细菌进入体内， 很快就会蔓延至全身。而且鲎在海洋中和海岸的栖息地充斥着细菌，所以它们需要敏感的免疫系统。鲎能在毁灭了地球 90% 的生命，包括恐龙的大规模 灭绝事件中存活下来。但鲎也有天敌。数百万年来， 它们最大的挑战来自人类。研究显示，近 15% 的鲎会在血液采集过程中死亡。最新的研究发现， 这个数字可能更高。研究者发现在一些富产鲎的地区，越来越少的雌鲎返回那里产卵。我们对鲎的影响甚至 超越了生物产业领域。近海开发破坏了产卵栖息地，鲎也时常死在鱼钩之下。大量证据显示， 它们的数量正在急剧减少。一些研究者已经开始在实验室合成鲎血。目前，我们还不可能停止捕获鲎，但希望合成品有一天可以免除我们对这些远古生物血液的依赖。

**P505 2017-09-08 A brief history of banned numbers - Alessandra King**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=505)

They say the pen is mightier than the sword, and authorities have often agreed. From outlawed religious tracts and revolutionary manifestos to censored and burned books, we know the potential power of words to overturn the social order. But as strange as it may seem, some numbers have also been considered dangerous enough to ban. Our distant ancestors long counted objects using simple tally marks. But as they developed agriculture and began living together in larger groups, this was no longer enough. As numbers grew more complex, people began not just using them, but thinking about what they are and how they work. And by 600 B.C.E. in Ancient Greece, the study of numbers was well-developed. The mathematician Pythagoras and his school of followers found numerical patterns in shapes, music, and the stars. For them, mathematics held the deepest secrets of the universe. But one Pythagorean named Hippasus discovered something disturbing. Some quantities, like the diagonal of a square with sides of length one couldn't be expressed by any combination of whole numbers or fractions, no matter how small. These numbers, which we call irrational numbers, were perceived as a threat to the Pythagorean's notion of a perfect universe. They imagined a reality that could be described with rational, numerical patterns. Historians write that Hippasus was exhiled for publicizing his findings, while legends claim he was drowned as punishment from the gods. While irrational numbers upset philosophers, later mathematical inventions would draw attention from political and religious authorities, as well. In the Middle Ages, while Europe was still using Roman numerals, other cultures had developed positional systems that included a symbol for zero. When Arab travelers brought this system to the bustling maritime cities of Italy, its advantages for merchants and bankers was clear. But the authorities were more wary. Hindu-Arabic numerals were considered easier to forge or alter, especially since they were less familiar to customers than to merchants. And the concept of zero opened the door to negative numbers and the recording of debt at a time when moneylending was regarded with suspicion. In the 13th century, Florence banned the use of Hindu-Arabic numerals for record keeping. And though they soon proved too useful to ignore, controversies over zero and negative numbers continued for a long time. Negative numbers were dismissed as absurd well into the 19th century. And prominent mathematicians, like Gerolamo Cardano, avoided using zero, even though it would have made it much easier to find solutions to cubic and the quartic equations. Even today it's illegal to use some numbers for different reasons. Some are banned because of what they represent. For example, governments have prohibited the display of numbers that have symbolic meaning, such as the date of a revolution or connections to oppositional political figures or parties. Other numbers are potentially illegal because of the information they carry. Just about any information, whether text, image, video, or executable programs can be translated into a string of numbers. But this means that protected information, whether copyrights, proprietary materials, or state secrets can also be represented as numbers, so possessing or publishing these numbers may be treated as a criminal offense. This idea gathered attention in 2001 when code that could be used to decrypt DVDs was widely shared and distributed in the form of a large prime number. The idea of illegal numbers may sound absurd, but like words, written numbers are a way of expressing concepts and information. And in a world where calculations and algorithms shape more and more of our lives, the mathematician's pencil grows stronger by the day.

**P505 2017-09-08 A brief history of banned numbers - Alessandra King**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=505)

翻译人员: Lynn Zhou 校对人员: Jiawei Ni人们认为文字比武器更有力,统治者们通常也这么认为。从非法宗教传单及革命宣言到被删减和烧毁的书籍，我们了解了文字足以 推翻社会秩序的潜能。尽管这看起来很奇怪，但一些数字也被认为 是危险的而被禁止。我们的祖先们长期使用 简单的计数符号来计数。但当他们发展农业并开始群居时，这种方法便不再适用。当数字变得越来越复杂时，人们不再只是使用它们而开始思考它们是什么 以及如何被使用。公元前600年的古希腊 对数字的研究已很发达。数学家毕达哥拉斯和他的学生们发现了图形，音乐及 星体的数字规律。对于古希腊人而言，数学家们 掌握着宇宙中最深奥的秘密。但是毕达哥拉斯学派中的希帕苏斯 发现了一些令人不安的事情。一些数字，比如边长为一的正方形的 对角线长度是不能以整数或小数形式来表示的，不管这些数字有多小。这些被我们称为无理数的数字在当时被视为毕达哥拉斯完美宇宙学论 中的一个威胁。他们想象出一个由有理数和数学规律 组成的现实世界。历史学家写道，希帕苏斯 由于公开这一发现而被流放，但传说却是他被众神惩罚溺水而亡。当哲学家们为无理数所烦恼不安时，后来关于它的数学研究发现也引起了政治及宗教 两界的极大关注。中世纪时期，当欧洲仍在 使用罗马数字时，其他国家已经发展出一套包含了零这一标志的数字系统。当阿拉伯旅行者将这套系统 带到意大利繁华的海港城市，它带给商人和银行家的便利 不言而喻。但统治阶级对此很谨慎。人们认为阿拉伯数字更容易 被伪造或改变，尤其是顾客不如商人对其熟悉时。在人们对于金钱借贷很谨慎的时代，零的这一数字概念打开了负数和债务记录的大门。13世纪时，佛罗伦萨禁止 使用阿拉伯数字来进行记录。尽管由于阿拉伯数字太过方便使用，人们不久便忽视了这一禁令但对零和负数的争议 仍持续了很长时间。直到19世纪负数仍被认为是不可理喻的存在。声名显赫的数学家，比如卡尔达诺也避免使用数字零，尽管零的使用会使解决 立方和四次方程式变得简单很多。即便在今天，一些数字仍由于 各种原因而被禁止使用。一些数字由于其代表含义而被禁。比如，政府会禁止那些含有标志性意义的数字排列组合，例如，一场革命的日期或与反政府分子或政党有关的数字。其余的数字则由于它们所传达的信息 而具有潜在非法性。任何信息，无论是文本、图像、视频、还是可执行程序 都可以转译为一串数字。但这意味着机密信息，无论是版权、专利材料、或是国家机密都可以以数字的形式呈现。所以占有或公开这些数字 也许会被视为犯罪。这种观点在2001年引起了公众注意当时用于解密DVD 的编码以大质数的形式被广泛分享和散布。非法数字的概念也许听起来很荒诞，但和文字一样数字也是表达概念和信息的一种方式。在数字计算和运算法则对我们生活产生越来越大 影响的当今世界数学家们的力量日渐强大。

**P506 2017-09-08 What are gravitational waves - Amber L. Stuver**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=506)

At about six o'clock in the morning on September 14, 2015, scientists witnessed something no human had ever seen: two black holes colliding. Both about 30 times as massive as our Sun, they had been orbiting each other for millions of years. As they got closer together, they circled each other faster and faster. Finally, they collided and merged into a single, even bigger, black hole. A fraction of a second before their crash, they sent a vibration across the universe at the speed of light. And on Earth, billions of years later, a detector called the Laser Interferometer Gravitational Wave Observatory, or LIGO for short, picked it up. The signal only lasted a fifth of a second and was the detector's first observation of gravitational waves. What are these ripples in space? The answer starts with gravity, the force that pulls any two objects together. That's the case for everything In the observable universe. You're pulling on the Earth, the Moon, the Sun, and every single star, and they're pulling on you. The more mass something has, the stronger its gravitational pull. The farther away the object, the lower its pull. If every mass has an effect on every other mass in the universe, no matter how small, then changes in gravity can tell us about what those objects are doing. Fluctuations in the gravity coming from the universe are called gravitational waves. Gravitational waves move out from what caused them, like ripples on a pond, getting smaller as they travel farther from their center. But what are they ripples on? When Einstein devised his Theory of Relativity, he imagined gravity as a curve in a surface called space-time. A mass in space creates a depression in space-time, and a ball rolling across a depression will curve like it's being attracted to the other mass. The bigger the mass, the deeper the depression and the stronger the gravity. When the mass making the depression moves, that sends out ripples in space-time. These are gravitationl waves. What would a gravitational wave feel like? If our bodies were sensitive enough to detect them, we'd feel like we were being stretched sideways while being compressed vertically. And in the next instant, stretched up and down while being compressed horizontally, sideways, then up and down. This back and forth would happen over and over as the gravitational wave passed right through you. But this happens on such a minute scale that we can't feel any of it. So we've built detectors that can feel it for us. That's what the LIGO detectors do. And they're not the only ones. There are gravitational wave detectors spread across the world. These L-shaped instruments have long arms, whose exact length is measured with lasers. If the length changes, it could be because gravitational waves are stretching and compressing the arms. Once the detectors feel a gravitational wave, scientists can extract information about the wave's source. In a way, detectors like LIGO are big gravitational wave radios. Radio waves are traveling all around you, but you can't feel them or hear the music they carry. It takes the right kind of detector to extract the music. LIGO detects a gravitational wave signal, which scientists then study for data about the object that generated it. They can derive information, like its mass and the shape of its orbit. We can also hear gravitational waves by playing their signals through speakers, just like the music a radio extracts from radio waves. So those two black holes colliding sounds like this. Scientists call this slide whistle-like noise a chirp, and it's the signature of any two objects orbiting into each other. The black hole collision was just one example of what gravitational waves can tell us. Other high-energy astronomical events will leave gravitational echoes, too. The collapse of a star before it explodes in a supernova, or a very dense neutron stars colliding. Every time we create a new tool to look at space, we discover something we didn't expect, something that might revolutionize our understanding of the universe. LIGO's no different. In the short time it's been on, LIGO's already revealed surprises, like that black holes collide more often than we ever expected. It's impossible to say, but exciting to imagine, what revelations may now be propagating across space towards our tiny blue planet and its new way of perceiving the universe.

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翻译人员: Viviana Hu 校对人员: Chien Yet Chong“我现在真想看到爱因斯坦的脸。” - LIGO联合创始人，林勒·维斯2015 年 9 月 14 日 清晨六时左右，科学家观测到了 一个人类从未看到的现象：两个黑洞相撞。这两个黑洞的质量 均相当于太阳的 30 倍，它们已经围绕对方 旋转了数百万年。它们逐渐靠近，旋转速度也越来越快。最终撞了在一起， 并融合为一个更大的黑洞。就在他们即将相撞之前，它们以光速， 向宇宙发出了振动。而数十亿年后， 在地球上，一个简写为“LIGO”的激光干涉引力波探测器检测到了这次振动。振动信号仅持续了0.2秒，也是 LIGO 首次观测到的引力波。这些宇宙中的涟漪 到底是什么？让我们从引力说起。这种拉近两个物体的力量，在可观测的宇宙中， 无处不在。你正在拉动地球、月球、太阳、 以及宇宙中每颗星星，它们同时也在拉动你。物体的质量越大， 它产生的引力就越大。物体间的距离越大， 引力就越小。假设在宇宙中， 任何物质都对其他物质均有引力，无论这物质多么微小，引力的变化都能告诉我们， 这些物质在做什么。宇宙中传来的引力的波动，就是所谓的引力波。引力波从碰撞点向外扩散，就像水面的涟漪。远离涟漪中心的同时， 强度也会逐步衰减。但是，传递引力波的介质， 是什么呢？当爱因斯坦提出广义相对论时，他将引力比拟为 时空面上的一条曲线。空间中有质量的物体， 让时空产生了弯曲，另一物体穿过弯曲区域时， 便会改变自身原有轨迹，就像被其他物体吸引过去一样。物体的质量越大，时空的弯曲也就越明显， 该物体产生的引力也就越强。当该物体发生运动时， 便在时空中产生了“涟漪”。这些“涟漪”就是引力波。引力波会让人产生什么感觉呢？如果人体足够敏感， 能够感知引力波的话，我们会感觉身体被水平拉伸，同时被竖向挤压。接下来，身体会被竖向拉伸、 并水平挤压；水平拉伸、竖向挤压，再是竖向拉伸、水平挤压。这个过程周而复始，这就是引力波穿过人体的感觉。不过，这个效应十分微弱， 人体根本无法察觉。所以，我们建造了探测器， 以感知引力波。这就是 LIGO 的功能。LIGO 并不是唯一的探测器。全球各地都有引力波探测器。它们呈 L 形， 两侧有很长的臂状结构，臂状结构的准确长度 由激光测量。如果测量值发生变化，很可能就是因为引力波正在 拉伸、挤压这些臂状结构。一旦探测器感知到了引力波，科学家就能够提取 关于引力波来源的信息。某种意义上说，LIGO 这类探测器， 如同一台大型引力波收音机。普通的无线电信号穿梭在我们周围， 但我们却无法感知它们，也听不到它们携带的音乐。我们需要正确的探测器， 才能提取信号中的音乐。科学家借助 LIGO 探测到的引力波信号， 研究产生引力波的物体。他们能够从中提取物体质量、运行轨道等信息。这些信号也可通过扬声器播放， 这样我们就能听到引力波，就像收音机从无线电波中 提取音乐那样。因此，两个黑洞相撞， 听起来是这样的。科学家将这种口哨一样的声音 称作啾声，这是两个物体互相环绕时 发出的标志性的声音。黑洞相撞只是一个例子，引力波还能传达很多信息。其他高能量的天文现象 也会向外传递引力波。比如爆炸成为超新星前 恒星的坍缩，或是高密度中子星的相撞。每当人类发明了探索太空的新工具，我们总能获得意外发现，这些发现或许能彻底改变 我们对宇宙的认知。LIGO 也不例外。即使仅仅被投入使用了很短时间，LIGO 已经为我们带来了惊喜，例如，黑洞相撞的发生 比我们想象得更为频繁。尽管现在还很难确定， 但我们可以很兴奋地想象,还有什么新发现正在跨越宇宙，走向我们这颗小小的蓝色星球， 让我们对宇宙产生新的看法。

**P507 2017-09-11 The strange case of the cyclops sheep - Tien Nguyen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=507)

In the 1950s, a group of ranchers in Idaho were baffled when their sheep gave birth to lambs with a singular deformity. Mystified by these cyclops sheep, they called in scientists from the U.S. Department of Agriculture to investigate. The researchers hypothesized that the pregnant ewes had snacked on poisonous birth defect-causing plants. They collected the local flora and fed samples to lab rats, but struggled to replicate the effect. So they decided to directly observe the sheep with one scientist even living with the herd for three summers. After a decade of trial and error, the scientists finally found the culprit, wild corn lilies. The lilies contained an active molecule with six connected rings that they named cyclopamine in reference to the cyclops sheep. They didn't know exactly how cyclopamine caused the defect but told ranchers to steer clear. It took about four decades before a team of biologists, led by Professor Philip Beachy, stumbled upon the answer. His lab was studying a specific gene found in many species, from mice to humans, called the hedgehog gene. It was named by two scientists, who later shared the Noble Prize for their work, who found that mutating this gene in fruit flies produced pointy spikes like a hedgehog. Beachy and his colleagues performed genetic modifications to turn off the hedgehog genes in mice. This resulted in severe defects in the development of their brains, organs, and eyes or, rather, eye. Then while perusing a textbook, Beachy came across photos of the cyclops sheep and realized what had eluded scientists for four decades. Something must have gone awry involving the hedgehog gene. Let's take a step back. Genes contain instructions that tell cells what to do and when to do it, and they communicate their directives using proteins. The hedgehog gene itself tells cells to release a so-called hedgehog protein, which kicks off a complex series of cellular signals. Here's how it works in normal healthy development. Hedgehog protein latches on to a protein called patched. That inhibits, or holds, patched back, allowing another protein called smoothened to freely signal the cells, telling them where to go and what kind of tissues to become. Cyclopamine, say in the form of a delicious corn lily, interrupts this pathway by binding onto smoothened. That locks smoothened up so that it's unable to send the signals needed to mold the brain into two hemispheres, and form fingers or separate eyes. So even though the hedgehog protein is still doing its job of keeping the way clear for smoothened, cyclopamine blocks smoothened from passing along its chemical message. That settled the science behind the one-eyed sheep, but Beachy and his team caught the glimmer of another more beneficial connection. They noted that uncontrolled activation of the smoothened protein was associated with a human syndrome. It's known as Basal Cell Nevus Syndrome, and it predisposes people to certain cancers. The scientists proposed putting cyclopamine's smoothened binding powers to good use as a treatment for these cancers, as long as the patient wasn't pregnant. Unfortunately, researchers eventually found that cyclopamine causes negative side effects, and its chemical properties make it difficult to work with. But they did discover that closely related molecules are safe and effective, and two of these drugs were approved in 2012 and 2015 as skin cancer medicines. When those farmers first saw the cyclops sheep, they could have chalked it up to a freak genetic mutation and walked away. Instead, their decision to investigate turned a mystery into medicine showing that sometimes there's more than meets the eye.

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翻译人员: Liyu Liu 校对人员: Jenny Yang在上世纪50年代， 爱达荷州的一群牧场工人对新生的畸形小羊而困惑不已。因为对这些独眼羊感到困惑，他们从美国农业部找来科学家进行调查。研究者提出假说，认为怀孕的母羊吃下了有毒的、 会引起出生缺陷的植物。他们采集了当地的植物群， 并将样本喂给实验老鼠，但是难以达到相同的效果。因此他们决定直接观察羊群，一位科学家甚至与羊群一起 住了三个夏天。经过十年的试验和错误之后， 科学家终于找到了使羊群畸形的病因：野生玉米百合。百合含有一个带六个连接环的活性分子，这被称为环杷明， 以独眼畸形羊命名。他们并不清楚 环杷明是如何导致缺陷的，但告诉牧场工人让羊群避开这种植物。一个由Philip Beachy领导的 生物学家团队花了大约四十年蹒跚前行寻找答案。他的实验室正在研究一个从许多物种中都发现的一个特定的基因，从老鼠到人类身上都有，叫做hedgehog gene（刺猬蛋白基因）。两位科学家命名了这一基因， 他们随后获得诺贝尔奖。他们发现，果蝇体内这一变异的基因会产生像刺猬一样的尖刺。Beachy和他的同事通过遗传修饰来关闭老鼠体内的刺猬基因。这会导致大脑、器官、眼睛发展的 严重缺陷，更确切的说，一只眼睛。在研读一本教科书时， Beachy发现了独眼羊的照片，意识到了迷惑科学家们长达四十年的问题。一些涉及刺猬蛋白基因的东西 一定是出错了。让我们退回一步看看。基因会告诉细胞做什么和什么时候做的指令，它们运用蛋白质来交流这些指令。刺猬蛋白基因自身会告诉细胞 释放一种所谓的刺猬蛋白，它会开启一系列复杂的细胞信号。在正常的健康发展状态下， 它是这样工作的。刺猬蛋白锁定在一种叫补丁的蛋白质上。那会抑制，或者阻止补丁，让另一种叫smoothened的蛋白 来自由标记细胞，告诉细胞要去往那里， 要成为哪一种组织。以美味的玉米百合的形式而言，环杷明通过和smoothened的绑定， 来阻断通路。它锁住了smoothened， 因此让其无法传递信号让大脑形成两个半球并形成手指和分开的眼睛。因此，虽然刺猬蛋白仍在工作，帮助smoothened保持通路顺畅，环杷明阻挡了smoothened 通过化学信息传递。这就解答了独眼羊背后的科学问题，但是Beachy和他的团队从另一个更有益的联系中找到了 一线微光。他们指出，smoothened蛋白质 不受控制的激活和一种人类综合症相关。它被称作基底细胞痣综合征，并且它使人们易于患特定的癌症。科学家提出将环杷明smoothened的捆绑功能运用到治疗这些癌症上，只要病人没有怀孕的话。不幸的是，研究者最终发现，环杷明会导致负面的副作用，并且它的化学性质让人们难以把握。但他们确实发现了与之密切相关的分子 是安全有效的，并且其中两种在2012年和2015年的时候 被批准为皮肤癌药物。当那些农民第一次见到独眼羊的时候，他们本可以将其记作怪异的基因突变产物 并走开。相反，他们做出调查的决定 将这一谜团转变为药物，这展示了有时候 有些事实是眼睛看不到的。

**P508 2017-09-18 Why should you read Virginia Woolf - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=508)

What if William Shakespeare had a sister who matched his imagination, his wit, and his way with words? Would she have gone to school and set the stage alight? In her essay "A Room of One's Own," Virginia Woolf argues that this would have been impossible. She concocts a fictional sister who's stuck at home, snatching time to scribble a few pages before she finds herself betrothed and runs away. While her brother finds fame and fortune, she remains abandoned and anonymous. In this thought experiment, Woolf demonstrates the tragedy of genius restricted, and looks back through time for hints of these hidden histories. She wrote, "When one reads of a witch being ducked, of a woman possessed by devils, of a wise woman selling herbs, or even a very remarkable man who had a mother, then I think we're on the track of a lost novelist, a suppressed poet, of some mute and inglorious Jane Austen." "A Room of One's Own" considers a world denied great works of art due to exclusion and inequality. How best can we understand the internal experience of alienation? In both her essays and fiction, Virginia Woolf shapes the slippery nature of subjective experience into words. Her characters frequently lead inner lives that are deeply at odds with their external existence. To help make sense of these disparities, the next time you read Woolf, here are some aspects of her life and work to consider. She was born Adeline Virginia Stephen in 1882 to a large and wealthy family, which enabled her to pursue a life in the arts. The death of her mother in 1895 was followed by that of her half-sister, father, and brother within the next ten years. These losses led to Woolf's first depressive episode and subsequent institutionalization. As a young woman, she purchased a house in the Bloomsbury area of London with her siblings. This brought her into contact with a circle of creatives, including E.M. Forster, Clive Bell, Roger Fry, and Leonard Woolf. These friends became known as the Bloomsbury Group, and Virginia and Leonard married in 1912. The members of this group were prominent figures in Modernism, a cultural movement that sought to push the boundaries of how reality is represented. Key features of Modernist writing include the use of stream of consciousness, interior monologue, distortions in time, and multiple or shifting perspectives. These appear in the work of Ezra Pound, Gertrude Stein, James Joyce, and Woolf herself. While reading Joyce's "Ulysses," Woolf began writing "Mrs. Dalloway." Like "Ulysses," the text takes place over the course of a single day and opens under seemingly mundane circumstances. "Mrs. Dalloway said she would buy the flowers herself." But the novel dives deeply into the characters' traumatic pasts, weaving the inner world of numbed socialite Clarissa Dalloway, with that of the shell-shocked veteran Septimus Warren Smith. Woolf uses interior monologue to contrast the rich world of the mind against her characters' external existences. In her novel "To the Lighthouse," mundane moments, like a dinner party, or losing a necklace trigger psychological revelations in the lives of the Ramsay's, a fictionalized version of Woolf's family growing up. "To the Lighthouse" also contains one of the most famous examples of Woolf's radical representation of time. In the Time Passes section, ten years are distilled into about 20 pages. Here, the lack of human presence in the Ramsays' beach house allows Woolf to reimagine time in flashes and fragments of prose. "The house was left. The house was deserted. It was left like a shell on a sand hill to fill with dry salt grains now that life had left it." In her novel "The Waves," there is little distinction between the narratives of the six main characters. Woolf experiments with collective consciousness, at times collapsing the six voices into one. "It is not one life that I look back upon: I am not one person: I am many people: I do not altogether know who I am, Jinny, Susan, Neville, Rhoda or Louis, or how to distinguish my life from their's." In "The Waves," six become one, but in the gender-bending "Orlando," a single character inhabits multiple identities. The protagonist is a poet who switches between genders and lives for 300 years. With its fluid language and approach to identity, "Orlando" is considered a key text in gender studies. The mind can only fly so far from the body before it returns to the constraints of life. Like many of her characters, Woolf's life ended in tragedy when she drowned herself at the age of 59. Yet, she expressed hope beyond suffering. Through deep thought, Woolf's characters are shown to temporarily transcend their material reality, and in its careful consideration of the complexity of the mind, her work charts the importance of making our inner lives known to each other.

**P508 2017-09-18 Why should you read Virginia Woolf - Iseult Gillespie**

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翻译人员: Chong Liu 校对人员: Irene Xie如果威廉·莎士比亚 有一个与他的想象、风趣以及说话方式都相符 的妹妹，会发生什么呢？她会去学校，然后写出舞台巨著吗？弗吉妮娅·伍尔芙在自己的散文《一间自己的房间》中说： 这本来是不可能发生的。伍尔夫编造了一个 被困在家中的虚构的妹妹，在她发现自己被许配给别人并逃跑之前， 抓紧时间胡乱写了几篇文章。然而她的哥哥靠这些得到了 名气和运气，她却默默无闻被人遗忘。在这个思维实验中，伍尔芙展示了一个 受到禁锢的天才的悲剧，并穿越时光回首那些 隐藏在历史背后的故事。她写道：“当有人读到了： 一个被按入水中的女巫、一个被撒旦操纵的女人、一个在贩售香料的聪慧女人、或是一个拥有母亲 的非常了不起的男人，我想，我们就走上了一条不归路， 一条变成迷茫的小说家、压抑的诗人、无言的、可耻的简·奥斯汀的不归路。”《一间自己的房间》建构了一个世界， 这个世界由于排外和不平等，否认了伟大的文学艺术。我们怎么样才能最好地 理解被孤立的内心体验呢？弗吉妮娅·伍尔芙 在她的散文和小说里，用文字描述出了 这个主观体验的狡猾本质。她笔下的人物时常会有与他们的外在十分不相符的内心世界。为了更好的理解这样的差异， 等你下次阅读伍尔芙的作品时，不妨去考虑一下她的工作与生活。1882年，她出生在 一个庞大而富有的家庭，被取名为 Adeline Virginia Stephen， 从此得以过上与艺术相伴的生活。1895年，她的母亲去世， 在未来的十年里，她同父异母的姐姐，父亲， 和哥哥也相继去世。亲人们的离去导致了伍尔芙 第一次的抑郁症发作，以及随后病情的恶化。年轻时，她曾在伦敦 的布卢姆斯伯里地区和她的兄弟姐妹们 一起买了一套房子。这使她与创作圈产生了联系，包括 E.M. 福斯特，克莱坞∙贝尔，罗格∙弗莱，和莱纳德∙伍尔芙。这些友人被称作 “布卢姆斯伯里文化圈”而闻名于世，并且弗吉妮娅和莱纳德于 1912年结婚。这个圈子里的成员 都是现代主义中的杰出人物，现代主义是一场文化运动， 以求突破如何展示现实世界的界限。现代主义写作的主要特点 包括意识流的运用，内心独白，时间扭曲，以及多重观点和转移观点。这些特点出现在了埃兹拉·庞德、格特鲁德·斯泰因、詹姆斯·乔伊斯以及伍尔芙自己的作品中。在阅读詹姆斯·乔伊斯的《尤利西斯》时， 伍尔芙开始创作《达洛维夫人》。和《尤利西斯》一样，这部作品 描述了发生在一天中的事情，和非常开放的世俗环境。“达洛维夫人说 她想为自己买点儿花。”但这本小说还是融入了 人物令人痛苦的过去，编织了麻木的交际花克拉丽莎·达洛维， 以及患有炮弹休克症的老兵塞普蒂莫斯·沃伦·史密斯 的内心世界。伍尔芙通过运用内心独白， 对比了人物富有的精神世界和其外部存在。在她的小说《到灯塔去》中，世俗的时刻， 比如一场晚宴，或失去项链，触发了拉姆齐一家 生活的心理启示，这就是伍尔芙的家族史 的一个虚构版本。《到灯塔去》也囊括了 伍尔芙激进的时间表达方式中一个最著名的例子。在《时光流逝（Time Passes）》一节中，十年的时光被凝练成了20页的文字。在这里，由于拉姆齐家 的沙滩别墅鲜有人烟，让伍尔夫可以用闪现的片段 和散文诗重新想象时间。“房子被留下了，房子被遗弃了。它像个被留在沙丘上的贝壳， 里面装满了盐粒，现在就连生活也遗弃了它。“在她的作品《海浪》中，对六个主要人物的叙述 几乎没有区别。伍尔夫用集体意识进行实验，有时把六个声音合并为一个。“这不是我回首的一个人生：我不是一个人：我是很多人：我不完全知道我是谁，金妮，苏珊，内维尔，罗达，或路易斯，或者如何区分我的生活和他们的生活？”在《浪潮》中，这六个人成为了一个人， 但是在性别扭曲的《奥兰多》中，一个单一的角色 又分裂成为了不同的人格。主人公是一位在不同性别间切换， 并且生活了 300 年的诗人。《奥兰多》凭借流畅的语言 和身份认同的方式，被认为是性别研究的重要文本。心灵在回到生活的约束之前，只能飞离身体这么远。伍尔芙的生命终结于悲剧中， 就像她创作的许多角色一样，她在 59 岁时投水自尽。然而，她认为希望会超越痛苦。通过深刻的思考，伍尔芙笔下的人物 暂时超越了物质的现实，仔细考虑了心灵的复杂性之后，她的作品描绘了让我们 的内心世界相互了解的重要性。

**P509 2017-09-19 How aspirin was discovered - Krishna Sudhir**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=509)

4,000 years ago, the ancient Sumerians made a surprising discovery. If they scraped the bark off a particular kind of tree and ate it, their pain disappeared. Little did they know that why they'd found was destined to influence the future course of medicine. What the Sumerians had discovered was a precursor to the medicine known today as aspirin. Aspirin's active ingredient is found commonly in willow trees and other wild plants, which is how it came to infuse the medical traditions of Sumer, ancient Egypt, ancient Greece, and other cultures. Around 400 BC, Hippocrates, thought of as the father of modern medicine, first recommended chewing willow bark for pain relief and making willow leaf tea to ease the pain of childbirth. But it took over 2,000 years for us to comprehensively investigate its potential. In the mid-18th century, an Englishman named Edward Stone ran five years of experiments, showing that willow bark crushed into a powder and eaten could cure a fever. It took nearly another 70 years for a German pharmacist, Johann Buchner, to finally identify and purify the substance that made all this possible, a compound called salicin. By then, doctors were routinely using willow bark and other salicin-rich plants, like the herb meadowsweet, to ease pain, fever, and inflammation. But identifying the exact compound suddenly opened up the possibility of manipulating its form. In 1853, a French chemist managed to chemically synthesize the compound, creating a substance called acetylsalicylic acid. Then in 1897, the pharmaceutical company Bayer found a new method and began marketing the compound as a pain reliever called aspirin. This was widely recognized as one of the first synthetic pharmaceutical drugs. Originally, aspirin was just Bayer's brand name: A for acetyl, and spir for meadowsweet, whose botanical name is Spiraea ulmaria. Soon, aspirin became synonymous with acetylsalicylic acid. As its influence grew, aspirin was found to ease not just pain, but also many inflammation-related problems, like rheumatoid arthritis, pericarditis, which enflames the fluid-filled sack around the heart, and Kawasaki disease, where blood vessels become inflamed. Yet, despite aspirin's medical value, at this point, scientists still didn't actually know how it worked. In the 1960s and 70s, Swedish and British scientists changed that. They showed that the drug interrupts the production of certain chemicals called prostaglandins, which control the transmission of pain sensations and inflammation. In 1982, that discovery won the researchers a Nobel Prize in Medicine. Over time, research has also uncovered aspirin's risks. Overconsumption can cause bleeding in the intestines and the brain. It can also trigger Reye's Syndrome, a rare but often fatal illness that affects the brain and liver in children with an infection. And in the late 20th century, aspirin's success had been overshadowed by newer pain killers with fewer side effects, like acetaminophen and ibuprofen. But in the 1980s, further discoveries about aspirin's benefits revived interest in it. In fact, the 1982 Nobel Prize winners also demonstrated that aspirin slows production of thromboxanes, chemicals that cause clumping of platelets, which in turn form blood clots. A landmark clinical trial showed that aspirin reduced heart attack risk by 44% in participants who took the drug. Today, we prescribe it to people at risk of heart attack or stroke because it cuts the likelihood of clots forming in the arteries that supply the heart and brain. Even more intriguingly, there's a growing body of research that suggests aspirin reduces the risk of getting and dying from cancer, especially colorectal cancer. This might be due to aspirin's anti-platelet effects. By reducing platelet activity, aspirin may decrease the levels of a certain protein that helps cancer cells spread. These discoveries have transformed aspirin from a mere pain reliever to a potentially life-saving treatment. Today, we consume about 100 billion aspirin tablets each year, and researchers continue searching for new applications. Already, aspirin's versatility has transformed modern medicine, which is astounding considering its humble beginnings in a scraping of willow bark.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=509)

翻译人员: dottie zhao 校对人员: Lipeng Chen4000年前，古苏美尔人 发现了一个惊人的秘密。如果他们刮下一种特殊的树上的树皮，并吃下它，他们的疼痛就会消失。他们当时并不知道，他们的这个发现会影响未来的医学方向。苏美尔人在那时发现的药物， 就是当今广为人知的阿司匹林的前身。阿司匹林的活性成分 通常出现在柳树上，或者其他野生植物上，因此它被苏美尔人的医学历史所记载，因此它被苏美尔人的医学历史所记载，也包括古埃及、古希腊和其他文化中。公元前四百年左右， 现代医学之父，希波克拉底，第一个提出了 咀嚼柳树皮可缓解疼痛，并制作柳叶茶 以缓解分娩的痛苦。但是我们花了两千多年的时间 研究它的药效。在18世纪中期，一个名叫爱德华·斯通的英国人， 经过五年的实验，结果表明，食用压成粉末状的柳树皮，可以治愈发烧。又花了将近70年， 德国药剂师约翰·毕希纳，最终确定了 这种有药效的物质，是一种叫水杨苷的化合物。那时候，医生可以 使用柳树皮和其他富含水杨苷的植物 像草药或绣线菊属植物来缓解疼痛，发烧和炎症。但确定了这种化合物打开了人们可以改变其形式的大门。1853年，法国化学家开始研究 这个合成化合物，创造了一种物质， 乙酰水杨酸。然后在1897年，制药公司 拜耳发现了一种新方法，并开始营销这个化合物， 这种止痛药被称为阿司匹林。这是被广泛认可的 第一种合成药物。起初，阿司匹林只是 拜耳公司的品牌名称：A是指乙酰基，spir指绣线菊属植物，其植物学名称是 绣线菊属。阿司匹林很快就成了 乙酰水杨酸的代名称。随着其发展，人们发现阿司匹林 不仅可以缓解痛苦，还可以治愈许多炎症，例如，风湿关节炎、心包炎（心脏周围产生的炎症）、川崎病（血管病变产生的炎症）。川崎病（血管病变产生的炎症）。然而，尽管阿司匹林具有医学价值，但在这时，科学家们还没有 依据来证明它是如何治愈这些炎症的。20世纪60年代和70年代，瑞典和 英国科学家改变了这一观点。他们通过中断药物， 发现了这种化学物质，前列腺素，它可以控制 疼痛感和炎症。1982年，这一物质的发现者 获得了诺贝尔医学奖。随着时间的推移，研究也发现了 阿司匹林的风险。过度服用会导致 肠出血和脑出血。它也可以导致雷尔氏综合症，这一种罕见而又致命的疾病， 它影响着大脑和肝脏，尤其是在儿童群体中 更容易受到感染。在二十世纪末期，阿司匹林由新的止痛药所代替，这种新的药物副作用较少，例如，乙酰氨基酚和布洛芬。但在20世纪80年代， 阿司匹林又有了新的进展，它再次复兴。事实上，1982年诺贝尔奖得主 也展示了阿司匹林可以减缓血栓素，这种化学物质会使血小板结块，从而形成血栓。一个重大的临床试验表明， 如果患者服用此药物的话，阿司匹林可以使心脏病发作风险降低44％。今天，我们把用它来帮助患者 降低心脏病发作或中风的危险，因为它可以减少供应心脏和大脑的动脉中凝块的产生。更有趣的是，越来越多的研究表明阿斯匹林可以降低死于癌症的风险，尤其是结肠直肠癌。这可能是由于 阿司匹林抗血小板效应。通过减少血小板活性，阿司匹林 可能会降低某种蛋白质的含量，抑制癌细胞的传播。这些发现已经改变了阿司匹林， 从一个简单的止痛药到一种挽救生命的药物。今天，我们每年会消耗 约1000亿片阿司匹林，研究人员也在继续探索 其新的作用。阿司匹林的药效 已经改变了现代医学，而让人们震惊的是 这种药物的产生，起源于刮树皮。

**P510 2017-09-20 The surprising cause of stomach ulcers - Rusha Modi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=510)

In 1984, an enterprising Australian doctor named Barry Marshall decided to take a risk. Too many of his patients were complaining of severe abdominal pain due to stomach ulcers, which are sores in the lining of the upper intestinal tract. At the time, few effective treatments for ulcers existed, and many sufferers required hospitalization or even surgery. Desperate for answers, Dr. Marshall swallowed a cloudy broth of bacteria collected from the stomach of one of his patients. Soon, Dr. Marshall was experiencing the same abdominal pain, bloating, and vomiting. Ten days later, a camera called an endoscope peered inside his insides. Marshall's stomach was teeming with the same bacteria as his patient. He'd also developed gastritis, or severe inflammation of the stomach, the hallmark precursor of ulcers. Dr. Marshall's idea challenged a misconception that still persists to this day: that ulcers are caused by stress, food, or too much stomach acid. Marshall thought the culprit was bacterial infections. Initially, his idea was considered crazy by the brightest medical minds on the planet. But in 2005, he and Dr. Robin Warren received the ultimate validation when they were awarded the Nobel Prize for medicine. Our stomachs are J-shaped organs with surprisingly intricate ecosystems awash in hormones and chemicals. The stomach is under constant attack by digestive enzymes, bile, proteins, microbes, and the stomach's own acid. In response, it produces bicarbonate, mucus, and phospholipids called prostaglandins to maintain the integrity of its own lining. This delicate balance is constantly regulated and referred to as mucosal defense. Since the mid-1800s, doctors thought stress alone caused most stomach ulcers. Patients were given antidepressants or tranquilizers and told to visit health spas. This belief eventually shifted to the related notion of spicy foods and stress as culprits. Yet no convincing study has ever demonstrated that emotional upset, psychological distress, or spicy food directly causes ulcer disease. By the mid-20th century, it was widely accepted that excess hydrochloric acid prompted the stomach to eat itself. Fervent proponents of this idea were referred to as the acid mafia. The biggest hole in this theory was that antiacids only provide temporary relief. We now know that some rare ulcers are indeed caused by too much hydrochloric acid. But they make up less than 1% of all cases. Dr. Marshall and Dr. Warren pinpointed a spiral-shaped bacteria called Helicobacter pylori, or H. pylori, as the real offender. H. pylori is one of humanity's oldest and most frequent companions, having joined us at least 50,000 years ago, and now found in 50% of people. Previously, we thought the stomach was sterile on account of it being such an acidic, hostile environment. Yet H. pylori survives the acidic turmoil of the stomach with a variety of features that disrupt mucosal defense in its favor. For example, it produces an enzyme called urease that helps protect it from the surrounding gastric acid. H. pylori can make over 1,500 proteins, many of which are dedicated to maximizing its virulence. We still have unanswered questions, like why specific people develop ulcers at particular times. However, we do know individual genetics, other medical problems, use of certain medications, smoking, and the genetic diversity of Helicobacter strains all play a role. In particular, certain pain medications used to reduce inflammation in joints have been discovered to work with H. pylori to create more severe stomach ulcers. Dr. Marshall ended up being fine after his famous, albeit dangerous, experiment. He ingested a course of antibiotics similar to the ones taken now for ulcers. To be treated by simple antibiotics is a modern triumph for a disease that previously needed surgery. Marshall's work also reminded us that scientific progress is not always smooth. But there's value in trusting your proverbial, and sometimes literal, gut.

**P510 2017-09-20 The surprising cause of stomach ulcers - Rusha Modi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=510)

翻译人员: Liyu Liu 校对人员: Qinyang Zeng在1984年，一位雄心勃勃的 澳大利亚医生巴里·马歇尔决定冒个险。他有许多病人抱怨因胃溃疡而产生的腹痛，胃溃疡就是上消化道黏膜的疮口。在当时，有效治疗 溃疡的方法十分有限，许多溃疡患者需要 住院甚至接受手术。因为渴望得到答案，马歇尔医生吞下了 从他的一位病人的胃里收集来的浑浊的细菌液体。很快，马歇尔医生 也经历了同样的腹痛、腹胀和呕吐。十天后，一种叫内窥镜的相机被插入了他的食道。结果发现马歇尔的胃里充满着 和他的病人体内相同的细菌。同时，他也并发了胃炎， 即胃部的严重发炎，这是溃疡的典型前兆。马歇尔医生的想法挑战了一个至今仍然存在的误解：那就是溃疡是由压力、食物或者胃酸过多引起的。马歇尔认为病因是细菌感染。起初，全球最聪明的医疗学者们都认为他的这个想法十分疯狂。但在2005年，他和罗宾·沃伦博士 获诺贝尔医学奖的时候，这一想法最终得到了证实。我们的胃是个J字形的器官， 有着十分复杂生态系统，充满了激素和化学物质。胃一直处在消化酶、胆汁、蛋白质、微生物和胃酸的攻击之下。反过来，胃会产生碳酸氢盐、粘液和被称为前列腺素的磷脂来维持黏膜自身的完整。这一持续性的巧妙平衡被称作黏膜防御。自 19 世纪中叶，医生一直认为 压力是导致大多数胃溃疡的病因。他们会给病人服用 抗抑郁症药或注射镇定剂，让病人去温泉疗养。这一信念最终转变为 将食用辛辣食物和压力作为病因的相关概念。然而没有任何令人信服的 研究证明情绪不安，心理困扰和食用辛辣食物会直接导致溃疡的产生。到20世纪中叶， 人们普遍相信过量的盐酸会刺激胃侵蚀自身。这一观念的热情支持者 被称作“胃酸黑手党”。这一理论的最大破绽是抗酸剂只能暂时缓解症状。我们现在知道一些罕见的溃疡确实是由过多的盐酸导致的。但这在所有病因中只占不到1%。马歇尔医生和沃伦博士准确指出了 一种叫做幽门螺旋杆菌的螺旋形的细菌，或简称H. Pylori， 才是真正的罪魁祸首。幽门螺旋杆菌是人类 最古老、最常见的伙伴之一，至少在五万年前 就已经在我们身边存在了，现在，在一半的人体内 仍然能发现这种细菌。从前，我们认为胃里面是无菌的，因为胃的内部是一个 如此高酸度的恶劣环境。然而，幽门螺旋杆菌能 在胃部的酸性涤荡中存活，具备各种对其自身有利的 黏膜防御破坏性特征。比方说，它会产生一种叫脲酶的酶，来保护其免受周围胃酸的侵袭。幽门螺旋杆菌会制造 超过1500种蛋白质，大多数都致力于将毒力最大化。我们仍有未解答的疑问，比方说为什么特殊的人会 在特定的时间患有溃疡。然而，我们也知道个人遗传学、其他医学问题、使用特定的药物、吸烟以及幽门螺杆菌菌株的遗传多样性 都在其中发挥了作用。特别是一些用来缓解 关节炎症的特定止痛药被发现能协同幽门螺旋杆菌激发更加严重的胃溃疡。这个著名的实验虽然十分危险， 马歇尔医生最终却平安无事。他摄入了一种抗生素， 类似于现在用以治疗溃疡的药物。用简单的抗生素来治疗 过去需要做手术才能治愈的疾病是现代的胜利。马歇尔的工作也提醒我们 科学进步并不总是一帆风顺的。但是，相信你自己的格言是有价值的，或者直白点，相信你自己的肠道 （译注：gut也有勇气的意思）。

**P511 2017-09-21 Is DNA the future of data storage - Leo Bear-McGuinness**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=511)

Let's say there's a disaster that sends humanity back to the Stone Age. Can our knowledge and history survive? The printed page will decompose. Hard drive storage will deteriorate. Even stones will eventually crumble. But we might have something inside us that can outlast these physical limitations: deoxyribonucleic acid. DNA already stores our biological information. From eye color to skin tone, it programs our entire bodies. DNA is made of four organic bases: adenine, guanine, cytosine, and thymine, or A, G, C, and T. The specific sequence of these bases into groups of three, known as codons, gives our cells instructions to make each of the proteins in our bodies. But this code can be used for other things, too, like secret messages. In 1999, scientists in New York created an alphabet in which each of the 64 possible DNA codons substituted for a specific letter, number, or grammar symbol. They spliced a 22-character message into a long strand of DNA and surrounded it with specific genetic markers. They then hid the DNA over a period in a type-written letter with only a small smudge to give the location away. They mailed the letter back to themselves. Then they examined the letter looking for the DNA strand. Once the DNA strand was located, they found the genetic markers. Then, they sequenced the DNA and successfully decoded the message. It soon became obvious that DNA cryptography could code for much more than simple text. By translating the 1's and 0's of binary code into DNA codons, digital data could be programmed into synthetic DNA, then decoded back into its original form. In 2012, UK scientists encoded 739 kilobytes of computer files into DNA strands, including all 154 Shakespeare sonnets and an excerpt from Martin Luther King's "I Have a Dream" speech. And four years later, researchers at Microsoft and the University of Washington broke that record. They used binary coding to capture a whopping 200 megabytes of data, including the Universal Declaration of Human Rights and a high-def OK Go music video, all in strings of DNA. As far as storage capacity goes, DNA stands out because of the surprising amount of information it can hold in so little space. The current theoretical limit of DNA'S storage capacity is so high that you could fit 100 million HD movies on a pencil eraser. It's even conceivable that one day we could fit all of the information currently on the Internet into the space of a shoe box. Also, computers and the magnetic tape and discs that their information is stored on only last for a few decades, at most, before degrading and becoming unreliable. Meanwhile, DNA has a half-life of 500 years, meaning that's how long it takes for half of its bonds to break. And if left in a cold and dark environment, DNA could potentially last for hundreds of thousands of years. And if that isn't long enough, scientists experimented with having synthetic DNA auto-reproduce. After creating their own strands of DNA that spelled out the lyrics to the children's song "It's a Small World," they placed them into the genome of a microbe nicknamed Conan the Bacterium. Conan belongs to a species which can survive in a vacuum, or without water, for six years, or come out unscathed after being exposed to a dose of radiation 1,000 times that which would kill a human. According to the experiment, the bacterium was able to reproduce at least 100 generations without data loss. Theoretically, if the organism had redundant copies of the information that could be used to automatically correct mistakes, the information could stay preserved even longer. So one day, you might be able to create a living, growing, knowledge archive in your own backyard, and its seeds might carry your family's history, a detailed breakdown of the world's political upheavals, or the sum of humanity's knowledge into forests and across continents. Perhaps even into the far reaches of space. Though we might one day disappear, perhaps our legacy can still live on, if anyone would think to find it.

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翻译人员: Jiawen Wei 校对人员: Jiasi Hao“科学与生活无法且不应分割。” ——罗莎琳·富兰克林假如有一天，灾难使得 人类文明倒退回了石器时代。我们的知识和历史能否得以保存？印刷的纸张会分解。电脑硬盘的存储会退化。甚至连石头最终也会碎裂。但是也许我们体内有些东西 能超越这些物理的极限：脱氧核糖核酸 (DNA)。DNA 已经存储了我们的生物信息。从眼球颜色到肤色， 它通过编码构造了我们整个身体。DNA 是由四种碱基组成的：腺嘌呤 (A)、鸟嘌呤 (G)、胞嘧啶 (C)、以及胸腺嘧啶 (T)，或简略地用A、G、C和T表示。这些碱基每三个为一组 形成的序列，称为密码子。这些密码子会指引细胞以形成体内各种蛋白质。但是这种编码也可做他用，比如编写秘密信息。1999 年，纽约科学家 创建了一个字母表，这个字母表包含了 64 种可能的 DNA 密码子，每个密码子都代表 一个特定字母、数字或语法符号。他们根据这个字母表， 将一段 22 个字符的信息转译成一段长的 DNA 链，并且在周围加上特定的基因标记。他们将这段 DNA 隐藏 在一封打印信件的一个句号上，仅仅使用了一个小污渍 来提示这段信息的位置，并将这封信件寄回自己。再次收到信件， 他们检查了这封信件来寻找那段 DNA 链。他们找到了 DNA 链，也找到了基因标记。而后，他们将这段 DNA 排序并且成功地破译了这段信息。很快，科学家发现 DNA 编码不仅限于编译简单的文本：通过将二进制的 1 和 0 翻译成 DNA 密码子，我们可以将数码信息 编译进人工合成的 DNA，然后再将它们解码到原来的形式。2012 年，英国科学家将 739KB 的电脑文件编译入 DNA 链，其中包括莎士比亚所有的十四行诗 (154 首)以及一段节选 摘自马丁·路德·金“我有一个梦想”的演讲。四年之后，来自微软和华盛顿大学的研究者打破了这项纪录。他们将 200MB 由二进制编码译制的数据：包括“世界人权宣言”和一部高清的OK Go乐团的音乐录像，全部编入了 DNA 序列中。随着存储空间的增大，DNA 因其特点 “极小存储空间，惊人信息存量”而越发受到关注。现今 DNA 存储空间的极限，理论上可以达到将 1 亿部高清电影 存储到一块橡皮大小的空间。甚至可以想象有一天， 我们能将所有当今网络上的信息，存入一个鞋盒大小的空间中。而且，那些存储 在电脑，磁带和光碟中的信息在降解且变得不可靠之前， 最多仅仅能维持几十年。与此同时， DNA 的半衰期高达 500 年，这意味着 DNA 要经过 500 年， 其中一半的连接才会断裂。而如果保存在冰冷和阴暗的环境中，DNA 有可能维持几十万年。如果这还不够持久，科学家们还进行了 人工合成 DNA 的自动复制实验。他们合成了自己的 DNA 链，包含了儿童歌曲 “这是一个小小的世界”的歌词信息，并且将这段 DNA 链放入了一个昵称为柯南细菌的 微生物的基因中。柯南细菌是一种能够在真空，或在无水环境中生存六年；或暴露在高于致命辐射剂量 1000 倍的环境中，仍能毫发无损的物种。根据这个实验结果，这个细菌能至少复制 100 代而无任何数据丢失。理论上来说， 如果生物体留有多余的拷贝信息，这些信息能被主动用来 进行自我修复错误，而这段信息 也因此能被保存更长时间。所以有一天， 你也许能在自己的后院“种”一个鲜活的，发展的知识库。它的种子可能将携带你的家族史，世界政治动荡的详解，或是深入丛林，横跨大陆的 人类全部知识，甚至触及宇宙深处。尽管有一天我们会消失， 但或许我们的知识遗产将得以传承，若任何人有意探寻。

**P512 2017-09-30 How did Polynesian wayfinders navigate the Pacific Ocean - Alan Tamay**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=512)

Imagine setting sail from Hawaii in a canoe. Your target is a small island thousands of kilometers away in the middle of the Pacific Ocean. That's a body of water that covers more than 160 million square kilometers, greater than all the landmasses on Earth combined. For thousands of years, Polynesian navigators managed voyages like this without the help of modern navigational aids. Ancient Polynesians used the Sun, Moon, stars, planets, ocean currents, and clouds as guides that allowed them to see the ocean as a series of pathways rather than an obstacle. Their voyages began around 1500 B.C. when the people who would settle Polynesia first set sail from Southeast Asia. Early Polynesians eventually settled a vast area of islands spread over 40 million square kilometers of the Pacific Ocean. Some historians believe the voyagers moved from place to place to avoid overpopulation. Others, that they were driven by war. Voyages became less frequent by around 1300 A.D. as Polynesian societies became more rooted in specific locations. During the voyaging period, successful journeys depended on a number of factors: well-built canoes, the skill of navigators, and weather being some of the biggest. Voyages relied on sturdy wa'a kaulua, or double-hulled canoes, which were powered by sails and steered with a single large oar. Canoe building involved the whole community, bringing together the navigators, canoe builders, priests, chanters, and hula dancers. Navigators were keen observers of the natural world. They were abundantly familiar with trade wind-generated ocean swells, which typically flow northeast or southeast. By day, navigators could identify direction by the rocking motion of their canoes caused by these swells. But sunrise and sunset were even more useful. The Sun's position indicated east and west and created low light on the ocean that made it possible to see swells directly. At night, navigators used something called a star compass, which wasn't a physical object, but rather a sort of mental map. They memorized the rising and setting points of stars and constellations at different times of the year. They used those to divide the sky into four quadrants, subdivided into 32 houses, with the canoe in the middle. So, for example, when they saw the star Pira‘atea rising from the ocean, they knew that to be northeast. They had some other tricks, too. The Earth's axis points towards Hokupa'a, or the North Star, so called because it's the one fixed point in the sky as the Earth rotates and always indicates north. However, it's not visible south of the Equator, so navigators there could use a constellation called Newe, or the Southern Cross, and some mental tricks to estimate where south is. For instance, draw a line through these two stars, extend it 4.5 times, and draw another line from there to the horizon. That's south. But the sky also contains navigational aids much closer to Earth, the clouds. Besides being useful weather cues, under the right conditions, they can indicate landmasses. For instance, the lagoons of Pacific atolls can actually be seen reflected on the underside of clouds, if you know what to look for. And high masses of clouds can indicate mountainous islands. Once navigators neared their destination, other clues, such as the flight patterns of birds, floating debris or vegetation, and types of fish in the area helped determine the proximity of land. For example, the Manu-O-Ku had a known flight range of 190 kilometers, and could be followed back to shore. So how do we know all of this? Partially through evidence in petroglyphs, written observations of European explorers, and Polynesian oral traditions. But also by trying them out for ourselves. In 2017, a voyaging canoe called Hokulea completed a worldwide voyage using only these techniques. If that seems remarkable, remember the ancient Polynesians, who through close study and kinship with nature, were able to forge these paths across an unfathomably vast, vibrant living ocean.

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翻译人员: Chien Yet Chong 校对人员: Sylvia He想象一下， 你乘着独木舟从夏威夷向几千公里外，坐落于太平洋中央的一个小岛出发。太平洋的面积超过 1 亿 6 百万平方公里，比地球所有陆地面积的总和还要大。几千年来，波利尼西亚航海者 没有现代的航海仪器，也能成功完成这样的航行。远古的波利尼西亚人使用太阳，月亮，星星，行星，洋流和云来导航，他们把海洋 视为一系列的路径，而不是障碍。公元前 1500 年左右，最早前往波利尼西亚群岛 定居的人从东南亚启航。早期的波利尼西亚人分散地安顿在超过 4 千万平方公里的太平洋海域。有些历史学家相信 那些航海者通过不断迁徙来避免人口过度拥挤。另一些则认为他们是 因战争而被迫迁徙。航行的规模到了 公元 1300 年左右逐渐缩小，因为波利尼西亚社会 逐渐在一些地方扎根。航海盛行时期，一次成功的航行背后 最重要的因素包括：坚固的独木舟、航海者的技术、和往往起主要作用的天气。航行依靠坚固 的 wa'akaulua 船，也叫双体船，靠船帆驱动，和一条大船桨掌舵。整个社区都参与了独木舟的制造，把航海员、船匠、祭司、歌手、和草裙舞员联系在一起。航海者精于观察自然界。他们很熟悉信风导致的，通常流向东北或东南方的海浪。白天，航海者可以通过船只的摇晃辨认海浪的方向。但是日出和日落更有用。太阳的方向标明东和西，日出日落时的微光让他们能直接地观察涌浪。晚上，航海者使用一种 叫“星象罗盘”的东西。这不是一种实体， 更像一种概念图像。他们牢记恒星和星座 一年内不同时期升起和落下的位置。使用这些位置， 他们把天空分成四个象限，每个象限再细分为三十二个星宿，而独木舟则位于中央。举个例子，当他们看到 Pira'atea 星从海洋升起，他们就知道那是东北方。此外他们还有其它诀窍。地球的轴指向 Hokupa'a 星， 也就是北极星，它因其位置在地球自转时不变而得名，而且永远指向北方。然而，它在赤道之南是看不到的，所以在南半球， 航海者使用 Newe 星座，也叫南方十字座，或者运用一些诀窍来辨认南方。比如，在这两颗星之间画一条线，把这条线伸长 4.5 倍，再从那儿往天际线画一条直线。那就是南方。不过天空中也有其它 更靠近地面的的导航物，云朵。除了能用于预测天气，理想的情况下， 云朵也能显示陆地的存在。比如，太平洋环礁的泻湖会倒影在云朵的下层，你懂得观察就能看见。大量的云朵也可显示 高山岛屿的存在。当航海者靠近目的地时，其它线索，比如鸟儿的飞行模式，海上漂浮物和浮游植物，同地区特有的鱼种 也能帮助推断陆地的距离。例如，Manu-O-Ku（白玄欧） 的飞行范围是 190 公里，航海者可跟随它们归岸。我们是怎么知道这一切的？部分通过岩石雕刻，欧洲探险家写下的观察报告，以及波利尼西亚的口述传统。此外，我们也曾亲自试验。2017 年，一艘名为 Hokulea 的航海独木舟，在只使用这些技术下成功环绕地球。如果这令你惊叹， 要记得跟大自然有亲密关系，通过仔细观察，在深湛宽广，生气盎然的泱泱大洋上开拓海上路径 的古波利尼西亚人。

**P513 2017-10-04 The first asteroid ever discovered - Carrie Nugent**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=513)

On the night of January 1, 1801, Giuseppe Piazzi, a priest in Palermo, Italy, was mapping the stars in the sky. Over three nights, he'd look at and draw the same set of stars, carefully measuring their relative positions. That night, he measured the stars. The next night, he measured them again. To his surprise, one had moved. The third night, the peculiar star had moved again. This meant it couldn't be a star at all. It was something new, the first asteroid ever discovered, which Piazzi eventually named Ceres. Asteroids are bits of rock and metal that orbit the Sun. At over 900 kilometers across, Ceres is a very large asteroid. But through a telescope, like Piazzi's, Ceres looked like a pinpoint of light similar to a star. In fact, the word asteroid means star-like. You can tell the difference between stars and asteroids by the way they move across the sky. Of course, Piazzi knew none of that at the time, just that he had discovered something new. To learn about Ceres, Piazzi needed to track its motion across the sky and then calculate its orbit around the Sun. So each clear night, Piazzi trained his telescope to the heavens. Night after night, he made careful measurements until finally, he couldn't. The Sun got in the way. When Piazzi first spotted Ceres, it was here, and the Earth was here. As he tracked it each night, the Earth and Ceres moved like this until Ceres was here. And that meant that Ceres was only in the sky when it was daytime on Earth. During the day, bright sunlight made this small asteroid impossible to see. Astronomers needed to calculate Ceres's orbit. This would let them predict where it was going to be in the vast night sky on any given night. But the calculations were grueling and the results imprecise. Many astronomers searched for Ceres, but not knowing exactly where to look, no one could find it. Luckily, a hardworking mathematician named Carl Friedrich Gauss heard about the lost asteroid. He thought it was an exciting puzzle and went to work. When he realized he didn't have the mathematical methods he needed, he invented new ones that we still use today. He derived a new orbit and new predictions of where to look for Ceres. Hungarian astronomer Baron Franz Xaver von Zach searched for Ceres with Gauss's predictions. After weeks of frustrating clouds, von Zach finally had clear skies on December 31, 1801. He looked through his telescope and finally saw Ceres. We haven't lost track of it since. Today, we've discovered hundreds of thousands of asteroids. Many, including Ceres, orbit the Sun between Mars and Jupiter, while near-Earth asteroids orbit the Sun relatively close to Earth. When we recorded this narration, astronomers had discovered 16,407 near-Earth asteroids, but since we find new asteroids all the time, that number will have grown by hundreds or thousands by the time you watch this. Today, asteroid hunters use modern telescopes, including one in space. Computers analyze the images, and humans check the output before reporting the asteroid observations to an archiving center. Each discovered asteroid has its unique orbit measured. An orbit lets astronomers predict where asteroids are going to be at any given time. Most asteroid trajectories can be predicted for about 80 years though we can calculate where the best studied asteroids will be every day between now and 800 years into the future. We must keep searching for asteroids in case there's one out there on a collision course with Earth. Astronomers don't only search for asteroids, though. They also study them to learn how they formed, what they're made of, and what they can tell us about our solar system. Today, we can do something that Piazzi could only dream of: send spacecraft to study asteroids up close. One spacecraft called Dawn journeyed billions of kilometers over four years to the main asteroid belt. There, it visited Ceres and another asteroid, Vesta. Dawn's stunning images transformed Piazzi's dot of light into a spectacular landscape of craters, landslides, and mountains.

**P513 2017-10-04 The first asteroid ever discovered - Carrie Nugent**

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翻译人员: Nika Wang 校对人员: Jenny Yang1801年1月1日的夜晚，意大利巴勒莫市 的神父朱塞普·皮亚齐正在记录天空中的繁星。连续三个夜晚，他把观察到 的同一个星群画在纸上，并仔细测量它们的相对位置。第一晚，他做了一次测量。第二晚，他又测了一次。令他惊讶的是，有颗星移动了。第三晚，那颗奇异的星又移动了。也就是说那不会是颗恒星。这是第一颗被人发现的小行星，皮亚齐将它命名为谷神星（Ceres）。小行星是环绕太阳的岩石与金属。谷神星直径超过900公里， 可说是巨型小行星。但从望远镜看去，正如皮亚齐所见，谷神星只是一个小亮点， 和其他恒星一样。其实，asteriod (小行星) 这个词的意思就是“如恒星般”。从星体在空中移动的方式就可以分辨出恒星和小行星。当然，皮亚齐当时并不知道这些。他只晓得自己有了个新发现。要了解谷神星，皮亚齐需要记录它在空中移动的位置，然后计算出其环绕太阳的轨道。所以，在每个月朗星稀的夜晚， 皮亚齐都会用望远镜观察星空。每一晚，他都会仔细测量，直到有一天他再也无法计算。因为太阴阻挠了他的观察。皮亚齐首次发现谷神星时 它就在这里，地球在这边。随着每晚的记录， 地球和谷神星会这样移动，直到谷神星移到了这里。这表示，谷神星只有在白天才会出现。但明亮的阳光 让人很难看见这颗小行星。天文学家需要计算谷神星的轨道，以预测谷神星每个夜晚的运行路线。但计算轨道十分劳神，结果也并不准确。许多天文学家都在寻找谷神星，但却不晓得该从何处找， 所以没人能找到。幸好，一名叫高斯的勤奋数学家听说了此事。他想解开这有趣的谜题。当他发现自己没有所需的数学方法时，他发明了一个新的方法，沿用至今。他推演出一套新方法 来测定谷神星的轨道。匈牙利天文学家 弗朗茲·冯·扎克男爵用高斯的轨道测定法来寻找谷神星。熬过几周乌云密布的夜晚后，在1801年12月31日晴朗的夜空中，他终于从望远镜中看见谷神星了。自那之后，谷神星的踪迹 便一直在我们的掌握中。如今，我们已经发现了 数十万颗小行星。包括谷神星在内的许多小行星 都在火星和木星间绕着太阳转，近地小行星环绕太阳 的轨道也离地球更近。录制这段旁白的时候，天文学家已发现了 16407颗近地小行星，由于新的小行星不断被发现，在你观看这段视频的时候，这个数字可能已经多出了几百，甚至几千。今天，寻找小行星的人 使用现代望远镜，其中包括空间望远镜。这些影像由电脑分析，通过人工检查结果，最后再将小行星的观察报告 送至归档中心。针对每颗被发现的小行星， 我们都有独特的方法来测量其轨道。该轨道可让科学家预测小行星在任何时间的走向。大多数测定的小行星轨道 准确度可以持续80年，但对于那些详尽研究的小行星，我们甚至可计算其未来 800年的每日运行轨道。虽然如此，我们还是要不断寻找新的小行星， 以免它们撞上地球。天文学家要做的不止如此。他们也要研究小行星， 了解它们如何形成，由什么元素构成，以及它们和太阳系的关系。今天，我们能做到 皮亚齐无法完成的事：把宇航飞船送到太空 近距离观察小行星。一艘名为“黎明号”的宇航船 飞了几十亿公里，用四年多的时间进入小行星带。它在那里观察了谷神星 和另一颗小行星，灶神星。黎明号拍出的动人照片 将皮亚齐当时看见的光点放大为令人惊艳的陨石坑，滑坡和山峦。

**P514 2017-10-09 What in the world is topological quantum matter - Fan Zhang**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=514)

What if electricity could travel forever without being diminished? What if a computer could run exponentially faster with perfect accuracy? What technology could those abilities build? We may be able to find out thanks to the work of the three scientists who won the Nobel Prize in Physics in 2016. David Thouless, Duncan Haldane, and Michael Kosterlitz won the award for discovering that even microscopic matter at the smallest scale can exhibit macroscopic properties and phases that are topological. But what does that mean? First of all, topology is a branch of mathematics that focuses on fundamental properties of objects. Topological properties don't change when an object is gradually stretched or bent. The object has to be torn or attached in new places. A donut and a coffee cup look the same to a topologist because they both have one hole. You could reshape a donut into a coffee cup and it would still have just one. That topological property is stable. On the other hand, a pretzel has three holes. There are no smooth incremental changes that will turn a donut into a pretzel. You'd have to tear two new holes. For a long time, it wasn't clear whether topology was useful for describing the behaviors of subatomic particles. That's because particles, like electrons and photons, are subject to the strange laws of quantum physics, which involve a great deal of uncertainty that we don't see at the scale of coffee cups. But the Nobel Laureates discovered that topological properties do exist at the quantum level. And that discovery may revolutionize materials science, electronic engineering, and computer science. That's because these properties lend surprising stability and remarkable characteristics to some exotic phases of matter in the delicate quantum world. One example is called a topological insulator. Imagine a film of electrons. If a strong enough magnetic field passes through them, each electron will start traveling in a circle, which is called a closed orbit. Because the electrons are stuck in these loops, they're not conducting electricity. But at the edge of the material, the orbits become open, connected, and they all point in the same direction. So electrons can jump from one orbit to the next and travel all the way around the edge. This means that the material conducts electricity around the edge but not in the middle. Here's where topology comes in. This conductivity isn't affected by small changes in the material, like impurities or imperfections. That's just like how the hole in the coffee cup isn't changed by stretching it out. The edge of such a topological insulator has perfect electron transport: no electrons travel backward, no energy is lost as heat, and the number of conducting pathways can even be controlled. The electronics of the future could be built to use this perfectly efficient electron highway. The topological properties of subatomic particles could also transform quantum computing. Quantum computers take advantage of the fact that subatomic particles can be in different states at the same time to store information in something called qubits. These qubits can solve problems exponentially faster than classical digital computers. The problem is that this data is so delicate that interaction with the environment can destroy it. But in some exotic topological phases, the subatomic particles can become protected. In other words, the qubits formed by them can't be changed by small or local disturbances. These topological qubits would be more stable, leading to more accurate computation and a better quantum computer. Topology was originally studied as a branch of purely abstract mathematics. Thanks to the pioneering work of Thouless, Haldane, and Kosterlitz, we now know it can be used to understand the riddles of nature and to revolutionize the future of technologies.

**P514 2017-10-09 What in the world is topological quantum matter - Fan Zhang**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=514)

翻译人员: Chong Liu 校对人员: Alicia Cai如果电流可以一直毫无损耗地 流动会怎么样呢？如果电脑的运行速度可以指数增长 并保持准确无误会怎么样呢？什么样的科技才能使上述想象成真呢？也许我们可以找出一个方法， 为此我们要感谢获得2016年诺贝尔奖的三位科学家，David Thouless，Duncan Haldane 和 Michael Kosterlitz，他们三位发现即使是最小尺度的微观物质也可以展现拓扑 的宏观性质和各种相态。但这是什么意思呢？首先，拓扑学是数学的一个分支，它关注物体的基本属性。当物体逐渐伸展或弯曲时， 它的拓扑性质不会改变。物体必须被撕裂或附着在新的地方。在拓扑学家看来，一个甜甜圈 和一只咖啡杯是毫无差别的，因为它们都有一个洞。你可以把一个甜甜圈 重塑为一只咖啡杯，它仍旧只会有一个洞。这种拓扑学属性是稳定的。从另一个方面讲， 一个蝴蝶脆饼有三个洞。没有平稳的、不断增加的改变可以 使一个甜甜圈变成一个蝴蝶脆饼。你必须撕出两个新口子才行。在很长一段时间里， 人们并不清楚拓扑学能否用于描述亚原子粒子的行为。这是因为粒子，比如电子和光子遵循奇怪的量子物理法则，其中包含了很多不确定的因素，在咖啡杯的层面我们根本观察不到。但这三位诺贝尔奖得主发现，拓扑学的属性是存在于 量子水平上的。这个发现也许可以 在材料科学，电子工程学还有计算机科学中引发革命。这是因为这些属性 在微妙的量子世界里为物质的一些奇异相态提供了惊人的稳定性 和显著的特征。举一个“拓扑绝缘体”的例子。想像一个电子薄膜。如果有一个足够强 的电磁场从中穿过，每一个电子就会开始 进行圆周性的运动，这一轨迹叫做近轨。因为这些电子都被困在这些环里，它们没有办法产生电。但在材料的边缘，这些轨道变得开放、互联， 并且有着相同的指向。这时，电子就可以 从一个环跳到下一个环上，在这块材料的边缘移动。这就意味着电子只能 在材料的边缘导电，而不能在材料的中间部分导电。在这里，拓扑学可以发挥作用了。这块材料的传导性并没有 被材料中细小的变化所影响，比如杂质，或者缺陷。它们就像咖啡杯的那个洞一样，不会因为形变而产生变化。在这样一块拓扑绝缘体的边缘 产生了完美的电子运动，没有电子回流，没有能量以热量的形式损耗，就连传导途径的数量都是可控的。未来的电子技术元件可以用这个高效的电子高速路建成。亚原子粒子的拓扑学属性也可以为量子计算带来革命。量子计算机利用亚原子粒子可以同时处于不同状态这一事实，将信息存储在量子位上。这些量子位与传统数码电脑相比，解决问题的速度可以呈指数增长。但问题是，这些数据实在是太脆弱，环境中轻微的干扰就会损坏它们。但在某些特定的拓扑学相态中，亚原子粒子可以呈现出 一种被保护的状态。换句话说，这些由它们组成的量子位，不会因那些内部 的微小干扰而产生变化。这些拓扑学量子位将更加稳定，从而产生更精确的计算 和更好的量子计算机。拓扑学起初是作为 纯抽象数学的分支来研究的。由于Thouless，Haldane 和 Kosterlitz 所做的先驱工作，我们现在知道了，拓扑学 可以帮助我们理解自然的奥秘，并且催生未来科技的巨变。

**P515 2017-10-09 Why is it so hard to cure cancer - Kyuson Yun**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=515)

Why is it so difficult to cure cancer? We've harnessed electricity, sequenced the human genome, and eradicated small pox. But after billions of dollars in research, we haven't found a solution for a disease that affects more than 14 million people and their families at any given time. Cancer arises as normal cells accumulate mutations. Most of the time, cells can detect mutations or DNA damage and either fix them or self destruct. However, some mutations allow cancerous cells to grow unchecked and invade nearby tissues, or even metastasize to distant organs. Cancers become almost incurable once they metastasize. And cancer is incredibly complex. It's not just one disease. There are more than 100 different types and we don't have a magic bullet that can cure all of them. For most cancers, treatments usually include a combination of surgery to remove tumors and radiation and chemotherapy to kill any cancerous cells left behind. Hormone therapies, immunotherapy, and targeted treatments tailored for a specific type of cancer are sometimes used, too. In many cases, these treatments are effective and the patient becomes cancer-free. But they're very far from 100% effective 100% of the time. So what would we have to do to find cures for all the different forms of cancer? We're beginning to understand a few of the problems scientists would have to solve. First of all, we need new, better ways of studying cancer. Most cancer treatments are developed using cell lines grown in labs from cultures of human tumors. These cultured cells have given us critical insights about cancer genetics and biology, but they lack much of the complexity of a tumor in an actual living organism. It's frequently the case that new drugs, which work on these lab-grown cells, will fail in clinical trials with real patients. One of the complexities of aggressive tumors is that they can have multiple populations of slightly different cancerous cells. Over time, distinct genetic mutations accumulate in cells in different parts of the tumor, giving rise to unique subclones. For example, aggressive brain tumors called glioblastomas can have as many as six different subclones in a single patient. This is called clonal heterogeneity, and it makes treatment difficult because a drug that works on one subclone may have no effect on another. Here's another challenge. A tumor is a dynamic interconnected ecosystem where cancer cells constantly communicate with each other and with healthy cells nearby. They can induce normal cells to form blood vessels that feed the tumor and remove waste products. They can also interact with the immune system to actually suppress its function, keeping it from recognizing or destroying the cancer. If we could learn how to shut down these lines of communication, we'd have a better shot at vanquishing a tumor permanently. Additionally, mounting evidence suggests we'll need to figure out how to eradicate cancer stem cells. These are rare but seem to have special properties that make them resistant to chemotherapy and radiation. In theory, even if the rest of the tumor shrinks beyond detection during treatment, a single residual cancer stem cell could seed the growth of a new tumor. Figuring out how to target these stubborn cells might help prevent cancers from coming back. Even if we solved those problems, we might face new ones. Cancer cells are masters of adaptation, adjusting their molecular and cellular characteristics to survive under stress. When they're bombarded by radiation or chemotherapy, some cancer cells can effectively switch on protective shields against whatever's attacking them by changing their gene expression. Malignant cancers are complex systems that constantly evolve and adapt. To defeat them, we need to find experimental systems that match their complexity, and monitoring and treatment options that can adjust as the cancer changes. But the good news is we're making progress. Even with all we don't know, the average mortality rate for most kinds of cancer has dropped significantly since the 1970s and is still falling. We're learning more every day, and each new piece of information gives us one more tool to add to our arsenal.

**P515 2017-10-09 Why is it so hard to cure cancer - Kyuson Yun**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=515)

翻译人员: Tianyu Qiao 校对人员: Jack Zhang为什么治愈癌症如此困难？我们已经成功开发了电力，给人类基因组进行了排序，成功根治了水痘。但是在科学研究上 花费了数十亿美元后，我们还是没办法治愈一种 影响着超过 1400 万人和家庭的疾病。癌症的病因是正常细胞的变异增多。大多数时候，细胞可以检测到 变异或 DNA 受损，然后进行修复或者自我毁灭。然而，有些变异会让 癌变的细胞悄悄增长，然后侵入附近的组织，或者转移到其它的器官。癌变细胞一旦转移 就无法医治而且癌症非常复杂，它并不是单一的疾病。癌症有 100 多个种类，我们还没有一个能治愈 所有癌症的万能药。就大多数癌症来讲，治疗方式通常包括 动手术切除肿瘤，和做放射及化疗来除掉 剩余的癌细胞。激素疗法，免疫治疗，和针对某种癌症的定制疗法有时候也会被采用。很多情况下，这些治疗方式很有效，病人可以被治愈。但是这些疗法绝不算是 百分百的成功。那我们该怎样找到 治愈不同种癌症的解决方案呢?目前我们已经开始明白科学家们该向哪些方向努力了。首先，我们需要更新和更好 的研究癌症的方法。大多数癌症治疗法都是使用 实验室培育的细胞研发出来的，这些细胞来自人类的肿瘤体。这些实验室培育的细胞 对于我们理解癌症基因和生物机理来说非常关键，但这种细胞缺失了活体内 肿瘤所含有的复杂性。通常，新研发出的药 在实验室细胞上药效不错，但是试用在真正 的病人身上却没效果。活跃肿瘤的其中一个复杂性在于，即使有些癌细胞间的区别很小， 它们也可以产生出多个群体。时间一长，不同的基因变异 在细胞内积累起来，出现在肿瘤的不同部位， 产生独特的亚克隆体。比如，活跃的脑瘤 被称为胶质母细胞瘤，在一个母体中可以有 多达 6 个不同的亚克隆体，这种现象叫做克隆异质性。此特性让治疗变得很困难， 能治一种亚克隆体的药可能对另一种完全无效。我们还面临着一个挑战。肿瘤是活跃的相互联系的生态系统，癌细胞们一直在互相交流，也和附近健康的细胞保持着联系。它们促使正常的细胞 形成为癌细胞供应养分和清理废物的血管。它们也可以和免疫系统互动，从而影响系统的正常运作，让其无法识别和摧毁癌变部位。如果我们能研究出如何制止 这些互动和交流，就有可能永久地消灭癌变。另外，越来越多的证据显示，我们需要研究出 消除癌症干细胞的方法。干细胞不常见， 但是它们的特质是对化疗和放射疗法有抵抗性。理论上来讲，即使大多数肿瘤 在治疗期间收缩到无法被识别，一小点剩余的癌细胞 也有可能长成新肿瘤。找到攻克这些倔强细胞的方法也许可以帮助防止癌细胞的复发。即使我们解决了这些问题， 也可能面临新的问题。癌细胞的适应性非常强，在苛刻的环境下也能通过调整 它们的分子和细胞特征生存下来。当它们被放疗和化疗攻击的时候，有些癌细胞可以 有效转换到自卫模式，改变它们的基因特征， 抵抗向它们发起进攻的因素。恶性癌症有着复杂的系统， 适应性强，变化多端。要想攻克恶性癌症，我们需要找到 和它们有相似复杂性的系统来进行实验，并随着癌细胞的变化 随时调整治疗方案。值得欣慰的是， 我已经取得了进步。即使我们目前对癌症 的了解还不够多，大多数种类癌症的平均致死率已经从 1970 年代开始 大幅度持续降低。我们每天都有新的研究成果，每一点科研的新进展都使 我们抗击癌症的军火库更加壮大。

**P516 2017-10-18 Why should you read Virgil's 'Aeneid' - Mark Robinson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=516)

In 19 B.C., the Roman poet Virgil was traveling from Greece to Rome with the emperor Augustus. On the way, he stopped to go sightseeing in Megara, a town in Greece. Out in the sun for too long, he suffered heatstroke and died on his journey back to Italy. On his deathbed, Virgil thought about the manuscript he had been working on for over ten years, an epic poem that he called the "Aeneid." Unsatisfied with the final edit, he asked his friends to burn it, but they refused, and soon after Virgil's death, Augustus ordered it to be published. Why was Augustus so interested in saving Virgil's poem? The Romans had little tradition of writing serious literature and Virgil wanted to create a poem to rival the "Iliad" and "Odyssey" of Ancient Greece. The "Aeneid," a 9,896 line poem, spans twelve separate sections, or books, the first six of which mirror the structure of the "Odyssey" and the last six echo the "Iliad." Also like the Greek epics, The "Aeneid" is written entirely in dactylic hexameter. In this meter, each line has six syllable groups called feet made up of dactyls which go long, short, short, and spondees which go long, long. So the famous opening line in the original Latin starts, "Arma Virvmqve Cano," which can be translated as "I sing of arms and the man," arms, meaning battles and warfare, another "Iliad" reference, and the man being the hero Aeneas. To understand the "Aeneid," it's necessary to examine the unsettled nature of Roman politics in the second half of the 1st century B.C. In 49 B.C., Julius Caesar, Augustus's great uncle, triggered nearly 20 years of civil war when he led his army against the Roman Republic. After introducing a dictatorship, he was assassinated. Only after Augustus's victory over Marc Antony and Cleopatra in 31 B.C. did peace return to Rome and Augustus became the emperor. Virgil aimed to capture this sense of a new era and of the great sacrifices that the Romans had endured. He wanted to give the Romans a fresh sense of their origins, their past, and their potential. By connecting the founding of Rome to the mythological stories that his audience knew so well, Virgil was able to link his hero Aeneas to the character of Augustus. In the epic poem, Aeneas is on a quest to establish a new home for his people. This duty, or pietas as the Romans called it, faces all kinds of obstacles. Aeneas risks destruction in the ruins of Troy, agonizes over love when he meets the beautiful Queen of Carthage, Dido, and in one of the most vivid passages in all of ancient literature, has to pass through the underworld. On top of all that, he must then fight to win a homeland for his people around the future sight of Rome. Virgil presents Aeneas as a sort of model for Augustus, and that's probably one of the reasons the emperor was so eager to save the poem from destruction. But Virgil didn't stop there. In some sections, Aeneas even has visions of Rome's future and of Augustus himself. Virgil presents Augustus as a victor, entering Rome in triumph and shows him expanding the Roman Empire. Perhaps most importantly, he's hailed as only the third Roman leader in 700 years to shut the doors of the Temple of Janus signifying the arrival of permanent peace. But there's a twist. Virgil only read Augustus three selected extracts of the story and that was Augustus's entire exposure to it. Some of the other sections could be seen as critical, if not subtly subversive about the emperor's achievements. Aeneas, again a model for Augustus, struggles with his duty and often seems a reluctant hero. He doesn't always live up to the behavior expected of a good Roman leader. He struggles to balance mercy and justice. By the end, the reader is left wondering about the future of Rome and the new government of Augustus. Perhaps in wanting the story published, Augustus had been fooled by his own desire for self-promotion. As a result, Virgil's story has survived to ask questions about the nature of power and authority ever since.

**P516 2017-10-18 Why should you read Virgil's 'Aeneid' - Mark Robinson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=516)

翻译人员: Wang Jianyu 校对人员: Sylvia He公元前 19 年，古罗马诗人 维吉尔跟随奥古斯都大帝从希腊出游回到罗马。半路上，他停下来观赏 希腊小镇迈加拉的风景。因站在阳光下太久，他中了暑，在回意大利的路上不幸去世。临死时，维吉尔回想到过去十年 一直在撰写的书稿，一部他称为《埃涅伊德》的史诗。由于对终稿不满意， 他请求朋友们烧掉这本书，但他们拒绝了，维吉尔去世后不久， 奥古斯都下令出版这部史诗。为什么奥古斯对拯救 维吉尔这部史诗有如此大的兴趣？古罗马人没有创作严肃文学的传统，而维吉尔想要创作一部能与古希腊史诗《伊利亚特》 和《奥德赛》抗衡的史诗。《埃涅伊德》是一部有 9896 行， 分为 12 个独立章节 （或书）的长诗，前六章模仿了《奥德赛》的结构，后六章则与《伊利亚特》相呼应。《埃涅伊德》同希腊的史诗一样，完全是按照六音步长短短格写成的。按照这个韵律，每一行都有 六个音节小组，称为韵脚，由长短短格构成，长-短-短，长长格就是长-长。所以拉丁文源语开场白是"Arma Virvmqve Cano,"可以翻译成：我赞扬战争和男人，arms 是战争的意思， 这也是参照《伊利亚特》的写法，这个男人指的是 特洛伊战争中的勇士埃涅阿斯。要理解《埃涅伊德》这部史诗，有必要研究一下公元前 1 世纪后半叶罗马政治不稳定的特点。公元前 49 年，尤利乌斯•凯撒， 也就是伟大的奥古斯都的舅爷，发起了长达 20 年的内战，亲自带军进攻罗马共和国。成为又一个独裁者之后，他被刺杀。公元前 31 年，在奥古斯都打败 马克·安东尼和克利欧佩特拉后，罗马才又迎来了和平。奥古斯都成为了大帝。维吉尔想要抓住新时代以及罗马人民的伟大牺牲这个灵感。他想要带给予罗马人有关 他们的起源，过去和潜能的一个全新的诠释。维吉尔通过 将罗马帝国的形成过程和他的读者早已熟知的传说联系起来，能够把他的英雄埃涅阿斯 和奥古斯都的性格联系到一起。在这部史诗中，埃涅阿斯 一直为人民寻求建立一个新的家园。然而这个责任， 或是罗马人所谓的 piatas ，面临着各种困难。阿涅阿斯在特洛伊的废墟面临危险，在迦太基美丽的女王那里 面对不能爱的痛苦。所有的古代文学里 最生动形象的一个章节中提到，他还不得不通过地狱。最后，他必须为他的子民战斗，在日后成为罗马的土地上 建立一个家园。维吉尔这样描写埃涅阿斯， 是为了给奥古斯都设立榜样，这可能也是奥古斯都大帝 如此迫切地防止这部史诗被销毁的原因之一。但是维吉尔并没有就此停止。在一些章节中，埃涅阿斯还提到了 对罗马的未来以及对奥古斯都本人的期许。维吉尔在史诗中将奥古斯都 描述成胜利者，带领罗马走向繁荣，扩张了罗马帝国的疆域。或许最重要的是，他被认为是 700 年来关上象征着永久和平的亚努斯神庙之门的 第三个罗马帝王。但是其中还蕴含着一个转折。维吉尔生前只为奥古斯都诵读过史诗中的三个选段。其他的选段对帝王有所批评，甚至是对他的成就 明显具有颠覆性的评价。埃涅阿斯作为奥古斯都的榜样， 纠结于自己的职责，似乎是个不情愿的英雄。他并不总能做到 一个好的罗马帝王需要做的事。他一直纠结于怜悯和正义的平衡。最后，读者会期待罗马的未来会怎样，奥古斯都带领的新政府会怎么样。也许为了出版这个故事，奥古斯都被自我吹捧的欲望蒙蔽了。于是，维吉尔的故事便留存了下来，从此继续质疑权利和权威的本质。

**P517 2017-10-19 Where do math symbols come from - John David Walters**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=517)

In the 16th century, the mathematician Robert Recorde wrote a book called "The Whetstone of Witte" to teach English students algebra. But he was getting tired of writing the words "is equal to" over and over. His solution? He replaced those words with two parallel horizontal line segments because the way he saw it, no two things can be more equal. Could he have used four line segments instead of two? Of course. Could he have used vertical line segments? In fact, some people did. There's no reason why the equals sign had to look the way it does today. At some point, it just caught on, sort of like a meme. More and more mathematicians began to use it, and eventually, it became a standard symbol for equality. Math is full of symbols. Lines, dots, arrows, English letters, Greek letters, superscripts, subscripts. It can look like an illegible jumble. It's normal to find this wealth of symbols a little intimidating and to wonder where they all came from. Sometimes, as Recorde himself noted about his equals sign, there's an apt conformity between the symbol and what it represents. Another example of that is the plus sign for addition, which originated from a condensing of the Latin word et meaning and. Sometimes, however, the choice of symbol is more arbitrary, such as when a mathematician named Christian Kramp introduced the exclamation mark for factorials just because he needed a shorthand for expressions like this. In fact, all of these symbols were invented or adopted by mathematicians who wanted to avoid repeating themselves or having to use a lot of words to write out mathematical ideas. Many of the symbols used in mathematics are letters, usually from the Latin alphabet or Greek. Characters are often found representing quantities that are unknown, and the relationships between variables. They also stand in for specific numbers that show up frequently but would be cumbersome or impossible to fully write out in decimal form. Sets of numbers and whole equations can be represented with letters, too. Other symbols are used to represent operations. Some of these are especially valuable as shorthand because they condense repeated operations into a single expression. The repeated addition of the same number is abbreviated with a multiplication sign so it doesn't take up more space than it has to. A number multiplied by itself is indicated with an exponent that tells you how many times to repeat the operation. And a long string of sequential terms added together is collapsed into a capital sigma. These symbols shorten lengthy calculations to smaller terms that are much easier to manipulate. Symbols can also provide succinct instructions about how to perform calculations. Consider the following set of operations on a number. Take some number that you're thinking of, multiply it by two, subtract one from the result, multiply the result of that by itself, divide the result of that by three, and then add one to get the final output. Without our symbols and conventions, we'd be faced with this block of text. With them, we have a compact, elegant expression. Sometimes, as with equals, these symbols communicate meaning through form. Many, however, are arbitrary. Understanding them is a matter of memorizing what they mean and applying them in different contexts until they stick, as with any language. If we were to encounter an alien civilization, they'd probably have a totally different set of symbols. But if they think anything like us, they'd probably have symbols. And their symbols may even correspond directly to ours. They'd have their own multiplication sign, symbol for pi, and, of course, equals.

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翻译人员: nisi J 校对人员: Ruilin Yao十六世纪的时候， 数学家罗伯特·雷考德写了一本叫做《砺智石》的书，以教授英国学生代数。但是他为一遍遍 写“等于”两个字而感到疲惫。他的解决方法是什么呢？他用两个平行的水平线段 替代了“等于”这个词。因为在他的眼中， 没有更相等的两个事物了。他可以用四条而非两条线段吗？当然。他可以用两条竖线吗？实际上，的确有人用了。等号并非一定要长成今天这样。某个时间起，它突然就 火了起来，有点像流行用语。越来越多的数学家开始使用它，最终，它成为了“等于”的标准符号。数学里到处都是符号。线，点，箭头，英语字母，希腊字母，上标，下标。有时候看起来杂乱无章。觉得这么大量的符号有点恐怖很正常，也自然想知道它们都从哪来。有时候，就像雷考得 注意到关于他的等号一样，这个符号和它所代表 的东西之间有恰当的一致性。另一个例子就是加法的加号，起源于拉丁et（&），“和”的缩写。有些时候，符号的选择就随性一点，例如当数学家基斯顿·卡曼推行用感叹号来表示阶乘，仅因为他需要一个 这种表达式的简写。实际上，这些符号都是由不想老是痛殴重复或写很多词描述数学思想的数学家发明或选用的。数学中使用的许多符号都是字母,拉丁字幕或是希腊字幕。符号一般用于表达未知数，以及变量之间的关系。它们也表示某些经常出现的用小数点式不可能或者 很难写的特定数字。数集以及整个式子 也可以用字母表示。其他符号被用来表示运算。其中有一些作为缩写尤为重要，因为他们能把重复的运算 浓缩到一个简单的表达式。同一个数字的重复相加被缩写成乘法，所以不会占用不必要的位置。数字的自相乘用指数来表示重复运算多少次。然后，一系列的数字相加缩写为大写的合集符号。这些符号把冗长的 计算过程简化成较小的更容易处理的项。符号也可以提供关于计算的简明指导。想象接下来的一系列运算。在脑海中选一个数字，乘以二，结果减一，结果和自己相乘，结果除以三，然后再加一以得到最终答案。如果没有符号，我们就要 面对这样的大块文字。有了符号，我们有了简洁， 优雅的表达方式。有时候，就像等号，这些符号通过形式传达意义。然而，许多符号是很随意的。要了解它们，记住它们的意思就好了，并在不同的场景下使用，直到把它们 牢牢得记住，就像任何其他语言一样。如果我们遇到了外星文明，他们八成有完全不同的符号。可是如果他们像我们一样得思考， 他们八成也有许多符号。这些符号或许和我们的相呼应。他们也会有自己的乘号，代表圆周率的 π，当然还有等于号。

**P518 2017-10-19 Why should you read James Joyce's 'Ulysses' - Sam Slote**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=518)

James Joyce's "Ulysses" is widely considered to be both a literary masterpiece and one of the hardest works of literature to read. It inspires such devotion that once a year on a day called Bloomsday, thousands of people all over the world dress up like the characters, take to the streets, and read the book aloud. And some even make a pilgrimage to Dublin just to visit the places so vividly depicted in Joyce's opus. So what is it about this famously difficult novel that inspires so many people? There's no one simple answer to that question, but there are a few remarkable things about the book that keep people coming back. The plot, which transpires over the course of a single day, is a story of three characters: Stephen Dedalus, reprised from Joyce's earlier novel, "A Portrait of the Artist as a Young Man"; Leopold Bloom, a half-Jewish advertising canvasser for a Dublin newspaper; and Bloom's wife Molly, who is about to embark on an affair. Stephen is depressed because of his mother's recent death. Meanwhile, Bloom wanders throughout the city. He goes to a funeral, his work, a pub, and so on, avoiding going home because Molly is about to begin her affair. Where it really starts to get interesting, though, is how the story's told. Each chapter is written in a different style. 15 is a play, 13 is like a cheesy romance novel, 12 is a story with bizarre, exaggerated interruptions, 11 uses techniques, like onomatopoeia, repetitions, and alliteration to imitate music, and 14 reproduces the evolution of English literary prose style, from its beginnings in Anglo-Saxon right up to the 20th century. That all culminates in the final chapter which follows Molly's stream of consciousness as it spools out in just eight long paragraphs with almost no punctuation. The range of styles Joyce uses in "Ulysses" is one of the things that makes it so difficult, but it also helps make it enjoyable. And it's one of the reasons that the book is held up as one of the key texts of literary modernism, a movement characterized by overturning traditional modes of writing. Joyce fills his narrative gymnastic routines with some of the most imaginative use of language you'll find anywhere. Take, for instance, "The figure seated on a large boulder at the foot of a round tower was that of a broadshouldered deepchested stronglimbed frankeyed redhaired freelyfreckled shaggybearded widemouthed largenosed longheaded deepvoiced barekneed brawnyhanded hairlegged ruddyfaced sinewyarmed hero." Here, Joyce exaggerates the description of a mangy old man in a pub to make him seem like an improbably gigantesque hero. It's true that some sections are impenetrably dense at first glance, but it's up to the reader to let their eyes skim over them or break out a shovel and dig in. And once you start excavating the text, you'll find the book to be an encyclopedic treasure trove. It's filled with all manner of references and allusions from medieval philosophy to the symbolism of tattoos, and from Dante to Dublin slang. As suggested by the title, some of these allusions revolve around Homer's "Odyssey." Each chapter is named after a character or episode from the "Odyssey," but the literary references are often coy, debatable, sarcastic, or disguised. For example, Homer's Odysseus, after an epic 20-year-long journey, returns home to Ithaca and reunites with his faithful wife. In contrast, Joyce's Bloom wanders around Dublin for a day and returns home to his unfaithful wife. It's a very funny book. It has highbrow intellectual humor, if you have the patience to track down Joyce's references, and more lowbrow dirty jokes. Those, and other sexual references, were too much for some. In the U.S., the book was put on trial, banned, and censored before it had even been completed because it was originally published as a serial novel. Readers of "Ulysses" aren't just led through a variety of literary styles. They're also given a rich and shockingly accurate tour of a specific place at a time: Dublin in 1904. Joyce claimed that if Dublin were to be destroyed, it could be recreated from the pages of this book. While such a claim is not exactly true, it does show the great care that Joyce took in precisely representing details, both large and small, of his home city. No small feat considering he wrote the entire novel while living outside of his native Ireland. It's a testament to Joyce's genius that "Ulysses" is a difficult book. Some people find it impenetrable without a full book of annotations to help them understand what Joyce is even talking about. But there's a lot of joy to be found in reading it, more than just unpacking allusions and solving puzzles. And if it's difficult, or frustrating, or funny, that's because life is all that, and more. Responding to some criticism of "Ulysses," and there was a lot when it was first published, Joyce said that if "Ulysses" isn't worth reading, then life isn't worth living.

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翻译人员: 杰 杨 校对人员: Riley WANG詹姆斯·乔伊斯的《尤利西斯》 既是一本广受认可的文学巨著，也是最难读懂的文学作品之一。它深受读者喜爱， 以至于在一年一度的”布鲁姆日“，来自世界各地的几千人 会打扮成书中人物的样子，来到街道上大声朗读这本书。还有一些人会特地 踏上旅程前往都柏林，就是为了一睹乔伊斯妙笔下 这座城市的风采。那么究竟是什么 让这本出了名难懂的书感染了如此多的读者呢？要回答这个问题并不容易，但是这本书的确 有一些非比寻常的东西让读者们百看不厌。这本书讲述了一天之内发生在三个人身上的故事：第一个人是斯蒂芬·德迪勒斯，他曾出现在乔伊斯先前的作品 《一个青年艺术家的画像》中；第二位是有一半犹太血统的利奥波德·布鲁姆， 他是都柏林某报社的广告推销员；第三位便是布鲁姆的妻子摩莉， 她正打算另寻情人。斯蒂芬正沉湎于最近母亲的离世中。与此同时，布鲁姆正在城里游走晃荡。他先后去了一场葬礼，他工作的地方，一个酒吧，以及一些其它的地方，但他就是不回家， 因为摩莉将要离他而去。然而真正让这本书散发魅力的地方在于故事的讲述方式。每一章节的写作风格都截然不同。若说15章是一部戏剧，那么13章则像是一部俏皮的爱情小说，12章就是一个猝不及防， 戛然而止的故事，11章则采用了多种文学技法， 比如拟声词、重复和头韵的运用，以模拟音乐的效果，而14章更像是重现了 英国散文风格的变革，其时间跨度从盎格鲁-撒克逊时期 一直到20世纪。它们在最终的章节达到了高潮，紧接着的便是摩莉的那段意识流，其长度仅仅有8个自然段，其中几乎没有标点符号。乔伊斯在《尤利西斯》中 运用的多种语言风格是这本书如此难懂的原因之一，但同时也让这本书更加耐人寻味；同时也是让这本书中的许多语段被奉为文学现代主义运动 的圭臬的原因之一，后者的主要特点便是 推翻传统的写作模式。乔伊斯在讲述故事时不走寻常路，在书中的各个角落你都可以发现 他对语言最具创造性的运用。举个例子，“坐在圆形炮塔脚下 的大圆石的那个人生得肩宽胸厚、四肢发达、 眼神坦率、红头发、满脸雀斑、胡子拉碴、阔嘴大鼻 长长的头、嗓音深沉、光着膝盖、膂力过人、腿上多毛 面色红润，一副英雄气概”在这里，乔伊斯夸张了 酒馆里一位糟老头的特征，使他看起来像是个有悖常理的大英雄。书中的一些语段乍一看 的确是紧密到令人费解，但是读者要选择大致泛读还是精读深挖， 就取决于他们自己了。而一旦你开始深挖钻研书中的语段，就会发现这本书 是个百科全书般的宝库，书中到处都在引经据典，上至中世纪哲学，下至象征主义的纹身，上至但丁，下至都柏林的俚语。正如本书的标题所暗示的， 有些典故是围绕荷马的《奥德赛》展开的。书的每一章都以《奥德赛》中的 角色或是情节命名，但是引用文学典故的形式往往是含蓄的， 有争议的，讽刺的，或名不副实。比如，荷马笔下的奥德修斯， 在经历了长达 20 年的艰辛归途后，终于回到伊塔卡， 并和他忠贞不渝的妻子重聚。相比之下，乔伊斯笔下的布鲁姆 则是在都柏林游荡了一天，最后回到家面对他见异思迁的妻子。这是本引人发笑的书，它充满着浓厚的智慧与幽默，如果你有耐心追溯书中引用的典故，和数量更多的低俗笑话。这些内容和其他性暗示 对一部分人而言实在有些过度了。在美国，这本书曾被送上法庭， 被禁止发行，还受到了审查，而那时整本书还尚未完成，这是因为它原本是 以连载小说的形式发表的。《尤利西斯》的读者们不仅 领略了书中多样化的文学风格，也能够体验到一次 异常充实，原汁原味的旅行，而旅行目的地就是 那个特定的时间和地点：1904 年的都柏林。乔伊斯曾声称即便都柏林被毁灭了，人们也可以依据 这本书中的语段重建它。虽然这种说法有些言过其实，但是它的确表现了乔伊斯 对他家乡城市各种细节的精准把控，无论是大是小。这实在是很了不起，要知道，他写这本书 的时候还身居异乡。这本异常难懂的书也是 乔伊斯卓越才能的明证。它让一些人倍感费解， 以至于他们需要一整本的注解来让自己理解乔伊斯 到底讲了些什么。但读这本书会让你发掘出很多乐趣，不仅仅是找出其中指代的典故 和揭开书中难题的谜底。若你发觉这本书难以理解 或是叫人抓狂，亦或是令人捧腹，那是因为生活本身也是如此， 甚至更加复杂、艰难。《尤利西斯》在发行之初 遭受了大量的批评，而乔伊斯在回应这些声音时说，如果《尤利西斯》不值得一读，那么人的一生也就不值得一过了。

**P519 2017-10-19 Why should you read 'Macbeth' - Brendan Pelsue**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=519)

There's a play so powerful that an old superstition says its name should never even be uttered in a theater, a play that begins with witchcraft and ends with a bloody severed head, a play filled with riddles, prophesies, nightmare visions, and lots of brutal murder, a play by William Shakespeare sometimes referred to as the "Scottish Play" or the "Tragedy of Macbeth." First performed at the Globe Theater in London in 1606, "Macbeth" is Shakespeare's shortest tragedy. It is also one of his most action-packed. In five acts, he recounts a story of a Scottish nobleman who steals the throne, presides over a reign of terror, and then meets a bloody end. Along the way, it asks important questions about ambition, power, and violence that spoke directly to the politics of Shakespeare's time and continue to echo in our own. England in the early 17th century was politically precarious. Queen Elizabeth I died in 1603 without producing an heir, and in a surprise move, her advisors passed the crown to James Stewart, King of Scotland. Two years later, James was subject to an assassination attempt called the Gunpowder Plot. Questions of what made for a legitimate king were on everyone's lips. So Shakespeare must have known he had potent material when he conflated and adapted the stories of a murderous 11th century Scottish King named Macbeth and those of several other Scottish nobles. He found their annals in Hollinshed's "Chronicles," a popular 16th century history of Britain and Ireland. Shakespeare would also have known he needed to tell his story in a way that would immediately grab the attention of his diverse and rowdy audience. The Globe welcomed all sections of society. Wealthier patrons watched the stage from covered balconies while poorer people paid a penny to take in the show from an open-air section called the pit. Talking, jeering, and cheering was common during performances. There are even accounts of audiences throwing furniture when plays were flops. So "Macbeth" opens with a literal bang. Thunder cracks and three witches appear. They announce they're searching for a Scottish nobleman and war hero named Macbeth, then fly off while chanting a curse that predicts a world gone mad. "Fair is foul and foul is fair. Hover through the fog and filthy air." As seen later, they find Macbeth and his fellow nobleman Banquo. "All hail Macbeth," they prophesize, "that shalt be king hereafter!" "King?" Macbeth wonders. Just what would he have to do to gain the crown? Macbeth and his wife Lady Macbeth soon chart a course of murder, lies, and betrayal. In the ensuing bloodbath, Shakespeare provides viewers with some of the most memorable passages in English literature. "Out, damned spot! Out, I say!" Lady Macbeth cries when she believes she can't wipe her victim's blood off her hands. Her obsession with guilt is one of many themes that runs through the play, along with the universal tendency to abuse power, the endless cycles of violence and betrayal, the defying political conflict. As is typical with Shakespeare's language, a number of phrases that got their start in the play have been repeated so many times that they now feel commonplace. They include "the milk of human kindness," "what's done is done," and the famous witches' spell, "Double, double toil and trouble; Fire burn, and caldron bubble." But Shakespeare saves the juiciest bit of all for Macbeth himself. Towards the end of the play, Macbeth reflects on the universality of death and the futility of life. "Out, out, brief candle!" he laments. "Life's but a walking shadow, a poor player that struts and frets his hour upon the stage and then is heard no more. It is a tale told by an idiot, full of sound and fury signifying nothing." Life may be a tale told my an idiot, but "Macbeth" is not. Shakespeare's language and characters have entered our cultural consciousness to a rare extent. Directors often use the story to shed light on abuses of power, ranging from the American mafia to dictators across the globe. The play has been adapted to film many times, including Akira Kurosawa's "Throne of Blood," which takes place in feudal Japan, and a modernized version called "Scotland, PA," in which Macbeth and his rivals are managers of competing fast food restaurants. No matter the presentation, questions of morality, politics, and power are still relevant today, and so, it seems, is Shakespeare's "Macbeth."

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翻译人员: Riley WANG 校对人员: Sylvia He“拇指怦怦动， 必有恶人来。” ——莎士比亚, 《麦克白》有这样一部戏剧，它拥有强大的力量，甚至有古老传言认为 不能在剧院提起它的名字。这部剧以巫术开场， 以血腥的身首异处结束，它充满了谜团、预言、 梦魇 以及大量残忍的谋杀。这部剧由威廉·莎士比亚所著， 有时被称为 “那部苏格兰戏剧”，它就是悲剧《麦克白》。这部剧最初于 1606 年 在伦敦环球剧场上演，在莎士比亚的悲剧中， 《麦克白》是最短的一部，也是情节最跌宕的一部。莎士比亚用五幕戏 讲述了一位苏格兰贵族的故事，他窃取王位，施行恐怖统治，最终落得悲惨下场。这部剧提出了野心、权力和暴力等重要的问题。这些问题直指莎士比亚 所处的时代并延续至今的政治形势。17 世纪早期，英格兰政局十分动荡，伊丽莎白一世于 1603 年去世， 却没有子嗣。而令人惊讶的是，女王的大臣将皇位传给了 苏格兰国王詹姆士·斯图尔特。两年之后，詹姆士遭遇了 一次暗杀，险些丧命，此次事件被称为“火药阴谋”。一时间，人们都在讨论一位称职的君主 究竟需要拥有何种品质。莎士比亚必定确信 自己拥有丰富的素材，于是将这些事件进行合并和改编，撰写出了 11 世纪一位名叫 麦克白的凶残的苏格兰国王和其他几位苏格兰贵族的故事。他借鉴了霍林现特的《编年史》，这是一部 16 世纪流行的 英国及爱尔兰史书。莎士比亚也知道， 他要用能够立刻吸引那个年代鱼龙混杂、 吵嚷喧闹的观众的方式讲述这个故事。环球剧院向社会各个阶层开放。富有的顾客从有凉篷的阳台看戏，穷人们则只需付一个便士就可入场，在剧院露天的“正厅后座区” 观看演出。在表演期间， 喧哗、嘲弄、欢呼此起彼伏，甚至有观众在演出失误时 朝台上扔家具。《麦克白》以一声巨响开始。伴随着电闪雷鸣，三个女巫登场。她们念叨着自己正在寻找一位苏格兰贵族和战争英雄， 他的名字是麦克白。女巫们念着咒语飞走了， 预言一个疯狂世界即将到来。“美即丑恶丑即美，翱翔毒雾妖云里。”之后，她们找到麦克白和 他的朋友贵族班柯，“万福，麦克白！未来的君王！” 她们预言着。“国王？” 麦克白思忖着。他要如何做才能夺得王位？麦克白和夫人很快构想出一个计划，一个充满谋杀、谎言和背叛的计划。在随后的血腥屠杀中，莎士比亚为观众展现了英国文学中最令人印象深刻的篇章。比如，麦克白夫人大喊着， “消失，该死的血迹！消失！”她发现自己无法将手中的鲜血拭去。她满心的内疚是整部戏剧的主题之一。其他主题还包括滥用权力、无尽的暴力与背叛循环往复，以及互相对抗的政治斗争。莎士比亚的语言一向经典，许多首次出现在这部戏剧中的词句，由于多次重复使用， 现已成为惯常表达。包括 “the milk of human kindness,” 意为人类的恻隐之心，“what's done is done,” 意为木已成舟，覆水难收，以及那句著名的女巫咒语，“Double, double toil and trouble, “不惮辛劳不惮烦，Fire burn, and caldron bubble. ” 釜中沸沫已成澜。”但莎士比亚将最精彩的部分 留给了麦克白。在戏剧尾声，麦克白明白了， 众生皆有一死，生命毫无意义，他悲叹：“熄灭了吧， 熄灭了吧，短促的烛光！”“人生不过是行走的影子，不过是一个在舞台上 指手画脚的拙劣伶人，只登场片刻，就在无声无息中悄然退下。生命是一个愚人所讲的故事， 充满着喧哗和骚动，却找不到一点意义。”人生也许是愚人讲述的故事， 但《麦克白》却不是。莎士比亚的语言和人物 已融入我们的文化意识，其程度称得上罕见。导演们经常用这个故事 说明对权力·的滥用，从美国黑手党，到全球各处的独裁者。这部戏剧曾多次改编成为电影，包括黑泽明的《蜘蛛巢城》，其故事背景是封建时期的日本，以及现代版本的《苏格兰场》，在这部电影中，麦克白和其对手变成了相互竞争的快餐店老板。但是，无论其呈现方式 如何多样，对死亡、政治和权力的探讨，在今天依然意义重大，而莎士比亚的《麦克白》也同样不朽。

**P520 2017-10-23 How does your body know you're full - Hilary Coller**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=520)

Hunger claws at your grumbling belly. It tugs at your intestines, which begin to writhe, aching to be fed. Being hungry generates a powerful, often unpleasant physical sensation that's almost impossible to ignore. After you've reacted by gorging on your morning pancakes, you start to experience an opposing force, fullness, but how does your body actually know when you're full? The sensation of fullness is set in motion as food moves from your mouth down your esophagus. Once it hits your stomach, it gradually fills the space. That causes the surrounding muscular wall to stretch, expanding slowly like a balloon. A multitude of nerves wrapped intricately around the stomach wall sense the stretching. They communicate with the vagus nerve up to the brainstem and hypothalamus, the main parts of the brain that control food intake. But that's just one input your brain uses to sense fullness. After all, if you fill your stomach with water, you won't feel full for long. Your brain also takes into account chemical messengers in the form of hormones produced by endocrine cells throughout your digestive system. These respond to the presence of specific nutrients in your gut and bloodstream, which gradually increase as you digest your food. As the hormones seep out, they're swept up by the blood and eventually reach the hypothalamus in the brain. Over 20 gastrointestinal hormones are involved in moderating our appetites. One example is cholecystokinin, which is produced in response to food by cells in the upper small bowel. When it reached the hypothalamus, it causes a reduction in the feeling of reward you get when you eat food. When that occurs, the sense of being satiated starts to sink in and you stop eating. Cholecystokinin also slows down the movement of food from the stomach into the intestines. That makes your stomach stretch more over a period of time, allowing your body to register that you're filling up. This seems to be why when you eat slowly, you actually feel fuller compared to when you consume your food at lightning speed. When you eat quickly, your body doesn't have time to recognize the state it's in. Once nutrients and gastrointestinal hormones are present in the blood, they trigger the pancreas to release insulin. Insulin stimulates the body's fat cells to make another hormone called leptin. Leptin reacts with receptors on neuron populations in the hypothalamus. The hypothalamus has two sets of neurons important for our feeling of hunger. One set produces the sensation of hunger by making and releasing certain proteins. The other set inhibits hunger through its own set of compounds. Leptin inhibits the hypothalamus neurons that drive food intake and stimulates the neurons that suppress it. By this point, your body has reached peak fullness. Through the constant exchange of information between hormones, the vagus nerve, the brainstem, and the different portions of hypothalamus, your brain gets the signal that you've eaten enough. Researchers have discovered that some foods produce more long-lasting fullness than others. For instance, boiled potatoes are ranked as some of the most hunger-satisfying foods, while croissants are particularly unsatisfying. In general, foods with more protein, fiber, and water tend to keep hunger at bay for longer. But feeling full won't last forever. After a few hours, your gut and brain begin their conversation again. Your empty stomach produces other hormones, such as ghrelin, that increase the activity of the hunger-causing nerve cells in the hypothalamus. Eventually, the growling beast of hunger is reawakened. Luckily, there's a dependable antidote for that.

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翻译人员: Ying Lu 校对人员: Jenny Yang饥饿感挠着你饥肠辘辘的肚子。它拖拽着你的肠子，于是肠子 开始蠕动，等待着被喂食。饥饿会产生强大的， 令人不悦的生理感觉，几乎让你无法忽视。在你狼吞虎咽完早餐薄饼后，你开始体会到 完全相反的感觉，饱足感，但是当你吃饱的时候， 你的身体是如何知道的呢？饱足感随着食物从你的口中进入食道中就开始出现了。一旦食物到达胃， 便逐渐填充胃的空间。这导致周边的肌肉壁开始延展，就像气球一样缓慢扩张。胃壁中大量的错综复杂的神经感受到了这种扩展。它们与位于脑干和下丘脑 的迷走神经交换信息，这是大脑中的主要部分， 掌管食物的摄取。但这只是大脑用来感受 饱足感的其中一个来源。毕竟，当你的胃充满水的时候，饱足感并不会持续很长时间。你的大脑也会考虑化学因素，它们以内分泌细胞产生的激素形式存在于整个消化系统中。它们会对你内脏和血管中 特定的营养成分产生反应，当你消化食物时会逐渐加强。当激素溢出来时， 它们会被血液冲走，并最终到达大脑中的下丘脑。超过20种肠胃激素参与 调和我们的口味。胆囊收缩素就是其中一个例子，它是由上小肠的细胞通过 食物刺激产生的。当它到达下丘脑时，会降低你吃食物时的满足感。当发生这种情况时， 饱足感开始潜入，你也会停止进食。胆囊收缩素也会 减缓食物从胃到肠的运行速度。这会让你的胃持续扩展一段时间，让你的身体知道你已经饱了。这似乎解释了和当你狼吞虎咽时相比，进食速度更慢，就会觉得更饱。当你狼吞虎咽时，你的身体缺少 足够的时间来了解进食状态。一旦血液中有了营养素和肠胃激素，它们会触发胰腺分泌胰岛素。胰岛素会刺激人体的脂肪细胞 产生另一种叫做瘦素的激素。瘦素与下丘脑神经元群的 受体相互作用。下丘脑有两组对饥饿感 非常重要的神经元。一组通过制造和释放某些 蛋白质来产生饥饿感。另一组通过组内自身的 复化合物抑制饥饿感。瘦素抑制驱动食物摄入 的下丘脑神经元，并刺激神经元压制它。此时，你的身体已极度饱胀。通过在激素、迷走神经、脑干、以及下丘脑的不同部分进行的持续性信息交换，你的大脑收到了已经吃饱的信号。研究者发现，某些食物较其他食物而言， 会产生更持久的饱足感。例如，水煮土豆在最让人有饱足感的 食物中榜上有名，然而羊角面包带来的 饱足感则令人失望。总而言之，富含蛋白质、 食物纤维和水份的食物能让饱足感延续时间更长。但是饱足感不会永远持续。几小时之后，你的内脏和 大脑又开始了它们的交流。空空如也的胃产生了 其他激素，例如饥饿激素，它会加速在下丘脑发生的饥饿神经细胞活动。最终，饥饿这头低吼的野兽又被唤醒。幸运的是，我们有一个 可靠的解药。

**P521 2017-10-24 How many verb tenses are there in English - Anna Ananichuk**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=521)

Grammatical tense is how languages talk about time without explicitly naming time periods by, instead, modifying verbs to specify when action occurs. So how many different tenses are there in a language like English? At first, the answer seems obvious: there's past, present, and future. But thanks to something called grammatical aspect, each of those time periods actually divides further. There are four kinds of aspect. In the continuous or progressive aspect, the actions are still happening at the time of reference. The perfect aspect describes actions that are finished. The perfect progressive aspect is a combination, describing a completed part of a continuous action. And finally, there's the simple aspect, the basic form of the past, present, and future tense, where an action is not specified as continuous or discrete. That's all a little hard to follow, so let's see how it works in action. Let's say your friends tell you they went on a secret naval mission to collect evidence of a mysterious sea creature. The tense sets the overall frame of reference in the past, but within that, there are many options. Your friends might say a creature attacked their boat, that's the past simple, the most general aspect, which gives no further clarification. They were sleeping when it happened, a continuous process underway at that point. They might also tell you they had departed from Nantucket to describe an action completed even earlier. That's an example of the past perfect. Or that they had been sailing for three weeks, something that was ongoing up until that point. In the present, they tell you that they still search for the creature today, their present simple activity. Perhaps they are preparing for their next mission continuously as they speak. And they have built a special submarine for it, a completed achievement. Plus, if they have been researching possible sightings of the creature, it's something they've been doing for a while and are still doing now making it present perfect progressive. So what does this next mission hold? You know it still hasn't happened because they will depart next week, the future simple. Your friends will be searching for the elusive creature, an extended continuous undertaking. They tell you the submarine will have reached uncharted depths a month from now. That's a confident prediction about what will be achieved by a specific point in the future, a point at which they will have been voyaging for three weeks in the future perfect progressive. The key insight to all these different tenses is that each sentence takes place in a specific moment, whether it's past, present, or future. The point of aspects is that they tell you as of that moment the status of the action. In total, they give us twelve possibilities in English. What about other languages? Some, like French, Swahili, and Russian take a similar approach to English. Others describe and divide time differently. Some have fewer grammatical tenses, like Japanese, which only distinguishes past from non-past, Buli and Tukang Basi, which only distinguish future from non-future, and Mandarin Chinese with no verb tenses at all, only aspect. On the other hand, languages like Yagwa split past tense into multiple degrees, like whether something happened hours, weeks, or years ago. In others, tenses are intertwined with moods that can convey urgency, necessity, or probability of events. This makes translation difficult but not impossible. Speakers of most languages without certain tenses can express the same ideas with auxiliary words, like would or did, or by specifying the time they mean. Are the variations from language to language just differents ways of describing the same fundamental reality? Or do their diverse structures reflect different ways of thinking about the world and even time itself? And if so, what other ways of conceiving time may be out there?

**P521 2017-10-24 How many verb tenses are there in English - Anna Ananichuk**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=521)

翻译人员: Yijing Li 校对人员: Ellie Zhao时态，指的是语言如何谈论时间，而不需要直接说出时间段，通过修饰动词， 来具体说明行为何时发生。在一种语言，比如英语中， 有多少种不同时态呢？乍一看，答案似乎显而易见：有过去时、现在时和将来时。但由于“语法体”的存在，以上每种时间段， 实际上有更详细的划分。语法体共有四种。在持续体或进行体中，行为在所指的时间内，一直在持续发生。完成体用来形容已经完成的行为。完成进行体，是一种组合，用来形容一个持续行为中， 一个已经完成的部分。最后，是一般体，它是过去、现在、将来时态的基本形式，它并不具体说明一个行为是否连续。听起来有点难懂，下面我们举个例子。比如说，你朋友告诉你， 他们曾进行了一次秘密的海军行动，去寻找一种秘密海生动物的迹象。总的来说，时态为过去时，但是具体地说，有很多种选择。你的朋友们可能会说， 一只生物袭击了他们的船。这就是一般过去时， 最笼统的一种语法体，而没有给出进一步的划分。这件事发生时，他们正在睡觉。站在那个时间点看， 这是一个连续进行的过程。他们还可能告诉你， 他们已经从楠塔基特岛出发，用这种方式，去描述 一个更早完成的行为。这就是一个过去完成时的例子。或者，他们已经航行了三个星期，这件事截止到那个时间点，一直在发生。现在，他们告诉你， 他们今天还在寻找那种生物，他们的这一活动，属于一般现在时。也许，在他们说话的那一刻， 他们在持续地为下一次行动做准备。他们已为这次活动造了一艘特制 的潜水艇，这是一个已达成的成就。另外，如果他们一直在搜寻 这种生物可能的露面机会，则表示他们已经做了一段时间， 并且目前仍然在做。这样一来，就是一般现在进行时。那么，下一次行动会怎样呢？下一次行动还未发生， 因为他们将会于下周出发，也就是一般将来时。你的朋友们将会在搜寻 那种难以寻找的生物，这是一个长期的持续行动。他们告诉你，从现在起一个月后， 潜水艇将会已经达到一个新的深度。这是一个很有信心的预测，说的是在未来某一个确切 的时间点，将会达成何种成就，在那个时间点， 他们将会已经航行了三周，这就是将来完成进行时。对于这些不同的时态来说， 很关键的一点，就是每一个句子， 都产生于一个特定的时刻，无论这一刻在过去、现在还是将来。语法体的关键，就在于它们告诉你， 在那一个特定时刻，行为的状态是怎样的。在英语中，这些排列组合 共有十二种可能性。那么其他语言如何呢？有的语言，比如法语、斯瓦希里语和俄语，与英语类似。另一些语言，描述和划分时间 的方式则有所不同。有的语言时态更少，比如日语，只区分过去时和非过去时。古法文和图康伯西群岛的语言，只区分将来时和非将来时。而中文普通话则完全没有 动词时态，只有语法体。另一方面，有的语言，比如火地群岛的语言， 将过去时划分为多种程度，也就是某件事发生于几小时前、 几周前还是几年前。在另外一些语言中，时态和语气相交织， 而语气可以传达事件的紧急性、必要性、或可能性。这就让翻译变得很难， 但也不是不可能。大多数无特定时态语言的使用者， 也可以表达同样的意思，他们会运用助动词， 比如”将会“或者”曾经“，或者具体说明他们想表达的时间。不同语言之间的差异，仅仅是对同一个事实 有着不同描述方式吗？还是说，这些多元的结构， 反映了对世界的不同思考方式，甚至是对时间本身的思考方式？如果是这样，会不会还有 其他表达时间的方式呢？

**P522 2017-10-25 How your muscular system works - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=522)

Each time you take a step, 200 muscles work in unison to lift your foot, propel it forward, and set it down. It's just one of the many thousands of tasks performed by the muscular system. This network of over 650 muscles covers the body and is the reason we can blink, smile, run, jump, and stand upright. It's even responsible for the heart's dependable thump. First, what exactly is the muscular system? It's made up of three main muscle types: skeletal muscle, which attaches via tendons to our bones, cardiac muscle, which is only found in the heart, and smooth muscle, which lines the blood vessels and certain organs, like the intestine and uterus. All three types are made up of muscle cells, also known as fibers, bundled tightly together. These bundles receive signals from the nervous system that contract the fibers, which in turn generates force and motion. This produces almost all the movements we make. Some of the only parts of the body whose motions aren't governed by the muscular system are sperm cells, the hair-like cilia in our airways, and certain white blood cells. Muscle contraction can be split into three main types. The first two, shortening muscle fibers and lengthening them, generate opposing forces. So the biceps will shorten while the triceps will lengthen or relax, pulling up the arm and making it bend at the elbow. This allows us to, say, pick up a book, or if the muscle relationship is reversed, put it down. This complementary partnership exists throughout the muscular system. The third type of contraction creates a stabilizing force. In these cases, the muscle fibers don't change in length, but instead keep the muscles rigid. This allows us to grip a mug of coffee or lean against a wall. It also maintains our posture by holding us upright. Skeletal muscles form the bulk of the muscular system, make up about 30-40% of the body's weight, and generate most of its motion. Some muscles are familiar to us, like the pectorals and the biceps. Others may be less so, like the buccinator, a muscle that attaches your cheek to your teeth, or the body's tiniest skeletal muscle, a one-millimeter-long tissue fragment called the stapedius that's nestled deep inside the ear. Wherever they occur, skeletal muscles are connected to the somatic nervous system, which gives us almost complete control over their movements. This muscle group also contains two types of muscle fibers to refine our motions even further, slow-twitch and fast-twitch. Fast-twitch fibers react instantly when triggered but quickly use up their energy and tire out. Slow-twitch fibers, on the other hand, are endurance cells. They react and use energy slowly so they can work for longer periods. A sprinter will accumulate more fast-twitch muscles in her legs through continuous practice, enabling her to quickly, if briefly, pick up the pace, whereas back muscles contain more slow-twitch muscles to maintain your posture all day. Unlike the skeletal muscles, the body's cardiac and smooth muscles are managed by the autonomic nervous system beyond our direct control. That makes your heart thump roughly 3 billion times over the course of your life, which supplies the body with blood and oxygen. Autonomic control also contracts and relaxes smooth muscle in a rhythmic cycle. That pumps blood through the smooth internal walls of blood vessels, enables the intestine to constrict and push food through the digestive system, and allows the uterus to contract when a person is giving birth. As muscles work, they also use energy and produce an important byproduct, heat. In fact, muscle provides about 85% of your warmth, which the heart and blood vessels then spread evenly across the body via the blood. Without that, we couldn't maintain the temperature necessary for our survival. The muscular system may be largely invisible to us, but it leaves its mark on almost everything we do, whether it's the blink of an eye or a race to the finish line.

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翻译人员: Eileen Hu 校对人员: Yolanda Zhang“他已被生命的波涛，存在的浪潮和每一块肌肉完美的快感完全主宰......” ——杰克·伦敦每次你走一步，都需要200块肌肉一起工作， 你的脚被操控着抬起，向前推进，然后落下。这只是数千个肌肉系统活动中的一个。这个由超过650个肌肉组成的网络 覆盖了了整个身体，并成为了我们能够眨眼，微笑，奔跑，跳跃，和站起来的理由。它甚至还担负心脏稳定跳动的重任。那么问题来了，肌肉系统 究竟是怎么工作的呢？它由三种主要的肌肉种类构成：骨架肌，也就是通过筋腱附着在 我们骨头上的肌肉，贲门肌，只存在于心脏周围，还有平滑肌，存在于血管 和一些特定的器官上，比如肠道和子宫。这三种肌肉都由肌肉细胞构成，以纤维的形式，紧紧地贴合在一起。这些聚合体收到了 神经系统的指示之后就会告知纤维，由纤维 完成力度和动作的控制。这一过程完成了几乎我们所有的动作，而在我们身体的某些部分，动作不是由肌肉系统控制的，它们包括精细胞，我们气道里的丝状纤维，还有某些白细胞。肌肉的收缩可以 被分为三种主要类型。前两种包括收缩型肌肉纤维 和伸长型肌肉纤维，彼此会产生相对的作用力。所以在肱三头肌伸展或者放松时， 肱二头肌就会收缩，完成胳膊举起，向着手肘弯曲的动作，这使得我们可以拿起东西，比如一本书，或者反过来，放下一本书。这种互补的伙伴关系 贯穿于整个肌肉系统之中。第三种收缩方式， 创造出了一种稳定化的力。在这种情况之下， 肌肉纤维的长度保持不变，而整个肌肉处于一种僵硬的状态。这允许我们能够紧紧 握住一杯咖啡，或者靠着墙。这同时也让我们能够保持直立的姿势。肌肉系统中，骨架上的骨骼肌占据了人体30%－40%的重量，并管控着大部分的活动。有些肌肉对我们而言更为熟悉， 比如胸肌和肱二头肌。其他的肌肉我们就 比较陌生了，比如颊肌，这是一种把你的脸颊 连接到牙齿上的肌肉，还有身体上最纤细的骨骼肌，一片一毫米长的组织材料， 叫做镫骨肌，位于我们耳朵的深处。它们存在的地方， 骨骼肌被连接到身体的神经系统。几乎给了我们完整的活动控制权。这种肌肉组也包含两种肌肉纤维，以慢转换和快转换的方式 进一步改善我们的活动。快转换纤维在被激发的时候， 会持续地向外作出回应，但是它们的能量会很快被消耗掉。相反，慢转换纤维细胞 是具有持久性的细胞。它们的作用过程和能量消耗十分缓慢， 所以工作时间更久。一个运动员可以通过 持久的练习在腿部积攒更多的快速转换肌肉，从而让她更快，更简单的提速。然而背肌包括了更多的慢转换肌肉，来长久地保持你的姿势。与骨骼肌不同，身体的贲门肌和平滑肌是由自动神经系统控制，而非听从我们的直接控制。它使你的心脏在一生之中大概能跳动30亿下，支撑了你身体中血液和氧气的供应。自动控制系统同时也在 一个有节奏的循环中协调、放松平滑肌。血液通过血管内部平滑的壁管使肠道能够控制并推动 食物在消化系统中继续前进，允许子宫在婴儿诞生时收缩。在肌肉工作时，它们同时也用能量 来创造一个重要的副产品，热量。事实上，肌肉提供了 你身体中85%的热度，这样才使得心脏和血管 通过血液的持续流动在身体中平稳运作。如果没有肌肉， 我们无法保持所需的体温，从而也难以幸存。肌肉系统的存在对我们而言 似乎难以察觉，但它的效用却几乎体现 在我们做的每一件事上，无论是眨眼，还是一场 冲向终点线的比赛。

**P523 2017-10-31 How to make your writing suspenseful - Victoria Smith**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=523)

What makes a good horror story? Sure, you could throw in some hideous monsters, fountains of blood, and things jumping out from every corner, but as classic horror author H.P. Lovecraft wrote, "The oldest and strongest kind of fear is fear of the unknown." And writers harness that fear not by revealing horrors, but by leaving the audience hanging in anticipation of them. That is, in a state of suspense. The most familiar examples of suspense come from horror films and mystery novels. What's inside the haunted mansion? Which of the dinner guests is the murderer? But suspense exists beyond these genres. Will the hero save the day? Will the couple get together in the end? And what is the dark secret that causes the main character so much pain? The key to suspense is that it sets up a question, or several, that the audience hopes to get an answer to and delays that answer while maintaining their interest and keeping them guessing. So what are some techniques you can use to achieve this in your own writing? Limit the point of view. Instead of an omniscient narrator who can see and relay everything that happens, tell the story from the perspective of the characters. They may start off knowing just as little as the audience does, and as they learn more, so do we. Classic novels, like "Dracula," for example, are told through letters and diary entries where characters relate what they've experienced and fear what's to come. Next, choose the right setting and imagery. Old mansions or castles with winding halls and secret passageways suggest that disturbing things are being concealed. Nighttime, fog, and storms all play similar roles in limiting visibility and restricting characters' movements. That's why Victorian London is such a popular setting. And even ordinary places and objects can be made sinister as in the Gothic novel "Rebecca" where the flowers at the protagonist's new home are described as blood red. Three: play with style and form. You can build suspense by carefully paying attention not just to what happens but how it's conveyed and paced. Edgar Allan Poe conveys the mental state of the narrator in "The Tell-Tale Heart" with fragmented sentences that break off suddenly. And other short declarative sentences in the story create a mix of breathless speed and weighty pauses. On the screen, Alfred Hitchcock's cinematography is known for its use of extended silences and shots of staircases to create a feeling of discomfort. Four: use dramatic irony. You can't just keep the audience in the dark forever. Sometimes, suspense is best served by revealing key parts of the big secret to the audience but not to the characters. This is a technique known as dramatic irony, where the mystery becomes not what will happen but when and how the characters will learn. In the classic play "Oedipus Rex," the title character is unaware that he has killed his own father and married his mother. But the audience knows, and watching Oedipus gradually learn the truth provides the story with its agonizing climax. And finally, the cliffhanger. Beware of overusing this one. Some consider it a cheap and easy trick, but it's hard to deny its effectiveness. This is where a chapter, episode, volume, or season cuts off right before something crucial is revealed, or in the midst of a dangerous situation with a slim chance of hope. The wait, whether moments or years, makes us imagine possibilities about what could happen next, building extra suspense. The awful thing is almost always averted, creating a sense of closure and emotional release. But that doesn't stop us from worrying and wondering the next time the protagonists face near-certain disaster.

**P523 2017-10-31 How to make your writing suspenseful - Victoria Smith**

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翻译人员: Snow Wang 校对人员: Yingyu Liu到底是什么成就一部优秀的恐怖小说？当然，你可能会说是可怕的魔鬼、喷涌的鲜血，以及不知何处跳出的东西。但是正如经典恐怖小说作者 H·P·洛夫克拉夫特所说，最久远和最强烈的恐惧源自未知。作者掌控读者的恐惧， 并不是通过揭露恐惧本身，而是使读者身处其中，也就是处于一种紧张的状态中。大多数的悬疑案例 都出自恐怖电影和恐怖小说。鬼楼里面有什么？参加晚宴的人里哪一个才是凶手？但是悬疑并不仅仅来自这些因素，英雄会来拯救大家吗？情侣最终会在一起吗？是什么暗黑的秘密让主角如此痛苦？悬疑的秘诀就是设下一个或者一些疑问，让读者想要找到答案，然后迟迟不公布答案， 让他们有兴致地猜下去。那么，在你自己的作品中 你可以采用哪些方法呢？第一，控制信息量。从角色角度展开故事，而不是以上帝视角了解发生的所有事。他们和读者一样一点点地开始，读者随着他们的了解而了解。比如像《德拉库拉》这样的经典小说， 是通过与角色相关的信件和日记来展现他们经历的事，和他们害怕发生的事。第二，选择正确的设定和场景。高墙环绕和密道盘旋的古楼和城堡，意味着隐藏着令人不安的事物。黑夜、雾气和暴风雨都可以起到遮挡视线和限制角色行动的作用。这也是维多利亚式伦敦的场景设定风靡的原因。甚至不起眼的地点和物品都可以预示着不详。正如哥特式小说《蝴蝶梦》所描述，主角的新房子里的花是血腥的红色。第三，利用行文风格和形式你不仅仅可以着重注意发生的事情，还可以注重表达方式和行文节奏。埃德加·爱伦·坡在作品《告密的心》中，就是用零碎的句子来表达主角的心理状态。故事中的其他叙述性句子也是短句，营造一种窒息和压抑的节奏。大屏幕中，阿尔弗雷德·希区柯克的作品常采用的漫长的空寂和楼梯的镜头的方法，营造一种不安的氛围。第四，运用戏剧性的反讽。你不能让观众一直处于黑暗的氛围中。有时候，悬疑的最好的表达方式是向观众展现重大秘密的关键，而不是向角色。这就是戏剧性反讽的方法。神秘来源于主角了解原因的契机，而不是将要发生什么。在经典戏剧《俄狄浦斯王》中，主角并没有意识到自己杀了亲生父亲，还娶了自己的母亲。但是观众知道并目睹了 俄狄浦斯了解真相的过程，这是故事的一个折磨人的高潮。最后，说一说连续冒险的技巧。注意不要过度运用这种方法。有人认为这是既廉价有好用的方法， 同时这也有很好的效果。在至关重要的情节即将展现的时候，把故事分章、分节、分集或者分季，或者在紧急场景的中间插入一丝丝希望。这个空隙不论是短暂的一瞬还是几年，都会让我们想象接下来会发生什么。这就又制造了悬念。最坏的结果大多数不会发生，使观众的情绪得以释放。但同时没有阻碍我们忧心接下来主角的即将面临的灾难。

**P524 2017-11-01 Can you solve the egg drop riddle - Yossi Elran**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=524)

The city has just opened its one-of-a-kind Fabergé Egg Museum with a single egg displayed on each floor of a 100-story building. And the world's most notorious jewel thief already has her eyes on the prize. Because security is tight and the eggs are so large, she'll only get the chance to steal one by dropping it out the window into her waiting truck and repelling down before the police can arrive. All eggs are identical in weight and construction, but each floor's egg is more rare and valuable than the one below it. While the thief would naturally like to take the priceless egg at the top, she suspects it won't survive a 100-story drop. Being pragmatic, she decides to settle for the most expensive egg she can get. In the museum's gift shop, she finds two souvenir eggs, perfect replicas that are perfectly worthless. The plan is to test drop them to find the highest floor at which an egg will survive the fall without breaking. Of course, the experiment can only be repeated until both replica eggs are smashed. And throwing souvenirs out the window too many times is probably going to draw the guards' attention. What's the least number of tries it would take to guarantee that she find the right floor? Pause here if you want to figure it out for yourself! Answer in: 3 Answer in: 2 Answer in: 1 If you're having trouble getting started on the solution, it might help to start with a simpler scenario. Imagine our thief only had one replica egg. She'd have a single option: To start by dropping it from the first floor and go up one by one until it breaks. Then she'd know that the floor below that is the one she needs to target for the real heist. But this could require as many as 100 tries. Having an additional replica egg gives the thief a better option. She can drop the first egg from different floors at larger intervals in order to narrow down the range where the critical floor can be found. And once the first breaks, she can use the second egg to explore that interval floor by floor. Large floor intervals don't work great. In the worst case scenario, they require many tests with the second egg. Smaller intervals work much better. For example, if she starts by dropping the first egg from every 10th floor, once it breaks, she'll only have to test the nine floors below. That means it'll take at most 19 tries to find the right floor. But can she do even better? After all, there's no reason every interval has to be the same size. Let's say there were only ten floors. The thief could test this whole building with just four total throws by dropping the first egg at floors four, seven, and nine. If it broke at floor four, it would take up to three throws of the second egg to find the exact floor. If it broke at seven, it would take up to two throws with the second egg. And if it broke at floor nine, it would take just one more throw of the second egg. Intuitively, what we're trying to do here is divide the building into sections where no matter which floor is correct, it takes up to the same number of throws to find it. We want each interval to be one floor smaller than the last. This equation can help us solve for the first floor we need to start with in the 100 floor building. There are several ways to solve this equation, including trial and error. If we plug in two for n, that equation would look like this. If we plug in three, we get this. So we can find the first n to pass 100 by adding more terms until we get to our answer, which is 14. And so our thief starts on the 14th floor, moving up to the 27th, the 39th, and so on, for a maximum of 14 drops. Like the old saying goes, you can't pull a heist without breaking a few eggs.

**P524 2017-11-01 Can you solve the egg drop riddle - Yossi Elran**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=524)

翻译人员: Nisi J 校对人员: Sylvia He“许多人害怕高，我不怕，我怕宽。” ——Steven Wright这个城市刚刚开了一家 别具一格的俄罗斯彩蛋博物馆，一栋每层只展出一个蛋 的100层建筑。全世界最臭名昭著的珠宝大盗 已经锁定了她的目标。因为安保很严，蛋又很大， 她只有一次得手的机会，把蛋丢到下面接应的卡车，然后在警察到来之前撤退。每个蛋的重量和构造都是一样的，但是每一层的蛋都比 下面一层的更值钱。大盗自然想拿最顶层的无价之蛋，她觉得这个蛋不会 在掉落一百层后还完好无损。务实的她决定去偷 她能成功偷到的最贵的蛋。在博物馆的礼品店， 她找到了两个纪念蛋，完全不值钱但复制得很完美。她的计划是把它们从高处扔下来，看看它们能在最高的哪层掉落还能完好无损。当然，两个纪念蛋都碎了的时候就不能继续试验了。而且从窗户往外扔蛋太多次会引起保安的注意。她最少实验几次就能保证她找到对的层数？【如果你愿意的话， 暂停一下，自己想一想。】【答案在三秒后出现，二秒，一秒。】如果你觉得无从下手的话，可以简化一下情景。想像一下如果大盗只有一个蛋。她就只有一个选择：从第一层开始，一层层上去，直到蛋碎了。那她就知道下面那层就是她真正需要抢劫的目标。但是要试一百次。有第二个复制蛋 给了她更好的选择。她可以先用大间隔测试，以缩小实验范围。第一个蛋碎了以后，她就可以用第二个蛋 在间隔内一层层试了。太大的间隔不太有效。在最糟的情况下， 第二只蛋要试好多层。小间隔好用多了。打个比方，如果她每十层丢一次，蛋碎了之后就只要试之下的九层。这就意味着最多十九次 就能找到正确的层数。但是她还能做得更好吗？毕竟，每一间隔不需要一样大。如果只有十层，大盗可以四下试完，从四层开始，七层，九层。如果在第四层碎了， 就只要扔三次第二个蛋，就能找到准确层数。如果在第七层碎了，就只要再扔两次。如果在第九层碎了，就只要再试一次。实际上我们在试图将建筑物分区，无论哪一层是对的，都可以用同样的次数找到。我们要每一个间隔 都比下面的少一层。这个公式能帮我们 找到一百层内开始扔蛋的层数。这个式子有几种解法，包括反复试验。如果我们代入 2，等式就是这样。如果我们代入 3，等式就是这样。因此我们通过增加 n 的值， 就可以找到让左边总和超过 100 的 最小的 n，也就是 14。因此，我们的大盗 应该从第十四层开始，再到二十七层，三十九层，等等，最多十四下就可以找到正确的层数。就像老话说的， 不打碎几个蛋就抢不了劫。

**P525 2017-11-02 Why incompetent people think they're amazing - David Dunning**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=525)

Are you as good at things as you think you are? How good are you at managing money? What about reading people's emotions? How healthy are you compared to other people you know? Are you better than average at grammar? Knowing how competent we are and how are skill stack up against other people's is more than a self-esteem boost. It helps us figure out when we can forge ahead on our own decisions and instincts and when we need, instead, to seek out advice. But psychological research suggests that we're not very good at evaluating ourselves accurately. In fact, we frequently overestimate our own abilities. Researchers have a name for this phenomena, the Dunning-Kruger effect. This effect explains why more than 100 studies have shown that people display illusory superiority. We judge ourselves as better than others to a degree that violates the laws of math. When software engineers at two companies were asked to rate their performance, 32% of the engineers at one company and 42% at the other put themselves in the top 5%. In another study, 88% of American drivers described themselves as having above average driving skills. These aren't isolated findings. On average, people tend to rate themselves better than most in disciplines ranging from health, leadership skills, ethics, and beyond. What's particularly interesting is that those with the least ability are often the most likely to overrate their skills to the greatest extent. People measurably poor at logical reasoning, grammar, financial knowledge, math, emotional intelligence, running medical lab tests, and chess all tend to rate their expertise almost as favorably as actual experts do. So who's most vulnerable to this delusion? Sadly, all of us because we all have pockets of incompetence we don't recognize. But why? When psychologists Dunning and Kruger first described the effect in 1999, they argued that people lacking knowledge and skill in particular areas suffer a double curse. First, they make mistakes and reach poor decisions. But second, those same knowledge gaps also prevent them from catching their errors. In other words, poor performers lack the very expertise needed to recognize how badly they're doing. For example, when the researchers studied participants in a college debate tournament, the bottom 25% of teams in preliminary rounds lost nearly four out of every five matches. But they thought they were winning almost 60%. WIthout a strong grasp of the rules of debate, the students simply couldn't recognize when or how often their arguments broke down. The Dunning-Kruger effect isn't a question of ego blinding us to our weaknesses. People usually do admit their deficits once they can spot them. In one study, students who had initially done badly on a logic quiz and then took a mini course on logic were quite willing to label their original performances as awful. That may be why people with a moderate amount of experience or expertise often have less confidence in their abilities. They know enough to know that there's a lot they don't know. Meanwhile, experts tend to be aware of just how knowledgeable they are. But they often make a different mistake: they assume that everyone else is knowledgeable, too. The result is that people, whether they're inept or highly skilled, are often caught in a bubble of inaccurate self-perception. When they're unskilled, they can't see their own faults. When they're exceptionally competent, they don't perceive how unusual their abilities are. So if the Dunning-Kruger effect is invisible to those experiencing it, what can you do to find out how good you actually are at various things? First, ask for feedback from other people, and consider it, even if it's hard to hear. Second, and more important, keep learning. The more knowledgeable we become, the less likely we are to have invisible holes in our competence. Perhaps it all boils down to that old proverb: When arguing with a fool, first make sure the other person isn't doing the same thing.

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翻译人员: Cindy Zheng-Huang 校对人员: Riley WANG你的能力是否与想象中的一样好？你的理财能力有多强？你的解读情感能力有多好？与熟人相比，你有多健康？你的文法高于平均水平吗？了解自己的能力以及对比自己与别人能力不仅仅能够提升自尊。它帮助我们确定 何时可以凭着感觉走，何时需要寻求建议。但是心理学研究表明我们并不善于准确评价自己。事实上，我们经常高估自己的能力。研究人员将这种现象命名，称为邓宁-克鲁格效应。此效应解析了为什么有100多项研究 表明人们有虚幻的优越性。我们认为自己比别人好，这在某种程度上 甚至违反了数学定律。两个公司的软件工程师 被要求进行自我评定，两家公司分别有 32%和42%的工程师把自己排在前5%。在另一项研究中，88%的美国司机自认为 具有高于平均水平的驾驶技能。这些并不是特例。平均来说，人们倾向于认为 自己比大多数人更优秀，这表现在健康情况、领导才能 、 道德水平和其他领域。特别有趣的在于能力越低的人越容易 最大程度地高估自己的技能。在逻辑推理、文法、金融知识、数学、情商、做医学实验、国际象棋等方面，分数低的人都倾向于认为 自己与真正的专家能力相当。那么，究竟谁 最容易受这种错觉的影响呢？可悲的是，答案是所有人，因为我们都有 自己意识不到的不擅长领域。但为什么呢？1999年心理学家邓宁和克鲁格 首次描述了这种效应，他们认为 缺乏特定领域知识和技能的人遭受双重困境。第一，他们会犯错误 并做出糟糕的决定。第二，这种知识欠缺也会 阻碍他们发现错误。换句话说， 表现不佳的人缺乏所需的专业知识，因此无法认识到自己做得多么糟糕。举例来说，对大学辩论赛的参赛者进行的研究发现，在预赛中排在倒数25%的队员在每五场比赛中失败了近四场。但他们却认为自己赢了近60%的比赛。这些学生们没有扎实掌握辩论规则，因此他们根本分不清自己的论点 在何时被推翻或是多少次被推翻。邓宁-克鲁格效应并不是说 自我意识让我们看不到自身弱点。人们一旦发现自己的弱点 通常都会承认这些问题。在一项研究中， 一些学生起初在逻辑测验中表现不好，在参加了一些小型逻辑课程后，他们欣然承认原来的表现糟透了。这也许就是为何 拥有些许经验或专业知识的人往往对自己的能力信心不足。他们清楚地知道 自己还有很多不了解的事情。与此同时，专家们往往能意识到 自己知识多么渊博。但他们经常犯另一个错误：那就是，他们假定其他人同样知识渊博。结果就是， 无论是笨拙还是技艺精湛，人们经常不能准确认知自我。当他们不擅长某事的时候， 他们看不到自己的缺点。当他们异常能干的时候，他们不知道 自己的能力有多不寻常。对于正在经历邓宁-克鲁格效应 却不自知的人来说，如何能了解自己在各领域的真实水平呢？首先，要寻求别人的反馈，即使它并不动听，也要仔细考虑。其次，更重要的是不断学习。我们了解的知识越多，那些隐藏的能力缺陷就会越少。也许一切都归结为那句古老的谚语：当和傻瓜辩论时，首先要确定 对方是否也在做同样的事。

**P526 2017-11-03 The myth of Prometheus - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=526)

Before the creation of humanity, the Greek gods won a great battle against a race of giants called the Titans. Most Titans were destroyed or driven to the eternal hell of Tartarus. But the Titan Prometheus, whose name means foresight, persuaded his brother Epimetheus to fight with him on the side of the gods. As thanks, Zeus entrusted the brothers with the task of creating all living things. Epimetheus was to distribute the gifts of the gods among the creatures. To some, he gave flight; to others, the ability to move through water or race through grass. He gave the beasts glittering scales, soft fur, and sharp claws. Meanwhile, Prometheus shaped the first humans out of mud. He formed them in the image of the gods, but Zeus decreed they were too remain mortal and worship the inhabitants of Mount Olympus from below. Zeus deemed humans subservient creatures vulnerable to the elements and dependent on the gods for protection. However, Prometheus envisioned his crude creations with a greater purpose. So when Zeus asked him to decide how sacrifices would be made, the wily Prometheus planned a trick that would give humans some advantage. He killed a bull and divided it into two parts to present to Zeus. On one side, he concealed the succulent flesh and skin under the unappealing belly of the animal. On the other, he hid the bones under a thick layer of fat. When Zeus chose the seemingly best portion for himself, he was outraged at Prometheus's deception. Fuming, Zeus forbade the use of fire on Earth, whether to cook meat or for any other purpose. But Prometheus refused to see his creations denied this resource. And so, he scaled Mount Olympus to steal fire from the workshop of Hephaestus and Athena. He hid the flames in a hollow fennel stalk and brought it safely down to the people. This gave them the power to harness nature for their own benefit and ultimately dominate the natural order. With fire, humans could care for themselves with food and warmth. But they could also forge weapons and wage war. Prometheus's flames acted as a catalyst for the rapid progression of civilization. When Zeus looked down at this scene, he realized what had happened. Prometheus had once again wounded his pride and subverted his authority. Furious, Zeus imposed a brutal punishment. Prometheus was to be chained to a cliff for eternity. Each day, he would be visited by a vulture who would tear out his liver and each night his liver would grow back to be attacked again in the morning. Although Prometheus remained in perpetual agony, he never expressed regret at his act of rebellion. His resilience in the face of oppression made him a beloved figure in mythology. He was also celebrated for his mischievous and inquisitive spirit, and for the knowledge, progress, and power he brought to human hands. He's also a recurring figure in art and literature. In Percy Bysshe Shelley's lyrical drama "Prometheus Unbound," the author imagines Prometheus as a romantic hero who escapes and continues to spread empathy and knowledge. Of his protagonist, Shelley wrote, "Prometheus is the type of the highest perfection of moral and intellectual nature, impelled by the purest and the truest motives to the best and noblest ends." His wife Mary envisaged Prometheus as a more cautionary figure and subtitled her novel "Frankenstein: The Modern Prometheus." This suggests the damage of corrupting the natural order and remains relevant to the ethical questions surrounding science and technology today. As hero, rebel, or trickster, Prometheus remains a symbol of our capacity to capture the powers of nature, and ultimately, he reminds us of the potential of individual acts to ignite the world.

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翻译人员: Di SUN 校对人员: Chien Yet Chong在创造人类之前，希腊诸神赢得了一场伟大的战斗， 击败了泰坦巨人种族。大多数的泰坦都被摧毁 或驱赶到了永恒的地狱里。但名字意味着预见的 泰坦巨人普罗米修斯，说服了他的兄弟厄庇墨透斯 与他一同在神的一边作战。作为答谢，宙斯委以兄弟俩创造所有生物的重任。厄庇墨透斯将神的恩赐 分发给这些生物。他给了一些生物飞行的本领，给了另一些生物在水中游的能力，或者是在草从中奔跑的本事。他给了一些猛兽闪闪发光的鳞片、柔软的皮毛，和锋利的爪子。同时， 普罗米修斯 用泥做出第一个人形，效仿诸神的样貌。但是宙斯发布命令规定 这些人类必须维持平凡，同时要在山下 供奉奥林匹斯山的居民。宙斯把人类看作是怯懦的生物， 容易受到各种因素影响，并且依赖诸神保护。但是普罗米修斯对于他创造的生物 拥有更美好的设想。当宙斯让他决定人类该如何献祭时，机智的普罗米修斯想出了一招 来帮助人类。他宰了一头牛， 并把牛分成两部分呈给宙斯。其中一部分， 他把美味多汁的皮和肉藏在了难看的肚皮下面。另一部分， 他把骨头藏在了一层很厚的肥肉下。当宙斯选了看起来 更有吸引力的那一部分，他对普罗米修斯的欺骗行为 感到非常愤怒。火冒三丈的宙斯 禁止了人间用火，无论是烧肉还是其他用途。但普罗米修斯不愿意 看到他创造的人类失去这一资源。因此，他爬上了奥林匹斯山，从赫菲斯托斯和 雅典娜那里盗取火种。他把火焰藏在一根空心的茴香秆中， 并把它安全地送到人间。火使人类能利用自然为自身造福，也带给了人类战胜自然的力量。有了火， 人类可以烹饪食物和取暖，还可以打造武器，发动战争。普罗米修斯的火种 是人类文明进步的催化剂。当宙斯发现人间烟火袅袅， 他才意识到发生了什么。普罗米修斯再一次伤害了 他的自尊心，颠覆了他的权威。暴怒的宙斯决定 狠狠惩罚普罗米修斯，用铁链把他永远锁在悬崖绝壁上。一只秃鹰每天都会去 啄食普罗米修斯的肝脏，每天晚上他的肝脏又会长回来， 第二天继续被啄食。虽然普罗米修斯忍受着 巨大的痛苦，但他从不后悔他的反叛行为。他在面对压迫时的韧性 使他成为人们钟爱的神话人物。他也因机智和探索的精神,以及他带给人类的知识， 进步和力量而闻名。他也常在文学和艺术作品中出现。在珀西·比希·雪莱的 抒情剧《解放了的普罗米修斯》中，作者把普罗米修斯 描绘成一个浪漫主义的英雄，他逃跑并继续传播同情和知识。对于他笔下的主角，雪莱写到“普罗米修斯是道德和智慧最完美结合的化身，受最纯粹和真实的目的驱动，走向最好，最高贵的结局。“雪莱的妻子玛丽把普罗米修斯 设想成一个更加警世的人物，并给她的小说命名为 《科学怪人：现代普罗米修斯》。内容指出破坏自然秩序的影响，以及道德问题一直围绕着现代科技。作为一个英雄，反叛者， 或是骗子，普罗米修斯是人类能够 利用自然力量的象征。从根本上说，他提醒我们 依靠个人力量来点燃世界的可能性。

**P527 2017-11-06 How long will human impacts last - David Biello**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=527)

Imagine aliens land on the planet a million years from now and look into the geologic record. What will these curious searchers find of us? They will find what geologists, scientists, and other experts are increasingly calling the Anthropocene, or new age of mankind. The impacts that we humans make have become so pervasive, profound, and permanent that some geologists argue we merit our own epoch. That would be a new unit in the geologic time scale that stretches back more than 4.5 billion years, or ever since the Earth took shape. Modern humans may be on par with the glaciers behind various ice ages or the asteroid that doomed most of the dinosaurs. What is an epoch? Most simply, it's a unit of geologic time. There's the Pleistocene, an icy epoch that saw the evolution of modern humans. Or there's the Eocene, more than 34 million years ago, a hothouse time during which the continents drifted into their present configuration. Changes in climate or fossils found in the rock record help distinguish these epochs and help geologists tell deep time. So what will be the record of modern people's impact on the planet? It doesn't rely on the things that may seem most obvious to us today, like sprawling cities. Even New York or Shanghai may prove hard to find buried in the rocks a million years from now. But humans have put new things into the world that never existed on Earth before, like plutonium and plastics. In fact, the geologists known as stratigraphers who determine the geologic timescale, have proposed a start date for the Anthropocene around 1950. That's when people started blowing up nuclear bombs all around the world and scattering novel elements to the winds. Those elements will last in the rock record, even in our bones and teeth for millions of years. And in just 50 years, we've made enough plastic, at least 8 billion metric tons, to cover the whole world in a thin film. People's farming, fishing, and forestry will also show up as a before and after in any such strata because it's those kinds of activities that are causing unique species of plants and animals to die out. This die-off started perhaps more than 40,000 years ago as humanity spread out of Africa and reached places like Australia, kicking off the disappearance of big, likable, and edible animals. This is true of Europe and Asia, think woolly mammoth, as well as North and South America, too. For a species that has only roamed the planet for a few hundred thousand years, Homo sapiens has had a big impact on the future fossil record. That also means that even if people were to disappear tomorrow, evolution would be driven by our choices to date. We're making a new homogenous world of certain favored plants and animals, like corn and rats. But it's a world that's not as resilient as the one it replaces. As the fossil record shows, it's a diversity of plants and animals that allows unique pairings of flora and fauna to respond to environmental challenges, and even thrive after an apocalypse. That goes for people, too. If the microscopic plants of the ocean suffer as a result of too much carbon dioxide, say, we'll lose the source of as much as half of the oxygen we need to breathe. Then there's the smudge in future rocks. People's penchant for burning coal, oil, and natural gas has spread tiny bits of soot all over the planet. That smudge corresponds with a meteoric rise in the amount of carbon dioxide in the air, now beyond 400 parts per million, or higher than any other Homo sapiens has ever breathed. Similar soot can still be found in ancient rocks from volcanic fires of 66 million years ago, a record of the cataclysm touched off by an asteroid at the end of the late Cretaceous epoch. So odds are our soot will still be here 66 million years from now, easy enough to find for any aliens who care to look. Of course, there's an important difference between us and an asteroid. A space rock has no choice but to follow gravity. We can choose to do differently. And if we do, there might still be some kind of human civilization thousands or even millions of years from now. Not a bad record to hope for.

**P527 2017-11-06 How long will human impacts last - David Biello**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=527)

翻译人员: Siyuan Qi 校对人员: vivian qian设想一百万年后外星人登陆地球，并且查看地质记录。这些好奇的探索者会找到 关于我们的什么信息呢？他们会找到“人类世”的痕迹，这个名词被越来越多地质学家、 科学家和其他专家使用，意思是属于人类的新世纪。人类所产生的影响变得越来越普遍，越来越深入，越来越持久。于是一些地质学家认为 应该有一个关于人类的新纪元。这个纪元是一个新的地质单元，可以追溯到 45 亿年前，或者地球形成时。现代人类可能就与冰河时代的冰川以及造成恐龙灭绝 的小行星并驾齐驱了。纪元是什么？简单来讲，纪元 是地质时间的一个单元，比如有更新世，一个见证了现代人类演进的冰川纪元。比如有始新世，3400 多万年前 的一个地球活跃时间段。在此期间，大陆漂移成了现在的结构。气候变化和岩石记录中找到的化石能帮助我们区分这些纪元， 帮助地质学家识别更久远的时间。现代人类对于地球的影响， 会产生怎样的记录呢？这并不取决于我们今天 所见到的最显眼的东西，例如连绵不绝的城市。即便像纽约和上海这样的城市，也可能被埋在一百万年后 的岩石下，踪迹难寻。但是人类将新东西带到了世界上。这些新东西是地球之前没有的，例如钚和塑料。事实上，地质学家中 负责测定地质时间的地层学家提出，“人类世”的开始时间大约在 1950 年。在那时，人们开始 在世界范围内投放原子弹，使新元素大量扩散。这些元素会留存在岩石记录中，甚至在我们的骨头 和牙齿中留存数百万年。在仅仅 50 年中， 我们所生产的塑料就达到了 80 亿公吨以上，足以在地球表面覆盖一个薄层。人类的农业、林业、渔业活动也会先后表现在地层中,因为是这些活动导致了稀有的动植物物种灭绝。这种灭绝情况也许在 4 万年前人类走出非洲时就开始了，我们的祖先到达了 像澳大利亚这样的地方，开启了大型、可爱、 可食用的动物的消失进程。在欧洲和亚洲是这样的， 想一想长毛猛犸象就知道，北美和南美洲的动物也难逃一劫。对于一个仅仅在地球上出现了几十万年的物种来说，智人对于未来的化石记录 产生了巨大的影响。这也意味着，即便人类明天就消失，我们至今为止做出的选择 也会推动演进过程。我们正在创造一个同质化的世界， 有利于一些特定的动植物，如谷物和老鼠。但是这个世界不如 原来的世界适应能力强。化石记录表明，是植物和动物的多样性使得特定动植物群有可能去应对环境威胁， 甚至在大灾难之后依然繁衍生息。这点对于人类也是一样。假设过多的二氧化碳导致海洋微生植物受损，我们会失去现在一半的氧气来源。然后是未来岩石中的污迹。人类对于燃烧煤、 石油、天然气的偏好使细小的煤烟在地球上蔓延。这种煤烟会导致空气中二氧化碳含量激增，目前空气中二氧化碳含量 已经超过了400 ppm，或者说比以前所有智人呼吸过 的空气中的二氧化碳含量还要高。类似的煤烟也能在古岩石中找到，这些岩石来自 6600 万年前的火山喷发，它记录下了在白垩纪末期由小行星引发的一场大灾难。因此我们的煤烟也有可能 在 6600 万年后仍然存在，很容易被细心的外星人找到。当然，我们和小行星之间 有一个很大的区别。宇宙岩石除了 遵循重力规则外别无选择。但是我们可以选择做不一样的事情。如果我们行动起来， 几千年，甚至几百万年后，仍然会有人类文明的存在，希望这会是一个不错的记录。

**P528 2017-11-08 Why should you read 'The Handmaid's Tale' - Naomi R. Mercer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=528)

In Margaret Atwood's near-future novel, "The Handmaid's Tale," a Christian fundamentalist regime called the Republic of Gilead has staged a military coup and established a theocratic government in the United States. The regime theoretically restricts everyone, but in practice a few men have structured Gilead so they have all the power, especially over women. The Handmaid's Tale is what Atwood calls speculative fiction, meaning it theorizes about possible futures. This is a fundamental characteristic shared by both utopian and dystopian texts. The possible futures in Atwood's novels are usually negative, or dystopian, where the actions of a small group have destroyed society as we know it. Utopian and dystopian writing tends to parallel political trends. Utopian writing frequently depicts an idealized society that the author puts forth as a blueprint to strive toward. Dystopias, on the other hand, are not necessarily predictions of apocalyptic futures, but rather warnings about the ways in which societies can set themselves on the path to destruction. The Handmaid's Tale was published in 1985, when many conservative groups attacked the gains made by the second-wave feminist movement. This movement had been advocating greater social and legal equality for women since the early 1960s. The Handmaid's Tale imagines a future in which the conservative counter-movement gains the upper hand and not only demolishes the progress women had made toward equality, but makes women completely subservient to men. Gilead divides women in the regime into distinct social classes based upon their function as status symbols for men. Even their clothing is color-coded. Women are no longer allowed to read or move about freely in public, and fertile women are subject to state-engineered rape in order to give birth to children for the regime. Although The Handmaid's Tale is set in the future, one of Atwood's self-imposed rules in writing it was that she wouldn't use any event or practice that hadn't already happened in human history. The book is set in Cambridge, Massachusetts, a city that during the American colonial period had been ruled by the theocratic Puritans. In many ways, the Republic of Gilead resembles the strict rules that were present in Puritan society: rigid moral codes, modest clothing, banishment of dissenters, and regulation of every aspect of people's lives and relationships. For Atwood, the parallels to Massachusett's Puritans were personal as well as theoretical. She spent several years studying the Puritans at Harvard and she's possibly descended from Mary Webster, a Puritan woman accused of witchcraft who survived her hanging. Atwood is a master storyteller. The details of Gilead, which we've only skimmed the surface of, slowly come into focus through the eyes of its characters, mainly the novel's protagonist Offred, a handmaid in the household of a commander. Before the coup that established Gilead, Offred had a husband, a child, a job, and a normal, middle-class American life. But when the fundamentalist regime comes into power, Offred is denied her identity, separated from her family, and reduced to being, in Offred's words, "a two-legged womb for increasing Gilead's waning population." She initially accepts the loss of her fundamental human rights in the name of stabilizing the new government. But state control soon extends into attempts to control the language, behavior, and thoughts of herself and other individuals. Early on, Offred says, "I wait. I compose myself. My self is a thing I must compose, as one composes a speech." She likens language to the formulation of identity. Her words also acknowledge the possibility of resistance, and it's resistance, the actions of people who dare to break the political, intellectual, and sexual rules, that drives the plot of the Handmaid's Tale. Ultimately, the novel's exploration of the consequences of complacency, and how power can be wielded unfairly, makes Atwood's chilling vision of a dystopian regime ever relevant.

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翻译人员: Riley WANG 校对人员: Wentao Chian视而不见不同于无知， 你得劳神费力才能做到视而不见。——玛格丽特·阿特伍德《使女的故事》玛格丽特·阿特伍德的小说《使女的故事》描述了在不久的未来，基督教基要主义政府— 基列共和国通过军事政变，在美国建立了神权政府。理论上，这个政体约束每个人，但事实上，少数男性统治着基列共和国，因此他们拥有至高的权利，尤其是在对待女性方面。阿特伍德称《使女的故事》这类小说为 推想小说，这类小说构想可能的未来。这种推想性是乌托邦和反乌托邦小说共有的基本特点。在阿特伍德的小说里，未来通常是消极、反乌托邦的。一部分人的行为已毁灭了 我们所熟知的社会。乌托邦和反乌托邦的作品通常会影射时下政治走向乌托邦作品通常描述理想社会，是作者描绘出的有朝一日可以实现的未来。与之相反，反乌托邦作品并不一定预言未来发生大灾难，而是警示人们社会是如何走向灭亡之路的。《使女的故事》出版于1985年，当时很多保守团体抨击第二波女权运动所取得的成就。这一运动自1960年代初开始，一直倡导女性在社会和法律上更加平等。在《使女的故事》中，保守派的反平等运动占了上风，不仅摧毁了女性在平等方面 所取得的成果，还使女性彻底沦为了男性的附庸。基列共和国将女性分为多个阶层，依据是她们的职能，她们只是男性地位的象征。甚至她们的服装颜色也体现出阶级。女性不允许读书，不可以在公共场所自由行动。国家策划侵犯有生育能力的女子，从而令她们为政权生育孩子虽然《使女的故事》设定在未来，但阿特伍德在撰写此书时，自定规矩之一是她使用的事件或行为都有历史依据。故事设定在马萨诸塞州的剑桥市。在美国殖民时期，这个城市曾被清教徒统治。在很多方面，基列共和国 与规则森严的清教徒社会类似:苛刻的道德准则，朴素的服装，驱逐异议人士，人民生活和社会关系的 方方面面都受到管制。对阿特伍德来说，将麻省的清教徒作为原型既包含个人因素也拥有理论依据。她曾花数年在哈佛大学研究清教徒。她有可能是玛丽·韦伯斯特的后裔玛丽是一名清教徒女子，曾被指控使用巫术， 受绞刑却大难不死。阿特伍德名故事大师。基列共和国的诸多细节我们尚未提及，但通过人物视角， 更多细节慢慢展现，逐渐清晰。小说主要利用主人公 奥芙弗雷德的视角。她是将军家的一名侍女。在基列共和国政变夺权之前，奥芙弗雷德有丈夫、孩子和一份工作 过着普通的美国中产阶级生活。当基要主义者掌权后，奥芙弗雷德被剥夺了自我，被迫与家人分离。用她自己的话说，她沦为了“长着两条腿的子宫， 为人口稀少的基列共和国添丁”她起初接受了基本人权的丧失为的是稳定新政府但是国家的控制很快延伸到对语言、行为和思想的掌控，对所有人都如此。早先，奥芙弗雷德说：“我等待着，我要冷静，此刻，我必须理清自我，恰如理清一篇演讲稿。”她把语言比作自我意识的建立，她的话里也包含着抗争的可能性。这种抗争，以及人们勇敢地打破政治、知识和性方面的条条框框，推动了《使女的故事》的情节发展。归根到底，这部小说探索了傲慢自大的恶果 和权利的滥用，这使得阿特伍德对反乌托邦政权的刻画 意义重大，令人不寒而栗。下载此书或TED-ed读书清单中任意一本，您可以访问audible.com/teded每一次的免费试听都会帮助我们支持公益事业感谢您的收听以及对我们的支持。

**P529 2017-11-10 The complicated history of surfing - Scott Laderman**

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For some, it's a serious sport. For others, just a way to let loose. But despite its casual association with fun and sun, surfing has a richer and deeper history than many realize. What we today call surfing originated in the Polynesian islands of the Pacific Ocean. We know from various accounts that wave riding was done throughout the Polynesian Pacific, as well as in West Africa and Peru. But it was in the Hawaiian archipelago in particular that surfing advanced the most, was best documented, and, unlike elsewhere in Polynesia, persisted. And for the people of Hawaii, wave sliding was not just a recreational activity, but one with spiritual and social significance. Like much of Hawaiian society, nearly every aspect of surfing was governed by a code of rules and taboos known as kapu. Hawaiians made offerings when selecting a tree to carve, prayed for waves with the help of a kahuna, or an expert priest, and gave thanks after surviving a perilous wipeout. Certain surf breaks were strickly reserved for the elite. But it wasn't just a solemn affair. Surfers competed and wagered on who could ride the farthest, the fastest, or catch the biggest wave with superior skill, granting respect, social status, and romantic success. Though it was later called the sport of kings, Hawaiian men and women of all ages and social classes participated, riding surfboards shaped from koa, breadfruit, or wiliwili trees. Many Hawaiians road alaia boards, which were thin, midsized, and somewhat resemble today's shortboards. Some mounted paipo boards, short, round-nosed boards on which riders typically lay on their stomachs. But only chieftains could ride the massive olo boards, twice as long as today's longboards. Unlike most modern surfboards, all boards were finless, requiring surfers to drag their hands or feet to turn. We don't know exactly when wave sliding was invented, but we know that it had already been practiced in Polynesia for centuries by the time it was described in 1777 by William Anderson, a surgeon on Captain Cook's ship "Resolution." Although Anderson was in awe, most of the American Christian missionaries who arrived in Hawaii several decades later regarded surfing as sinful, and they discouraged it, along with other aspects of native culture. The biggest threat to surfing, however, was the threat to the natives themselves. By 1890, new illnesses introduced by Europeans and Americans had decimated the Hawaiian people, leaving fewer than 40,000 from a pre-contact population that may have exceeded 800,000. At the same time, foreign influence grew with white settlers overthrowing the native monarchy in 1893, and the U.S. annexing the islands five years later. The end of Hawaii's independence coincided with surfing's native-led revival, a revival soon exploited by the American colonizers. But first, some Hawaiians took surfing overseas. In 1907, George Freeth, the so-called Hawaiian Wonder, traveled to the west coast and gave surfing demonstrations in southern California. Then in 1914, Olympic swimmer Duke Kahanamoku made his way to Australia and New Zealand, gliding across the southern Pacific waves and attracting rapt audiences wherever he went. Shortly before Freeth went to California, a South Carolinian named Alexander Hume Ford moved to Hawaii. After learning to surf, he became a champion of the pastime. But Ford may have had unsavory reasons for his enthusiastic efforts to boost the sport. Like many settlers, he wanted Hawaii to become a U.S. state but was worried about its non-white majority of natives and Asian workers. Ford thus promoted surfing to attract white Americans to Hawaii, first as tourists, then as residents. He was helped by numerous writers and filmmakers. Ford's demographic plan would fail miserably. Hawaii became a state in 1959 and remains the most racially diverse state in the country. But the promotion of surfing was a far greater success. Today, surfing is a multi-billion dollar global industry, with tens of millions of enthusiasts worldwide. And though relatively few of these surfers are aware of the once-crucial wave chants or board carving rituals, Hawaiians continue to preserve these traditions nearly washed away by history's waves.

**P529 2017-11-10 The complicated history of surfing - Scott Laderman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=529)

翻译人员: Ying Lu 校对人员: Di SUN对于一些人而言， 冲浪是一项严肃的运动。对于另一些人而言， 这不过是一种放松方式。冲浪除了不经意的 结合了阳光与乐趣，它还拥有着比许多人所认知 更为丰富和深刻的历史。如今我们常说的冲浪起源于太平洋的波利尼西亚群岛。我们从不同的记录了解到，在波利尼西亚太平洋，西非和秘鲁都有冲浪运动。但是在夏威夷群岛，冲浪发展得最快，拥有最完整的记录，同时，不像在波利尼西亚的其他地方， 在这儿，冲浪运动一直被延续和保留。对于夏威夷的人们而言，冲浪并非只是一项娱乐活动，而是一项具有精神和 社会意义的运动。正如夏威夷社会的惯例，几乎冲浪的方方面面都被 一套规则和禁忌约束，被称为 kapu。夏威夷人民会为被选中用来 雕刻的树献上祭品，向祭司（Kahuna） 或者专业的牧师祈祷浪潮，并对遭受汹涌浪潮袭击后的 幸存表达感激。一些冲浪区只对优秀选手开放。但冲浪并不只是一项严肃的运动。冲浪者之间互相竞争并 打赌谁会冲得最远，最快，或者用高超的技巧 赶上最大的浪潮。这些人会赢得尊重，社会地位、和浪漫的爱情。尽管冲浪后来被称为 王者的运动，夏威夷不同年龄段和社会阶层的人 都参与这项运动，使用由夏威夷寇阿相思树、面包树、或者夏威夷刺桐做的冲浪板。很多夏威夷人用阿莱亚（alaia） 木质的冲浪板驰骋，这种板狭窄，中等大小， 有点类似于当今的小型滑水板。一些人用派波（paipo）板，这是一种短小，圆头的冲浪板， 通常冲浪者将腹部贴在板上。但是只有酋长才能驾驭 巨大的欧罗（olo）板，是当今长滑板的两倍长。和当今大多数冲浪板不同的是，所有的板都是无鳍的，需要冲浪者滑动手脚来转弯。我们并不能准确知道 冲浪是什么时候发明的，但我们知道在 1777 年， 冲浪被威廉·安德森记录下来的时候，它已经出现在波利尼西亚 好几个世纪了。威廉·安德森是库克船长“决心号” 船上的一名外科医生。尽管人们尊敬安德森，之后几十年来到夏威夷的大部分美国基督徒传教士把冲浪视为是有罪的，并且阻止这项运动， 以及本土文化的其他方面。然而对冲浪最大的威胁 是来自对原著民的威胁。在 1890 年，欧洲和美国 移民带来了新的疾病，导致夏威夷人口从最初的 80 多万锐减到 4 万以下。与此同时， 外界影响也逐渐增强。白人定居者在 1893 年 推翻了当地君主制，美国也在 5 年之后 吞并了这些岛屿。夏威夷岛的独立与本土主导的 冲浪复兴不谋而合，这也很快被美国殖民者充分利用。刚开始，一些夏威夷人 会去海外冲浪。1907年，被誉为 夏威夷奇迹的乔治·弗里斯到西海岸旅行，并在南加州做冲浪示范。在1914年，奥林匹克游泳选手 杜克·卡哈纳姆库前往了澳大利亚和新西兰冲浪，滑行在南太平洋的浪潮上。不论他去哪里，总能吸引 一大批狂热的观众。在弗里斯到加州的不久前，一个名为亚历山大·休姆·福特的 南卡罗来纳州人搬到了夏威夷。在学会冲浪后，他成为了 这个业余项目的好手。但是在福特不遗余力推广冲浪背后，也许有着不可告人的理由。和很多移民者一样， 他希望夏威夷成为美国的一个州，但对于这里大部分是非白人的 原住民和亚洲人感到担忧。因此福特通过推广冲浪吸引 美国白人来夏威夷，刚开始作为观光者， 之后成为定居者。他得到了许多作家和 电影制作人的帮助。但福特的人口计划以惨败告终。1959 年，夏威夷 成为了美国的一个州，并且一直都是美国 人种最为多样的州。但是冲浪的推广 取得了极大的成功。如今，冲浪是一个数十亿 美金的全球产业，拥有世界各地数千万爱好者。尽管曾经至关重要 的波潮吟咏或者板雕仪式现在在冲浪者中已经鲜有人知，夏威夷人们仍然继续保留着这些差点被历史浪潮淹没的传统。

**P530 2017-11-15 What is the tragedy of the commons - Nicholas Amendolare**

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Imagine as a thought experiment that you live in a small village and depend on the local fish pond for food. You share the pond with three other villagers. The pond starts off with a dozen fish, and the fish reproduce. For every two fish, there will be one baby added each night. So, in order to maximize your supply of food, how many fish should you catch each day? Take a moment to think about it. Assume baby fish grow to full size immediately and that the pond begins at full capacity, and ignore factors like the sex of the fish you catch. The answer? One, and it's not just you. The best way to maximize every villager's food supply is for each fisherman to take just one fish each day. Here's how the math works. If each villager takes one fish, there will be eight fish left over night. Each pair of fish produces one baby, and the next day, the pond will be fully restocked with twelve fish. If anyone takes more than one, the number of reproductive pairs drops, and the population won't be able to bounce back. Eventually, the fish in the lake will be gone, leaving all four villagers to starve. This fish pond is just one example of a classic problem called the tragedy of the commons. The phenomenon was first described in a pamphlet by economist William Forster Lloyd in 1833 in a discussion of the overgrazing of cattle on village common areas. More than 100 years later, ecologist Garrett Hardin revived the concept to describe what happens when many individuals all share a limited resource, like grazing land, fishing areas, living space, even clean air. Hardin argued that these situations pit short-term self-interest against the common good, and they end badly for everyone, resulting in overgrazing, overfishing, overpopulation, pollution, and other social and environmental problems. The key feature of a tragedy of the commons is that it provides an opportunity for an individual to benefit him or herself while spreading out any negative effects across the larger population. To see what that means, let's revisit our fish pond. Each individual fisherman is motivated to take as many fish as he can for himself. Meanwhile, any decline in fish reproduction is shared by the entire village. Anxious to avoid losing out to his neighbors, a fisherman will conclude that it's in his best interest to take an extra fish, or two, or three. Unfortunately, this is the same conclusion reached by the other fisherman, and that's the tragedy. Optimizing for the self in the short term isn't optimal for anyone in the long term. That's a simplified example, but the tragedy of the commons plays out in the more complex systems of real life, too. The overuse of antibiotics has led to short-term gains in livestock production and in treating common illnesses, but it's also resulted in the evolution of antibiotic-resistant bacteria, which threaten the entire population. A coal-fired power plant produces cheap electricity for its customers and profits for its owners. These local benefits are helpful in the short term, but pollution from mining and burning coal is spread across the entire atmosphere and sticks around for thousands of years. There are other examples, too. Littering, water shortages, deforestation, traffic jams, even the purchase of bottled water. But human civilization has proven it's capable of doing something remarkable. We form social contracts, we make communal agreements, we elect governments, and we pass laws. All this to save our collective selves from our own individual impulses. It isn't easy, and we certainly don't get it right nearly all of the time. But humans at our best have shown that we can solve these problems and we can continue to do so if we remember Hardin's lesson. When the tragedy of the commons applies, what's good for all of us is good for each of us.

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翻译人员: Chien Yet Chong“大众共同拥有的往往却是最被忽视的。” ——亚里士多德，《政治学》有这样一道思考题， 假设你住在一个小村庄里，村民们依靠在当地鱼塘打渔为食。 你要与另外三位村民共享这个鱼塘。鱼塘自起始时有十二条鱼， 同时鱼也会繁殖。每两条鱼每晚会产出一条小鱼。那么为了最大化你们的食物供给，你们每天可以捕多少条鱼呢？让我们花点时间思考一下。假设大鱼每晚产下的小鱼 在次日就会变为大鱼，鱼塘自起始时也有 足够的条件供鱼类生息，同时忽略鱼的性别， 以及类似的影响因素。答案是一条， 而且不仅仅是你只能打一条鱼。最大化每位村民 食物供给的方法就是，每位渔民每天只能捕一条鱼。算法是这样的。如果每位村民每天打一条鱼， 当晚鱼塘内会剩下八条鱼。每两条鱼会繁殖出一条小鱼，于是次日，鱼塘内鱼的 数量又会恢复到十二条。如果有任何一位多捕了一条， 鱼塘内的繁殖对数量就会减少，鱼的数量也就无法恢复， 无法维持正常供给。最终鱼塘里也就不再有鱼了，而村民们只能挨饿。这个鱼塘引发的问题， 只是这类问题的一个示例，即所谓的“公用品悲剧”。这个现象首次于1833年由威廉·福斯特·洛伊提出， 发布在一本小手册上，以此讨论了在村庄的公共区域内过度放牧的现象。一百多年后，经济学家 加勒特·哈丁再次提出了这个概念，用来描述当许多人 共享一种有限的资源时会发生什么，比如共用牧场、鱼塘、生活空间、甚至是清新的空气。哈丁认为造成这些 公共资源短缺的现象是由于人们盲目追求短期自我利益，而这最终只会有害于所有人，导致过度放牧、过度捕鱼、人口过剩、大气污染以及其他社会环境问题。“公用品悲剧“的主要特点是，它为人们提供了让自己获益的机会，同时却对大众造成负面影响。想要进一步了解它的含义， 让我们回到之前的鱼塘思考题。每位渔民都有理由为自己捕捞尽可能多的鱼。然而同时鱼塘内 鱼的繁殖量下降是需要所有村民一起承受的。急于避免自己的捕鱼量比邻居少，渔民会为了个人利益 尽可能地多捕一条鱼，或者两条，或者三条。不幸的是，每位渔民都是这样想的，而这就是悲剧的开始。自身短期的利益往往 与群体长期利益向冲突。以上只是一个简单的例子， 然而公用品悲剧也发生在现实生活中 更复杂的情形里。过多使用抗生素可以增长 畜牧生产的短期收益并治疗一些人类普遍的疾病，但同时也会引发细菌的抗药性，从而对整个人口系统造成威胁。依靠燃煤发电可以为人们 提供廉价的电力并使发电厂获利。这些诚然可以为当地发展 提供短期的利益，但采矿和燃煤造成的污染 则会遍布整个大气层，在几千年内都无法消失。这样的例子举不胜举。乱扔垃圾、水资源短缺、砍伐森林、交通堵塞，甚至是购买瓶装水。然而人类文明已经证明了 它可以做一些卓尔不群的事。我们起草社会契约、我们制定公用协定、我们选择政府党派、我们通过法律议案。这都是为了拯救因个人行为 而受损的集体利益。这并不是简单的事， 而我们也没有经常做对。但当人类怀有最好的意愿时， 我们总是可以解决这些问题，如果我们能铭记哈丁的这个理论， 就能继续做正确的决定。当公用品的利益出现时，对大家都有益的， 才是对每个人有益的。

**P531 2017-11-15 Why do you need to get a flu shot every year - Melvin Sanicas**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=531)

All year long, researchers at hundreds of hospitals around the world collect samples from flu patients and send them to top virology experts with one goal: to design the vaccine for the next flu season. But why do we need a new one every year? Vaccines for diseases like mumps and rubella offer a lifetime of protection with two shots early in life. What's so special about the flu? Two factors make the flu a tough target. First, there are more than 100 subtypes of the influenza virus, and the ones in circulation change from season to season. And second, the flu's genetic code allows it to mutate more quickly than many other viruses. The flu spreads by turning a host's own cells into viral production factories. When the virus is engulfed by a host cell, it expels its genetic material, which makes its way to the nucleus. There, cellular machinery that normally copies the host's genes starts replicating viral genes instead, creating more and more copies of the virus. New viruses are repackaged and crammed into the cell until it bursts, sending freshly minted influenza viruses out to infect additional cells. Most viruses follow this script. The trick with the flu is that its genetic material isn't DNA but a similar compound called RNA. And RNA viruses can mutate much faster. When cells synthesize DNA, a built-in proofreader recognizes and corrects mistakes, but the RNA synthesis mechanism doesn't have this fail-safe. If errors creep in, they stick around creating new variants of the virus. Why is this a problem? Because vaccines depend on recognition. The flu vaccine includes some of the same substances, called antigens, found on the surface of the virus itself. The body identifies those fragments as foreign and responds by producing compounds called antibodies, tailor-made to match the antigens. When a vaccinated person encounters the actual virus, the preprogrammed antibodies help the immune system identify the threat and mobilize quickly to prevent an infection. Those antigens are different for every strain of influenza. If vaccination has prepared the immune system for one strain, a different one may still be able to sneak by. Even within the same strain of flu, those rapid genetic mutations can change the surface compounds enough that the antibodies may not recognize them. To make things even more complicated, sometimes two different strains combine to create an entirely new hybrid virus. All of this makes vaccinating for the flu like trying to hit a moving transforming target. That's why scientists are constantly collecting data about which strains are circulating and checking to see how much those strains have mutated from previous years' versions. Twice annually, the World Health Organization pulls together experts to analyze all that data, holding one meeting for each hemisphere. The scientists determine which strains to include in that season's vaccine, picking four for the quadrivalent vaccine in use today. In spite of the flu's evasive maneuvers, in recent years, the group's predictions have been almost always correct. Even when flu strains mutate further, the vaccine is often close enough that a vaccinated person who catches the flu anyway will have a milder and shorter illness than they would otherwise. Vaccination also helps protect other people in the community who may not be medically eligible for the shot by preventing those around them from carrying the virus. This is called herd immunity. The flu shot can't give you the flu. It contains an inactivated virus that isn't capable of making you sick. You might feel tired and achy after getting it, but that's not an infection. It's your normal immune response to the vaccine. Some parts of the world use, instead of a shot, an inhaled vaccine that contains a weakened live virus. This is also safe for the vast majority of people. Only those with impaired immune systems would be at risk, but they're typically not given live vaccines. Meanwhile, scientists are working to develop a universal flu vaccine that would protect against any strain, even mutated ones. But until then, the hunt for next year's vaccine is on.

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翻译人员: Chien Yet Chong 校对人员: Riley WANG“疫苗拯救生命，恐惧危害生命。” ——《时代》杂志高级编辑 杰弗里·克鲁格每年，全球数百家医院的研究人员们 都会从流感患者身上采集样本交给顶级病毒学专家，目的是为下一个 流感发病季研发疫苗。但为什么我们每年都需要新的疫苗？针对腮腺炎和风疹的疫苗 可以提供终身保护，只要在儿童时期接种两次即可。流感有什么特殊之处吗？预防流感之所以困难 有如下两个原因。原因一，流感病毒 有一百多种亚型，每个季节盛行 的流感病毒都有所不同。原因二在于，流感病毒 的基因序列使得它的突变速度比其它病毒更快。流感病毒把宿主细胞变成 病毒生产工厂，从而实现传播。当病毒被宿主细胞吞噬后， 会释放遗传物质，这些遗传物质会进入细胞核。细胞核中本应进行宿主基因的复制，现在则转而复制病毒基因，从而制造出更多的病毒。新的病毒将重新组装 充满整个细胞，直至细胞迸裂，新产生的流感病毒得以扩散， 继续感染新的细胞。大部分病毒会遵循这个过程，但流感病毒的特别之处在于， 其遗传物质并非DNA（脱氧核糖核酸），而是一种与之类似的化合物， 称为RNA（核糖核酸）。RNA病毒突变速度更快。当细胞合成DNA时，细胞本身具有校对机制， 可以辨认和修正错误，但RNA的合成过程 并不具有这种机制。如果出现错配 ， 就会制造出新的变异病毒。为什么这是个麻烦呢？这是因为，疫苗需要辨认病毒特点。流感疫苗含有一些与 病毒相同的物质，我们称之为抗原，抗原存在于病毒表面。身体把抗原视为外来物质，为了应对威胁，身体会释放出 一种化合物，我们称之为抗体，抗体与抗原相互匹配。当一个已接受过疫苗接种的人 被真正的病毒感染时，之前已经激活的抗体 会帮助免疫系统识别该种威胁，并迅速出击，避免感染发生。不同流感病毒具有不同的抗原。如果疫苗是为单一毒株而设，那么其他病毒依然可以引起感染。就算流感病毒相同，迅速的基因突变 也足以改变病毒表面的化合物，以致抗体无法辨认它们。让事情更复杂的是，有时，两种不同病毒 会结合形成新的混种病毒。这使得流感疫苗的研发像是射击一个 不断移动和变化的靶子。这也就是为什么 科学家夜以继日地工作，收集当下流行病毒的数据，并将这些病毒与往年相比，观察其变异情况。每年，世界卫生组织 都会召集专家分析这些数据，南北半球各举行一次会议。科学家将确定用于 制作当季疫苗的病毒，选出四种， 作为现今所用的四价疫苗。尽管流感病毒捉摸不定，但近些年来 ，专家团体的预测 几乎都准确无误。就算流感病毒进一步突变， 制作的疫苗仍然奏效，相比没有进行疫苗接种的人，打过疫苗的人即使感染流感， 病情也更轻微和短暂。疫苗接种也会保护社区内的其他人，这些人可能不具备 接种疫苗的医学条件，若周边的人接种了疫苗， 他们自己也就不会成为病毒携带者。这被称为“群体免疫”。流感疫苗并不会让你感染流感，疫苗包含的是 无法引起病症的灭活病毒。打完疫苗后 ， 你也许会感觉疲惫或疼痛，但那并不是病毒感染，而是身体对疫苗的正常免疫反应。一些国家使用的不是疫苗针， 而是疫苗吸入器，其中含有活性较低的活体病毒。对大多数人来说，这也是很安全的。可能会面临风险的 只有那些免疫系统存在缺陷的人，但通常也不会 让这些人使用活性疫苗。与此同时，科学家正努力 研发一种通用性流感疫苗，可预防任何类型的病毒， 甚至包括变异病毒。但在那之前，研发下一年 疫苗的工作仍在继续。

**P532 2017-11-21 History vs. Che Guevara - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=532)

His face is recognized all over the world. The young medical student who became a revolutionary icon. But was Che Guevara a heroic champion of the poor or a ruthless warlord who left a legacy of repression? Order, order. Hey, where have I seen that guy before? Ahem, your Honor, this is Ernesto Che Guevara. In the early 1950s, he left behind a privileged life as a medical student in Argentina to travel through rural Latin America. The poverty and misery he witnessed convinced him that saving lives required more than medicine. So he became a terrorist seeking to violently overthrow the region's governments. What? The region's governments were brutal oligarchies. Colonialism may have formally ended, but elites still controlled all the wealth. American corporations bought up land originally seized from indigenous people and used it for profit and export, even keeping most of it uncultivated while locals starved. Couldn't they vote to change that? Oh, they tried, your Honor. In 1953, Che came to Guatemala under the democratically-elected government of President Árbenz. Árbenz passed reforms to redistribute some of this uncultivated land back to the people while compensating the landowners. But he was overthrown in a CIA-sponsored coup. The military was protecting against the seizure of private property and communist takeover. They were protecting corporate profits and Che saw that they would use the fear of communism to overthrow any government that threatened those profits. So he took the lessons of Guatemala with him to Mexico. There, he met exiled Cuban revolutionaries and decided to help them liberate their country. You mean help Fidel Castro turn a vibrant Cuba into a dictatorship. Dictatorship was what Cuba had before the revolution. Fulgencio Batista was a tyrant who came to power in a military coup. He turned Havana into a luxury playground for foreigners while keeping Cubans mired in poverty and killing thousands in police crackdowns. Even President Kennedy called it the worst example of "economic colonization, humiliation, and exploitation in the world." Whatever Batista's faults, it can't compare to the totalitarian nightmare Castro would create. Forced labor camps, torture of prisoners, no freedom to speak or to leave. But this isn't the trial of Fidel Castro, is it? Che Guevara was instrumental in helping Castro seize power. As a commander in his guerilla army, he unleashed a reign of terror across the countryside, killing any suspected spies or dissenters. He also helped peasants build health clinics and schools, taught them to read, and even recited poetry to them. His harsh discipline was necessary against a much stronger enemy who didn't hesitate to burn entire villages suspected of aiding the rebels. Let's not forget that the new regime held mass executions and killed hundreds of people without trial as soon as they took power in 1959. The executed were officials and collaborators who had tormented the masses under Batista. The people supported this revolutionary justice. Which people? An angry mob crying for blood does not a democracy make. And that's not even mentioning the forced labor camps, arbitrary arrests, and repression of LGBT people that continued long after the revolution. There's a reason people kept risking their lives to flee, often with nothing but the clothes on their backs. So was that all this Che brought to Cuba? Just another violent dictatorship? Not at all. He oversaw land redistribution, helped established universal education, and organized volunteer literacy brigades that raised Cuba's literacy rate to 96%, still one of the highest in the world. Which allowed the government to control what information everyone received. Guevara's idealistic incompetence as Finance Minister caused massive drops in productivity when he replaced worker pay raises with moral certificates. He suppressed all press freedom, declaring that newspapers were instruments of the oligarchy. And it was he who urged Castro to host Soviet nuclear weapons, leading to the Cuban Missile Crisis that brought the world to the brink of destruction. He was a leader, not a bureaucrat. That's why he eventually left to spread the revolution abroad. Which didn't go well. He failed to rally rebels in the Congo and went to Bolivia even when the Soviets disapproved. The Bolivian Government, with the help of the CIA, was able to capture and neutralize this terrorist in 1967, before he could do much damage. While doing plenty of damage themselves in the process. So that was the end of it? Not at all. As Che said, the revolution is immortal. He was publicly mourned in cities all over the world. Not by the Cubans who managed to escape. And his story would inspire young activists for generations to come. Ha. A trendy symbol of rebellion for those who never had to live under his regime. Symbols of revolution may become commodified, but the idea of a more just world remains. Maybe, but I'm not sharing my coffee. Che Guevara was captured and executed by government forces in Bolivia. His remains would not be found for another 30 years. But did he die a hero or had he already become a villain? And should revolutions be judged by their ideals or their outcomes? These are the questions we face when we put history on trial.

**P532 2017-11-21 History vs. Che Guevara - Alex Gendler**

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翻译人员: Chien Yet Chong 校对人员: Riley WANG“我们仍需等待多年，直到激情消退，历史才能给格瓦拉下定论。” ——伍娃·狄·阿拉贡博士（作家，主编，学者）他的面孔世人皆知， 一个年轻医学生变成了革命偶像。但切 · 格瓦拉到底是穷人的英雄， 还是压迫人民的残酷军阀？肃静！肃静！我怎么好像以前见过这个人？啊，法官大人， 这可是埃内斯托 · 切 · 格瓦拉。在 19 世纪 50 年代早期，作为医学生的他 放弃了在阿根廷的优越生活，游历了整个拉丁美洲的乡村地区。当地人民贫穷与悲惨的苦况让他坚信，仅靠医学无法拯救生命。因此，他成了一个恐怖分子，试图通过暴力手段推翻当地政府。什么！？当地政府是残暴的寡头政治家。虽然殖民主义在当时已宣告结束，但政治高层依然控制着所有的财富。美国企业买光了 从原住民那里搜刮的土地，用来获利和出口，甚至荒废大片土地不耕种， 而当地人却忍饥挨饿。他们难道不能投票表决改变形势吗？哦，法官大人，他们试过了。1953 年，切 · 格瓦拉来到了危地马拉，该国政府由民选的阿本斯总统领导。阿本斯通过了改革方案，把一些荒废的土地 重新分配给人民，与此同时，对土地的拥有者进行赔偿。但是他被美国中情局 支持的一场政变推翻了。军政府保护私有财产不被没收以及共产党不执政。他们只是在保护 那些美国公司的利益罢了，格瓦拉意识到，他们可以 利用这种对共产党的恐惧，来推翻任何威胁这些利益的政府。所以，他把在危地马拉 得到的教训带到墨西哥。在那里，他见到了流亡的古巴革命家，于是决定帮助他们解放祖国。你的意思是帮助菲德尔·卡斯特罗 把自由的古巴转变成独裁的国家。古巴经历革命前才是独裁的国家。富尔亨西奥·巴蒂斯塔是个暴君， 他通过军事政变掌权，把哈瓦那变成了外国人的豪华游乐场，却让古巴人民陷入贫穷， 并通过警力镇压杀戮上千名平民。就连肯尼迪总统也将其例举为“世界上最糟糕的 经济殖民化、羞辱和剥削。”不管巴蒂斯塔有什么过错，总比不上卡斯特罗设立的极权恶梦。劳改营，对囚犯实施酷刑， 没有言论自由和出境自由。但这不是针对 菲德尔·卡斯特罗的审讯，对吧？切·格瓦拉在帮助卡斯特罗 掌权方面举足轻重。身为游击军队司令官，他在农村开启了恐怖统治，对疑似间谍的人 或持不同政见的人格杀勿论。他也帮助农民建立诊所和学校，教导他们认字，甚至吟诗给他们听。严酷纪律是必要的， 毕竟他的敌人更加强大，那些人能够毫不犹豫地 把疑似帮助叛军的村庄付之一炬。但别忘了，新的政权也实行大屠杀，在 1959 年刚取得政权时，他们就未经审讯处决了数百人。被处决的都是前任官员和通敌者，他们在巴蒂斯塔政权下折磨大众。人民也拥护这革命性的正义。什么人民？来自一群愤怒暴民的嗜血要求 并非民主。更不用提劳改营，强行拘捕，以及在革命很久后仍继续实行的 对同性恋社群的压迫。人民不断冒着生命危险 逃离该国是有原因的，他们逃难时通常都身无分文。所以格瓦拉给古巴的只有这些？只是另一个暴力的独裁政府？并非如此。他监督土地的重新分配，帮助设立全民教育，组织起自愿的教育团队， 将古巴的识字率提高到 96%，目前仍然是全球识字率 最高的国家之一。这让政府能够 控制人民接受何种资讯。身为财政部长，格瓦拉不切实际。他的无能导致生产力大跌，原因是他用模范证书 来取代劳工加薪。他也禁止所有的媒体自由，宣称报纸是寡头政府的喉舌。也正是他促使卡斯特罗 部署苏联核武器，导致了古巴导弹危机，几乎把世界推向毁灭之路。他是个领导，不是个官僚。这就是为什么他最后离开古巴， 把革命散播到其它国家。但这一行动并不顺利，他未能在刚果号召叛军，之后又不顾苏联反对， 跑到玻利维亚。玻利维亚政府在中情局的帮助下，在 1967 年成功抓捕 并转化了这帮恐怖分子，阻止他造成更多破坏。但在拘捕过程中 ， 玻利维亚政府也同样造成了大量破坏。事情就这样完结了吗？完全没有，就如格瓦拉所说， 革命是永恒的。全世界许多城市都公开为他哀悼。但并不包括成功逃离古巴的人们。他的生平继续激励着 后世的年轻活动分子。哼，对于不曾在他政权下受苦的人来说， 他不过是个时髦的叛逆象征。革命的象征也许变得商业化了，但他那“公正世界”的思想得以保留。也许是吧 ， 但我决不和他人共用我的马克杯。切·格瓦拉遭到了 玻利维亚政府军的拘捕和处决。他的遗体三十年后才被发现。但他究竟是以英雄形象殉身， 还是未死就成千古罪人？革命究竟应该 根据思想还是结果进行评判？这些都是我们审视历史时 会浮现的疑问。

**P533 2017-11-22 How do fish make electricity - Eleanor Nelsen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=533)

In 1800, the explorer Alexander von Humboldt witnessed a swarm of electric eels leap out of the water to defend themselves against oncoming horses. Most people thought the story so unusual that Humboldt made it up. But fish using electricity is more common than you might think; and yes, electric eels are a type of fish. Underwater, where light is scarce, electrical signals offer ways to communicate, navigate, and find—plus, in rare cases, stun—prey. Nearly 350 species of fish have specialized anatomical structures that generate and detect electrical signals. These fish are divided into two groups, depending on how much electricity they produce. Scientists call the first group the weakly electric fish. Structures near their tails called electric organs produce up to a volt of electricity, about two-thirds as much as a AA battery. How does this work? The fish's brain sends a signal through its nervous system to the electric organ, which is filled with stacks of hundreds or thousands of disc-shaped cells called electrocytes. Normally, electrocytes pump out sodium and potassium ions to maintain a positive charge outside and negative charge inside. But when the nerve signal arrives at the electrocyte, it prompts the ion gates to open. Positively charged ions flow back in. Now, one face of the electrocyte is negatively charged outside and positively charged inside. But the far side has the opposite charge pattern. These alternating charges can drive a current, turning the electrocyte into a biological battery. The key to these fish's powers is that nerve signals are coordinated to arrive at each cell at exactly the same time. That makes the stacks of electrocytes act like thousands of batteries in series. The tiny charges from each one add up to an electrical field that can travel several meters. Cells called electroreceptors buried in the skin allow the fish to constantly sense this field and the changes to it caused by the surroundings or other fish. The Peter’s elephantnose fish, for example, has an elongated chin called a schnauzenorgan that's riddled in electroreceptors. That allows it to intercept signals from other fish, judge distances, detect the shape and size of nearby objects, and even determine whether a buried insect is dead or alive. But the elephantnose and other weakly electric fish don't produce enough electricity to attack their prey. That ability belongs to the strongly electric fish, of which there are only a handful of species. The most powerful strongly electric fish is the electric knife fish, more commonly known as the electric eel. Three electric organs span almost its entire two-meter body. Like the weakly electric fish, the electric eel uses its signals to navigate and communicate, but it reserves its strongest electric discharges for hunting using a two-phased attack that susses out and then incapacitates its prey. First, it emits two or three strong pulses, as much as 600 volts. These stimulate the prey's muscles, sending it into spasms and generating waves that reveal its hiding place. Then, a volley of fast, high-voltage discharges causes even more intense muscle contractions. The electric eel can also curl up so that the electric fields generated at each end of the electric organ overlap. The electrical storm eventually exhausts and immobilizes the prey, and the electric eel can swallow its meal alive. The other two strongly electric fish are the electric catfish, which can unleash 350 volts with an electric organ that occupies most of its torso, and the electric ray, with kidney-shaped electric organs on either side of its head that produce as much as 220 volts. There is one mystery in the world of electric fish: why don't they electrocute themselves? It may be that the size of strongly electric fish allows them to withstand their own shocks, or that the current passes out of their bodies too quickly. Some scientists think that special proteins may shield the electric organs, but the truth is, this is one mystery science still hasn't illuminated.

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翻译人员: Ethan Ouyang 校对人员: Sylvia He1800 年，探险家 亚历山大·冯·洪堡看到了一群电鳗为了 避免被过河的马踩伤而跳出水面的瞬间。大多数人认为这个离奇 的故事是洪堡编造出来的。但鱼类使用电的现象 比你想象中更为普遍；而且，电鳗确实是一种鱼。在光线微弱的水底，电信号可以被用来交流，导航，和定位——偶尔甚至会 用来攻击——猎物。大概有 350 种鱼拥有 能产生及探测电信号的能力的特殊的身体结构。依据它们产生电信号的量，这些鱼可以被分成两组。科学界称第一组为弱电鱼类，它们尾部有被称为电能器官的结构，能产生一伏特的电力， 相当于一个 AA 电池三分之二的电量。其中的原理是什么呢?这类鱼的大脑通过神经系统 给电能器官送出信号。电能器官充满了成百上千个被称作发电细胞的盘状细胞。通常，发电细胞 会释放钠离子和钾离子来保证細胞外部呈正电， 内部呈负电。但当神经系统信号到达发电细胞时，离子通道会被打开。呈正电的离子开始涌回细胞。现在，发电细胞的外部呈负电，内部呈正电，而其另一边的正负电情况却相反。这些互相交替的正负结构 能够形成电流，让发电细胞变成生物电池。这些鱼具有这个能力的关键 是它们神经系统的协调性，信号能在最恰当的时刻被发出，使堆叠的电解质变成 上千个串联的电池组，每个电池释放出 的少量电量积累成一个可以延伸到几米外的电磁场。鱼的皮肤下有能让它察觉磁场的电感应器细胞，因此它能感受到周围环境 或其它鱼类造成的磁场的变化。拿弯颌象鼻鱼来举例，它们的下巴叫做 schnauzenorgan，很长，且长满电感应器，让这类鱼能够和其它鱼交换信号，计算距离，估计附近物体的形状和大小，甚至能知道一个 埋起来的虫子是死是活。但是象鼻鱼和其它弱电鱼类无法产生足够的电量 去攻击猎物。使用电捕食 是强电鱼类的专长。只有少数几种鱼属于这一类。最强有力的带电鱼是电刀鱼，俗称电鳗。它们两米长的身子 基本被三个带电器官占满。和弱电鱼一样，电鳗使用信号来导航和交流。但是它最强的电流是留给捕食用的。它们的进攻分为两步， 定位猎物以及使猎物瘫痪。首先，它会释放出两至三道强有力的，高达 600 伏特的电流。这些电波会刺激猎物的肌肉 导致其痉挛，还会产生显示 猎物的藏匿地点的反射电波。接着，电鳗会释放一系列 快速的高压电流，导致更严重的肌肉收缩。电鳗还会在放电时弯曲身体，使身体两端产生的电场重叠和加强。电流风暴最终使猎物 筋疲力尽，无法动弹，电鳗就可以把猎物生吞下去。另外两个强大的发电鱼是 发电鲶鱼和鳐鱼。前者可以利用占据它大部分躯干的发电器官 释放 350 伏特的电流。后者可以在它头的两侧、 形状像肾的发电器官中，产生 220 伏特的电流。在发电鱼的世界中有一个谜团：为什么它们不会把自己电死？这可能是因为强电鱼的大小使他们能够承受自身发出的电流，或者是电流会很快地通过它们的身体。一些科学家认为， 有些特殊的蛋白质保护了发电器官，但是事实上，这个谜团还尚未解开。

**P534 2017-11-28 Can 100% renewable energy power the world - Federico Rosei and Renzo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=534)

Every year, the world uses 35 billion barrels of oil. This massive scale of fossil fuel dependence pollutes the Earth and it won't last forever. Scientists estimate that we've consumed about 40% of the world's oil. According to present estimates, at this rate, we'll run out of oil and gas in 50 years or so, and in about a century for coal. On the flip side, we have abundant sun, water, and wind. These are renewable energy sources, meaning that we won't use them up over time. What if we could exchange our fossil fuel dependence for an existence based solely on renewables? We've pondered that question for decades, and yet, renewable energy still only provides about 13% of our needs. That's because reaching 100% requires renewable energy that's inexpensive and accessible. This represents a huge challenge, even if we ignore the politics involved and focus on the science and engineering. We can better understand the problem by understanding how we use energy. Global energy use is a diverse and complex system, and the different elements require their own solutions. But for now, we'll focus on two of the most familiar in everyday life: electricity and liquid fuels. Electricity powers blast furnaces, elevators, computers, and all manner of things in homes, businesses, and manufacturing. Meanwhile, liquid fuels play a crucial role in almost all forms of transportation. Let's consider the electrical portion first. The great news is that our technology is already advanced enough to capture all that energy from renewables, and there's an ample supply. The sun continuously radiates about 173 quadrillion watts of solar energy at the Earth, which is almost 10,000 times our present needs. It's been estimated that a surface that spans several hundred thousand kilometers would be needed to power humanity at our present usage levels. So why don't we build that? Because there are other hurdles in the way, like efficiency and energy transportation. To maximize efficiency, solar plants must be located in areas with lots of sunshine year round, like deserts. But those are far away from densely populated regions where energy demand is high. There are other forms of renewable energy we could draw from, such as hydroelectric, geothermal, and biomasses, but they also have limits based on availability and location. In principle, a connected electrical energy network with power lines crisscrossing the globe would enable us to transport power from where it's generated to where it's needed. But building a system on this scale faces an astronomical price tag. We could lower the cost by developing advanced technologies to capture energy more efficiently. The infrastructure for transporting energy would also have to change drastically. Present-day power lines lose about 6-8% of the energy they carry because wire material dissipates energy through resistance. Longer power lines would mean more energy loss. Superconductors could be one solution. Such materials can transport electricity without dissipation. Unfortunately, they only work if cooled to low temperatures, which requires energy and defeats the purpose. To benefit from that technology, we'd need to discover new superconducting materials that operate at room temperature. And what about the all-important, oil-derived liquid fuels? The scientific challenge there is to store renewable energy in an easily transportable form. Recently, we've gotten better at producing lithium ion batteries, which are lightweight and have high-energy density. But even the best of these store about 2.5 megajoules per kilogram. That's about 20 times less than the energy in one kilogram of gasoline. To be truly competitive, car batteries would have to store much more energy without adding cost. The challenges only increase for bigger vessels, like ships and planes. To power a cross-Atlantic flight for a jet, we'd need a battery weighing about 1,000 tons. This, too, demands a technological leap towards new materials, higher energy density, and better storage. One promising solution would be to find efficient ways to convert solar into chemical energy. This is already happening in labs, but the efficiency is still too low to allow it to reach the market. To find novel solutions, we'll need lots of creativity, innovation, and powerful incentives. The transition towards all-renewable energies is a complex problem involving technology, economics, and politics. Priorities on how to tackle this challenge depend on the specific assumptions we have to make when trying to solve such a multifaceted problem. But there's ample reason to be optimistic that we'll get there. Top scientific minds around the world are working on these problems and making breakthroughs all the time. And many governments and businesses are investing in technologies that harness the energy all around us.

**P534 2017-11-28 Can 100% renewable energy power the world - Federico Rosei and Renzo**

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翻译人员: Huang Haisu 校对人员: Zhuo Hao每年，全世界会用掉 350 亿桶油。这种对化石燃料的大规模依赖 会污染我们的地球，而且不会永远持续下去。科学家估计我们已经使用了 大约世界总油量的百分之四十。根据目前的估计，以这个速度进行下去，我们将在 大约 50 年后用光总有的油和气，在一个世纪后用尽所有的煤炭。另一方面，我们拥有 充足的阳光、水和风。这些是可再生能源，意思是无论多久， 我们都不会用尽这些资源。如果我们可以把对化石燃料的依赖换成仅靠可再生能源 的存在方式会是什么样呢？几十年来，我们一直在思考那个问题，然而，可再生能源仍只能满足 我们对能源需求的大约百分之十三。那是因为，要达到百分之百的利用率， 可再生能源需要更廉价，而且要容易得到。这是项强大的挑战，即使我们忽略政治的参与， 集中在科学和工程上面。我们可以通过我们如何 使用能源来理解这个问题。全球能源使用是 一个多样而且复杂的系统，并且不同的元素需要 个性化的解决方式。但是现在，我们将集中于 每日生活中最熟悉的两项：电能和液体燃料。电能为高炉、电梯、电脑，还有所有家里、企业和制造业需要 的各个方面提供能量。同时，液体燃料起到了关键的作用，主宰差不多所有方式的交通。让我们先来考虑电的部分。好消息是，我们的技术已经发展到了可以捕获从可再生资源那里得到的能量，而且这种供给资源十分充足。太阳持续放射大约 173 万亿瓦特太阳能到地球，这是大约我们目前需要的 1 万倍。据估计，几十万公里长的表面应该足够提供我们人类 目前使用水平的能量。那为什么我们不去建造呢？因为有其他阻碍，例如效率和能源运输。为了把效率最大化，太阳能工厂必须建在 长年有充足阳光的地区，例如沙漠。但是那些地区离能量需求很高的人口密集地区很远。我们还有其他可再生资源可以考虑，例如水力电气，地热和生物质，但是它们也有可获取性和地域的限制。原则上讲，一个相连的电能网络通过在全球纵横交错的电线连接可以让我们把电从发电地运输到用电的地方。但是建造这种规模的系统需要 配备的价格标签却是个天文数字。我们可以通过发展高科技来降低成本，以更有效率地捕获能源。运输能源需要的基础设施也 不得不发生巨大的改变。当今的电线会损失 百分之六到八的运输电能，是因为电线材料会通过电阻耗散能量。电线越长意味着丢失的能量越多。超导体可以是一种解决方式。这种材料可以在没有能量耗散 的情况下运电。不幸的是，它们只在低温环境下工作，这就需要额外的能量来 控制温度，结果适得其反。为了在这个技术上获益，我们将需要发现可以在室温下工作的新型超导体材料。那基于石油的重要液体燃料怎么样呢？它的科学挑战是把可再生能源以容易运输的方式储存。近来，我们已经在生产 锂离子电池方面大有进步，它很轻而且拥有高能量密度。但即使是最好的锂离子电池 储存的能量，每千克也只有 2.5 兆焦耳。比一千克的石油提供的能量 低大约 20 倍。要真正有竞争力，车用电池 需要储存更多的能量，而且不增加成本。随着载体变大，挑战也就越大， 例如：船只和飞机。给一架喷气式飞机提供 横跨大西洋飞行的能量，我们需要一个重约 1000 吨的电池。这个问题也需要技术上 的创新来发展新材料，拥有更高的能量密度和更好的储存方式。一个很有前景的解决方式 也许是想办法高效地把太阳能转换成化学能。这已经正在实验室里发生了，但效率仍然太低，远不能满足市场需求。要找到更新颖的解决方式， 我们将需要很多创新，革新，和强大的激励政策。向全部可再生资源转移 是一个复杂的问题，它涉及到技术，经济和政治。应对这一挑战的优先次序取决于我们在试图解决这一多面问题时 必须做出的具体假设。可是诸多理由让我们乐观地 相信我们可以做到。世界顶级科学家们正在寻找 解决这些问题的方式，而且一直在取得突破。许多政府和企业也正在投资技术，为我们创造源源不断的能量。

**P535 2017-11-30 Why is Herodotus called “The Father of History” - Mark Robinson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=535)

Giant gold-digging ants, a furious king who orders the sea to be whipped 300 times, and a dolphin that saves a famous poet from drowning. These are just some of the stories from The Histories by Herodotus, an Ancient Greek writer from the 5th century BCE. Not all the events in the text may have happened exactly as Herodotus reported them, but this work revolutionized the way the past was recorded. Before Herodotus, the past was documented as a list of events with little or no attempt to explain their causes beyond accepting things as the will of the gods. Herodotus wanted a deeper, more rational understanding, so he took a new approach: looking at events from both sides to understand the reasons for them. Though he was Greek, Herodotus's hometown of Halicarnassus was part of the Persian Empire. He grew up during a series of wars between the powerful Persians and the smaller Greeks, and decided to find out all he could about the subject. In Herodotus's telling, the Persian Wars began in 499 BCE, when the Athenians assisted a rebellion by Greeks living under Persian rule. In 490, the Persian King, Darius, sent his army to take revenge on Athens. But at the Battle of Marathon, the Athenians won an unexpected victory. Ten years later, the Persians returned, planning to conquer the whole of Greece under the leadership of Darius's son, Xerxes. According to Herodotus, when Xerxes arrived, his million man army was initially opposed by a Greek force led by 300 Spartans at the mountain pass of Thermopylae. At great cost to the Persians, the Spartans and their king, Leonidas, were killed. This heroic defeat has been an inspiration to underdogs ever since. A few weeks later, the Greek navy tricked the Persian fleet into fighting in a narrow sea channel near Athens. The Persians were defeated and Xerxes fled, never to return. To explain how these wars broke out and why the Greeks triumphed, Herodotus collected stories from all around the Mediterranean. He recorded the achievements of both Greeks and non-Greeks before they were lost to the passage of time. The Histories opens with the famous sentence: "Herodotus, of Halicarnassus, here displays his inquiries." By framing the book as an “inquiry,” Herodotus allowed it to contain many different stories, some serious, others less so. He recorded the internal debates of the Persian court but also tales of Egyptian flying snakes and practical advice on how to catch a crocodile. The Greek word for this method of research is "autopsy," meaning "seeing for oneself." Herodotus was the first writer to examine the past by combining the different kinds of evidence he collected: opsis, or eyewitness accounts, akoe, or hearsay, and ta legomena, or tradition. He then used gnome, or reason, to reach conclusions about what actually happened. Many of the book's early readers were actually listeners. The Histories was originally written in 28 sections, each of which took about four hours to read aloud. As the Greeks increased in influence and power, Herodotus's writing and the idea of history spread across the Mediterranean. As the first proper historian, Herodotus wasn't perfect. On occasions, he favored the Greeks over the Persians and was too quick to believe some of the stories that he heard, which made for inaccuracies. However, modern evidence has actually explained some of his apparently extreme claims. For instance, there's a species of marmot in the Himalayas that spreads gold dust while digging. The ancient Persian word for marmot is quite close to the word for ant, so Herodotus may have just fallen prey to a translation error. All in all, for someone who was writing in an entirely new style, Herodotus did remarkably well. History, right down to the present day, has always suffered from the partiality and mistakes of historians. Herodotus’s method and creativity earned him the title that the Roman author Cicero gave him several hundred years later: "The Father of History."

**P535 2017-11-30 Why is Herodotus called “The Father of History” - Mark Robinson**

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翻译人员: Rocky Zuo 校对人员: Jenny Yang巨型挖金蚁，愤怒的国王命令大海受刑300鞭，海豚救起了一位快淹死的著名诗人。这些仅是《历史》中的一部分故事，作者希罗多徳，公元前5世纪古希腊作家。并不是所有发生的故事都是希罗多徳记录的那样，但他的作品彻底改变了人们记录历史的方式。在希罗多徳之前，历史文件就是一条条的历史事件，几乎不会去解释事件的原由，即使有，也不过解释为“上帝的意愿”。希罗多徳希望有更深刻、更理智的解释，因此他采用了一个新的方法：调查事件的双方，从而理解他们行为的原因。尽管希罗多徳是希腊人，但他的家乡哈利卡尔那索斯是波斯帝国的一部分。他幼年经历了波斯与希腊的一系列战争，彼时波斯强大，希腊弱小，他决定尽自己所能找出有关这些战争的一切。在希罗多徳的描述中，波斯战争开始于公元前499年，雅典人协助希腊人发起了一场反抗波斯统治的战争。公元前490年，波斯皇帝达利斯出兵报复雅典人。但在这场持久战中，雅典人意外地获得了胜利。十年后，波斯人重返，计划征服整个希腊，统帅为达利斯的儿子，薛西斯。据希罗多徳记载，当薛西斯抵达时，他的百万军队立刻遭到了由斯巴达300勇士带领的希腊军队的反抗，战役发生在塞莫皮莱的山道上。波斯付出了巨大的代价斩杀了斯巴达勇士和他们的国王列奥尼达斯。这一英雄式的战败自此成为了弱者的模范。几周后，希腊海军将波斯战队诱至雅典附近一窄小海峡，双方交战。波斯战败，薛西斯逃跑，再也没有回来。为了解释这些战争是如何发生，以及希腊为何获胜，希罗多徳收集了地中海所有的故事。他赶在人们淡忘之前记录下来希腊人和非希腊人双方的重大事件。《历史 》以这一名句开篇：“来自哈利卡尔那索斯的希罗多徳在此展现他的调查。”因为将这本书定位为“调查”，希罗多徳在其中记载了很多不同的故事，有的严肃、有的没那么严肃。他记载了波斯法庭的内部辩论，但也同时记录了埃及飞蛇的传说以及抓住鳄鱼的可行方法。这种研究方法在希腊文中称为“autopsy”，意为“亲眼查看”。希罗多德是第一个运用这一方法的作家：他将所有搜集的证据都综合起来去调查过去的事情。这些证据包括：opsis（目击证人的描述）akoe（传闻）和ta legomena（传统）。之后他有用gnome（逻辑）来得出结论，推断出发生的事实。他书本早期的读者是听众。《历史》一书最初由28部分组成，每一部分都要朗读4个小时。随着希腊影响力与权力与日俱增，希罗多徳的作品和对历史的看法传遍了地中海。希罗多徳是第一个历史学家，因为他并不完美。有时，他会偏向希腊、贬低波斯，并且会很快相信他听到的一些故事，从而导致一些不准确性。不过，现代证据已经解释了部分明显极端的事件。例如，在喜马拉雅山上，有一种土拨鼠，在挖洞时，会扬起金粉。在古波斯语中，“土拨鼠”这个单词与“蚂蚁”非常接近，所以，希罗多徳可能是在翻译时弄错了。总而言之，对于一个用全新风格写作的人来说，希罗多徳已经出奇的出色。历史，从古至今，都多多少少有些历史学家的偏见与错误 。希罗多徳的方法与创造性为他赢得了名声，罗马作家西塞罗在几百年后称他为“历史学之父”。

**P536 2017-12-06 How your digestive system works - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=536)

Across the whole planet, humans eat on average between one and 2.7 kilograms of food a day. That's over 365 kilograms a year per person, and more than 28,800 kilograms over the course of a lifetime. And every last scrap makes its way through the digestive system. Comprised of ten organs covering nine meters, and containing over 20 specialized cell types, this is one of the most diverse and complicated systems in the human body. Its parts continuously work in unison to fulfill a singular task: transforming the raw materials of your food into the nutrients and energy that keep you alive. Spanning the entire length of your torso, the digestive system has four main components. First, there's the gastrointestinal tract, a twisting channel that transports your food and has an internal surface area of between 30 and 40 square meters, enough to cover half a badminton court. Second, there's the pancreas, gallbladder, and liver, a trio of organs that break down food using an array of special juices. Third, the body's enzymes, hormones, nerves, and blood all work together to break down food, modulate the digestive process, and deliver its final products. Finally, there's the mesentery, a large stretch of tissue that supports and positions all your digestive organs in the abdomen, enabling them to do their jobs. The digestive process begins before food even hits your tongue. Anticipating a tasty morsel, glands in your mouth start to pump out saliva. We produce about 1.5 liters of this liquid each day. Once inside your mouth, chewing combines with the sloshing saliva to turn food into a moist lump called the bolus. Enzymes present in the saliva break down any starch. Then, your food finds itself at the rim of a 25-centimeter-long tube called the esophagus, down which it must plunge to reach the stomach. Nerves in the surrounding esophageal tissue sense the bolus's presence and trigger peristalsis, a series of defined muscular contractions. That propels the food into the stomach, where it's left at the mercy of the muscular stomach walls, which bound the bolus, breaking it into chunks. Hormones, secreted by cells in the lining, trigger the release of acids and enzyme-rich juices from the stomach wall that start to dissolve the food and break down its proteins. These hormones also alert the pancreas, liver, and gallbladder to produce digestive juices and transfer bile, a yellowish-green liquid that digests fat, in preparation for the next stage. After three hours inside the stomach, the once shapely bolus is now a frothy liquid called chyme, and it's ready to move into the small intestine. The liver sends bile to the gallbladder, which secretes it into the first portion of the small intestine called the duodenum. Here, it dissolves the fats floating in the slurry of chyme so they can be easily digested by the pancreatic and intestinal juices that have leached onto the scene. These enzyme-rich juices break the fat molecules down into fatty acids and glycerol for easier absorption into the body. The enzymes also carry out the final deconstruction of proteins into amino acids and carbohydrates into glucose. This happens in the small intestine's lower regions, the jejunum and ileum, which are coated in millions of tiny projections called villi. These create a huge surface area to maximize molecule absorption and transference into the blood stream. The blood takes them on the final leg of their journey to feed the body's organs and tissues. But it's not over quite yet. Leftover fiber, water, and dead cells sloughed off during digestion make it into the large intestine, also known as the colon. The body drains out most of the remaining fluid through the intestinal wall. What's left is a soft mass called stool. The colon squeezes this byproduct into a pouch called the rectum, where nerves sense it expanding and tell the body when it's time to expel the waste. The byproducts of digestion exit through the anus and the food's long journey, typically lasting between 30 and 40 hours, is finally complete.

**P536 2017-12-06 How your digestive system works - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=536)

翻译人员: Chien Yet Chong 校对人员: Alicia Cai全世界，人类平均每天摄入 1 到 2.7 千克的食物。也就是一个人每年 摄入的食物多达 365 千克，一生则摄入超过 28800 千克的食物。每一口食物都会经过消化系统。消化系统由十个器官组成，长约九米，并包含超过 20 种具有特殊功能的细胞，这是人体最多元化和最复杂的系统之一。系统内的器官协作完成一项任务：把食物中的原料转换成维持你生命的养分和能源。贯穿你的整个躯干的消化系统有四个主要部分。首先是胃肠道，这个弯弯曲曲的管道负责运送食物，其内部总面积多达 30 至 40 平方米，可覆盖半个羽毛球场。第二部分是胰脏，胆囊和肝脏，这三个器官组合使用一系列 特殊汁液来分解消化食物。第三部分是身体中的酶，激素，神经和血液，它们同心协力分解食物，调节消化过程，以及运送消化后的最终产物。最后是肠系膜，这一大块组织负责在腹部支撑和固定你所有的消化器官，使它们能够完成它们的工作。消化过程在食物接触到 你的舌头前就已经开始了。当你期待享用美食时，你嘴里的腺体就会开始分泌唾液。我们每天分泌出约 1.5 升的口水。当食物进入你的嘴里，咀嚼运动和流动的唾液一起把食物变为潮湿的一团，叫做“食团”。唾液里的酶能分解淀粉。然后，你的食物就会进入一个长 25 公分的管道的边缘， 这个管道叫“食道”，食物通过食道下降至胃。食道组织周围的神经侦察到食团的存在后，就触发蠕动，这是一系列的特定肌肉伸缩。它们蠕动着把食物推进胃，胃的肌壁会剧烈地运动，摇晃食团，把它们打碎成小块。内膜细胞分泌的激素会引发胃壁释放酸和富含酶的汁液，这些汁液会开始溶解食物并分解其中的蛋白质。这些激素也会通告胰脏，肝脏和胆囊生产消化汁液和输送胆汁，一种可以 消化脂肪的黄绿色液体，好为下一个步骤做准备。在胃里逗留了三个小时后，原本有形的食团现在已变成 表面起泡的“食糜"，准备进入小肠了。肝脏将胆汁输送到胆囊，胆囊将胆汁分泌到 小肠的第一部分，即十二指肠。在这里，十二指肠会分解 漂浮于食糜中的脂肪，这样，同时渗入的胰液和肠液就能轻易地消化这些脂肪。这些富含酶的汁液 会把脂肪分解成脂肪酸和甘油，好让身体更容易吸收。这些酶会进行最后的分解过程，把蛋白质分解成氨基酸，把碳水化合物分解成葡萄糖。这些过程发生于小肠下半部分，空肠和回肠，这里的肠壁由数以百万计 的凸出物覆盖着，叫”肠绒毛“。这些绒毛形成了巨大的表面积， 以最大限度地吸收和转移分子到血液中。养分通过血液完成它们最后的旅程，也就是滋养身体各个器官和组织。但整个过程并还未结束。剩余的纤维，水份和消化进行时候死亡的细胞被推入大肠，也就是回肠。身体通过大肠壁吸收 大多数剩余的液体。此后剩余的软块被称为”粪便“。回肠把这些副产品挤入 被称为”直肠“的囊状袋，这里的神经可以感觉到直肠膨胀，然后通告身体什么时候把废物排出。消化的副产品通过肛门排出体外，这时，食物漫长的旅程在经过 30 到 40 小时后终于完成了。

**P537 2017-12-06 Who's at risk for colon cancer - Amit H. Sachdev and Frank G. Gress**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=537)

If you were to lay your digestive tract out in a straight line, it would form a tube spanning nearly ten meters. The last 1.5 meters of that are called the colon, or large intestine. Cells in this organ's lining constantly renew themselves, but the genes that moderate this process occasionally go awry, leading to the excessive growth of new cells. That results in small growths or abnormal clumps of cells called polyps. The majority of these polyps won't do any harm, but some can become cancerous when their cells begin to grow and divide rapidly, projecting further into the colon. At that point, they can transform into colon cancer, one of the most prevalent and preventable forms of cancer in the world. That's a slow process: though growth times vary, it often takes around ten years for a small polyp to grow and develop into a cancerous one. We don't know exactly what causes the majority of colon polyps and colon cancers. We do know in general that colon cancer involves the activation of what's called oncogenes in the polyp, and/or the loss of tumor-suppressor genes that usually keep cancer cells in check. Most cells have proto-oncogenes that help them grow. When a proto-oncogene mutates, or there are two many copies of it, it can become a permanently active oncogene with cells that grow out of control. While we don't yet know exactly what underlying factors cause these changes, experts suspect a combination of both environmental and inherited genetic factors. In the worst cases, when cells within polyps divide and spread unchecked, they eventually break through the lining of the colon. Lymph and blood vessels carry those cells all over the body, and they can go on to form tumors. Despite these challenges, there's a solution. We've become extremely good at detecting and removing offending polyps before they can cause cancer. This happens through a process called screening, and when we do it regularly, we can prevent many cases of colon cancer. So, who's at risk? Most cases occur in people aged 50 years or older. This group is considered at average risk for colon cancer or colon polyps. There's also a higher risk group that includes people with personal or family histories of colon polyps or cancer, and those who suffer from inherited genetic syndromes, or inflammatory diseases, like Crohn’s disease and ulcerative colitis. So the best age to initiate screening varies from person to person. If you have access to healthcare, it's best to consult a doctor to find out when you should begin. Screening can be done with various tests. Colonoscopy involves a long, thin, flexible tube that's fitted with a video camera and light at the end and placed internally to examine the colon for polyps. If polyps are found, a doctor can do a polypectomy, a procedure that removes polyps from the colonic wall. Doctors can also then test the polyp for cancerous cells. Colonoscopy is the only test that can be used to both find and remove polyps. There are, however, other useful screening tests, including imaging and at-home tests that can allow patients to examine their stool for small amounts of blood. Occasionally, polyps are too large to be removed during a colonoscopy, in which case, the next step is surgery. If blood and imaging tests then reveal that cancerous cells have spread outside the colon, then a special treatment, like chemotherapy, may also be required to stop the cancer from escalating. We can also take on certain habits to reduce our likelihood of developing colon cancer in the first place. There's evidence that maintaining a healthy weight, not smoking, and being physically active can help. But most importantly, access to healthcare and regular screenings at crucial times in life are the best ways to prevent colon cancer.

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翻译人员: Chien Yet Chong 校对人员: Jenny Yang“预防胜于治疗。” -- 本杰明·富兰克林如果你把消化道拉直成线，它将形成一条长约十米的管子。这条管子最后1.5米的部分称为结肠，或大肠。大肠内壁的细胞不断地更新，但是调节这个过程的基因有时候会出错，导致新细胞过度地增生。结果是称为“息肉”的赘生物或不正常细胞组织。大多数的息肉对身体无害，但有些会有癌性。这就是当息肉细胞不断增生和迅速分裂，往大肠内增殖。这时候，肿瘤可以演变成大肠癌，世界上最普遍但最可预防的一种癌症。癌症发展缓慢：虽然癌症生长期不定，但通常一小簇息肉须花十多年时间增生和发展成癌性肿瘤。我们还不确定什么导致大多数的大肠息肉和癌症的形成。我们知道的是通常大肠癌的形成是跟息肉里的致癌基因被激活有关，又或者跟控制癌症细胞的肿瘤压抑基因有关。大多数细胞有帮助它们增生的原始致癌基因。当原始致癌基因突变或数量太多，它可以持久地激活致癌基因导致细胞不受控制地增生。我们还不确定什么因素导致这些突变，但专家怀疑环境和遗传为主要因素。最糟情况是当息肉细胞不受控制地分裂和散开时，它们会最终穿破大肠内壁。淋巴管和血管把这些细胞运输到身体各个部位，然后这细胞会继续形成新肿瘤。尽管这些挑战，我们并不是束手无策的。我们变得更擅长于检测和消除侵袭性的息肉，避免它们演变成癌症。这是通过称为筛检的过程，而如果定期进行，我们可以避免许多大肠癌的案例发生。那么，谁有罹患大肠癌的风险？大多数案例发生于50岁或以上的人士。这群人拥有中等的风险罹患大肠癌或长大肠息肉。也有一群拥有更高风险的群体，这包括个人或家族历史曾有患过大肠息肉或癌症的人，以及那些患上遗传性综合症的人，或者是患有炎性疾病的人，如克隆氏病和溃疡性结肠炎。所以开始进行筛检的最佳年龄因人而异。如果你可享有医疗服务，最好跟一位医师咨询你什么时候可以开始进行筛检。大肠筛检可包括许多不同种类的测试。肠镜是一支细长，可弯曲的管子，尾端则装上一台摄像头和灯，并插入大肠以检测息肉。如果发现息肉存在，医生可以进行息肉切除术，把息肉从大肠内壁切除。医生然后通过息肉来检查癌细胞的存在。做肠镜检查是唯一一个能同时检测和切除息肉的测试。虽然如此，也有其它有用的测试，这包括成像测试以及一些病人可在家使用的测试器来检测粪便是否含有血液。有时候，息肉太大，做肠镜时不能切除。这时候，下一步就是做手术。如果血液和成像测试都显示癌细胞已经扩散到大肠以外，特别的治疗如化疗，就可能需要进行来停止癌症恶化。癌症形成前，我们可以养成某些特定的习惯来减低罹患大肠癌的风险。证据显示保持健康的体重，不抽烟，和常做运动可帮助减低风险。但最重要的是，拥有医疗服务和在生命关键时期定期做筛检是预防大肠癌的最佳方法。

**P538 2017-12-06 Why should you read Charles Dickens - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=538)

The starving orphan seeking a second helping of gruel. The spinster wasting away in her tattered wedding dress. The stone-hearted miser plagued by the ghost of Christmas past. More than a century after his death, these remain recognizable figures from the work of Charles Dickens. So striking is his body of work that it gave rise to its own adjective. But what are the features of Dickens's writing that make it so special? Dickens’s fiction brims with anticipation through brooding settings, plot twists, and mysteries. These features of his work kept his audience wanting more. When first published, his stories were serialized, meaning they were released a few chapters at a time in affordable literary journals and only later reprinted as books. This prompted fevered speculation over the cliffhangers and revelations he devised. Serialization not only made fiction available to a wider audience and kept them reading, but increased the hype around the author himself. Dickens became particularly popular for his wit, which he poured into quirky characters and satiric scenarios. His characters exhibit the sheer absurdity of human behavior, and their names often personify traits or social positions, like the downtrodden Bob Cratchit, the groveling Uriah Heep, and the cheery Septimus Crisparkle. Dickens set these colorful characters against intricate social backdrops, which mimic the society he lived in. For instance, he often considered the changes brought about by the Industrial Revolution. During this period, the lower classes experienced sordid working and living conditions. Dickens himself experienced this hardship as a child when he was forced to work in a boot blacking factory after his father was sent to debtors' prison. This influenced his depiction of the Marshalsea prison in Little Dorrit, where the titular character cares for her convict father. Prisons, orphanages, or slums may seem grim settings for a story, but they allowed Dickens to shed light on how his society's most invisible people lived. In Nicholas Nickleby, Nicholas takes a job with the schoolmaster Wackford Squeers. He soon realizes that Squeers is running a scam where he takes unwanted children from their parents for a fee and subjects them to violence and deprivation. Oliver Twist also deals with the plight of children in the care of the state, illustrating the brutal conditions of the workhouse in which Oliver pleads with Mr. Bumble for food. When he flees to London, he becomes ensnared in a criminal underworld. These stories frequently portray Victorian life as grimy, corrupt, and cruel. But Dickens also saw his time as one in which old traditions were fading away. London was becoming the incubator of the modern world through new patterns in industry, trade, and social mobility. Dickens's London is therefore a dualistic space: a harsh world that is simultaneously filled with wonder and possibility. For instance, the enigma of Great Expectations centers around the potential of Pip, an orphan plucked from obscurity by an anonymous benefactor and propelled into high society. In his search for purpose, Pip becomes the victim of other people’s ambitions for him and must negotiate with a shadowy cast of characters. Like many of Dickens’s protagonists, poor Pip's position is constantly destabilized, just one of the reasons why reading Dickens is the best of times for the reader, while being the worst of times for his characters. Dickens typically offered clear resolution by the end of his novels, – with the exception of The Mystery of Edwin Drood. The novel details the disappearance of the orphan Edwin under puzzling circumstances. However, Dickens died before the novel was finished and left no notes resolving the mystery. Readers continue to passionately debate over who Dickens intended as the murderer, and whether Edwin Drood was even murdered in the first place. Throughout many adaptations, literary homages, and the pages of his novels, Dickens’s sparkling language and panoramic worldview continue to resonate. Today, the adjective Dickensian often implies squalid working or living conditions. But to describe a novel as Dickensian is typically high praise, as it suggests a story in which true adventure and discovery occur in the most unexpected places. Although he often explored bleak material, Dickens’s piercing wit never failed to find light in the darkest corners.

**P538 2017-12-06 Why should you read Charles Dickens - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=538)

翻译人员: Zibo Huang 校对人员: Bangyou Xiang忍饥挨饿的孤儿寻求着 第二份果腹的薄粥。未婚待嫁的老姑娘 在破旧的婚纱中虚度时光。铁石心肠的守财奴 饱受过去之灵的折磨。即便是在离世一百多年之后，查尔斯·狄更斯作品中的人物 依旧特点鲜明。他的作品如此的引人注目， 让他的写作风格自成一派。但是狄更斯作品的哪些特 征使它如此特别呢？狄更斯的小说让人满怀期待，作品贯穿着思维严谨的设定， 曲折的故事情节以及神秘性。这些特性激发了观众的求知欲。当第一章发行后，作品就开始连载了，也就是在读者买得起的文学期刊上 每次发行几个新章节，只有完结之后才会整理并刊印成书。这引发了人们对他设计 的扣人心弦的情节和所揭露真相的狂热猜测。连载不仅让作品面向更广大的读者，让他们保持阅读兴趣，而且也为作者本身做足了宣传。狄更斯因为他的才智变得尤其出名，他将才智完全倾注于离奇的人物 以及戏剧化的讽刺之中。他塑造的角色展示了 人类行为中极为荒谬的一面，这些角色的名字往往能展现出 个人特点或社会地位，像受压迫的 Bob Cratchit，卑躬屈膝的 Uriah Heap，以及活泼的 Septimus Crisparkle。狄更斯在复杂的社会背景中 设立了色彩鲜明的人物形象，这是对他所生活的社会 的一种写照。例如，狄更斯经常思考工业革命所带来的改变。在工业革命时期，底层社会居民的工作 和居住环境十分恶劣。狄更斯自身在孩童时期 就经历过这般苦难，在他的父亲因欠债而锒铛入狱后，他就被迫进入皮靴染色厂工作。这影响了他在长篇小说《小杜丽》中 对马歇尔希监狱的描写，其中名义上的角色 就负责照顾她的囚犯父亲。故事中监狱，孤儿院或者贫民窟 这些背景看起来残忍，但却使狄更斯能够揭示当时社会中最容易 被忽视的人群的生活。在《尼古拉斯·尼克贝》中，尼古拉斯与学校校长 Wackford Squeers 共事。他很快意识到， Squeers 在经营着一个骗局，他通过支付费用从而得到 那些父母欲抛弃的孩子，暴力对待这些孩子们并剥削他们。《雾都孤儿》同样也讲述了 州孤儿院的孩子们的困难处境，描绘了冷酷无情的贫民习艺所。在这里，Oliver 向 Bumble 先生乞求食物。当 Oliver 逃到伦敦后， 却又陷入了地下犯罪的圈套。这些故事频繁描绘了 维多利亚时代（译注：1837-1901)阴冷，腐败以及残酷无情的现实。但是狄更斯同样也注意到 在他所处的时代，老传统正日渐式微。伦敦凭借工业，贸易 以及社会流动能力的新模式，渐渐成为现代社会的孵化器。于是狄更斯笔下的伦敦 成为了二元化的世界：一面是艰难困苦的世界， 另一面充满着希望与无限可能。例如，《远大前程》里的奥秘就是围绕着主人公 Pip 的潜力，主人公是一名孤儿，默默无闻的他 受到一名匿名神秘人帮助，进入了上层社会。在他寻求真相的过程中，Pip 成为了其他人野心的替罪羊，必须与阴影下的角色做出妥协。与很多狄更斯笔下的主人公一样，可怜的 Pip 的地位瞬间土崩瓦解，这就是为何拜读狄更斯的作品对读者来说是最美好的时代，同时对他笔下的角色来说 是最悲惨时代的原因之一。狄更斯通常在小说的结尾 给出清晰的结局，——除了《艾德温·德鲁德之谜》。该小说详细描述了孤儿 Edwin 在谜一般的环境下消失了。然而，狄更斯本人 却在小说完成前去世了，没有留下任何信息 来辅助解决这个谜题。读者们继续激烈的争论 谁是狄更斯笔下的杀手，以及是否 Edwin Drood 在第一次出场就被杀死了。在许多改编版本，文学致敬以及小说的字里行间中，狄更斯引人入胜的文笔 以及全景版的世界观持续产生着共鸣。时至今日，形容词 Dickensian仍然暗指污秽的工作 或是肮脏的生活环境。但是形容一部小说为 Dickensian，通常来说是较高的称赞，因为它展示了发生在 意料之外的地点的真实冒险和发现。尽管狄更斯经常探寻 阴森冷酷的世界本质，但他那利刃般的思绪 总能在最黑暗的角落发现光明。

**P539 2017-12-13 Why do animals form swarms - Maria R. D'Orsogna**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=539)

When desert locusts are well fed, they're solitary creatures. But when food becomes scarce, hungry, desperate locusts crowd onto small patches of land where they can still find something to eat. Contact between different locusts' hind legs set off a slew of reactions that change their appearance and behavior. Now, instead of shunning their peers, they seek each other out. The locusts eventually start marching and then fly away in large numbers seeking a better habitat. These gigantic swarms can host millions of insects and travel thousands of miles, devastating vegetation and crops. They stay close to each other, but not too close, or they might get eaten by their hungry neighbors. When many individual organisms, like locusts, bacteria, anchovies, or bats, come together and move as one coordinated entity, that's a swarm. From a handful of birds to billions of insects, swarms can be almost any size. But what they have in common is that there's no leader. Members of the swarm interact only with their nearest neighbors or through indirect cues. Each individual follows simple rules: Travel in the same direction as those around you, stay close, and avoid collisions. There are many benefits to traveling in a group like this. Small prey may fool predators by assembling into a swarm that looks like a much bigger organism. And congregating in a large group reduces the chance that any single individual will be captured. Moving in the same direction as your neighbors saves energy by sharing the effort of fighting wind or water resistance. It may even be easier to find a mate in a swarm. Swarming can also allow groups of animals to accomplish tasks they couldn't do individually. When hundreds or millions or organisms follow the same simple rules, sophisticated behavior called swarm intelligence may arise. A single ant can't do much on its own, but an ant colony can solve complex problems, like building a nest and finding the shortest path to a food source. But sometimes, things can go wrong. In a crowd, diseases spread more easily, and some swarming organisms may start eating each other if food is scarce. Even some of the benefits of swarms, like more efficient navigation, can have catastrophic consequences. Army ants are one example. They lay down chemicals called pheromones which signal their neighbors to follow the trail. This is good if the head of the group is marching towards a food source. But occasionally the ants in the front can veer off course. The whole swarm can get caught in a loop following the pheromone trail until they die of exhaustion. Humans are notoriously individualistic, though social, animals. But is there anything we can learn from collective swarm-based organization? When it comes to technology, the answer is definitely yes. Bats can teach drones how to navigate confined spaces without colliding, fish can help design software for safer driving, and insects are inspiring robot teams that can assist search and rescue missions. For swarms of humans, it's perhaps more complicated and depends on the motives and leadership. Swarm behavior in human populations can sometimes manifest as a destructive mob. But collective action can also produce a crowd-sourced scientific breakthrough an artistic expression, or a peaceful global revolution.

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翻译人员: Chien Yet Chong 校对人员: Sylvia He当沙漠蝗虫有足够的食物时， 它们是独居的生物。但是在食物短缺时，饥饿的蝗虫逼于无奈群拥到一小块仍然还有食物的土地上。当不同蝗虫的后腿相触时， 一连串的反应将发生并改变蝗虫的外观和行为。现在，蝗虫不再避开同类， 而会开始寻找同伴。这些蝗虫大规模地成群飞行，去寻找更好的栖息地。这些巨大蝗群的蝗虫数量 可达几百万只，飞行距离长至几千英里，在途中破坏无数植物和庄稼。它们彼此靠近着飞行， 但不会过于紧密，否则会被饥饿的同伴吞噬。但大量的同类生物，如蝗虫，细菌，鳀鱼或蝙蝠，聚集起来，以一个单体协调地运动时，就形成了“群”。从寥寥无几的飞鸟到数以亿计的昆虫，群的大小不拘。这些群都有一个共同点， 就是没有领导。群的成员只跟离它们 最近的同类互动，或通过间接讯号沟通。每个成员都遵守一些简单的规则：跟身边的成员往同样的方向移动、互相挨近、和避免碰撞。像这样成群结队地移动有很多好处。体型小的猎物形成 看似巨大的生物群队，藉此蒙骗它们的天敌。聚集成群也能减少个别生物被捕猎的机会。和同伴往同一个方向移动可以一起抵抗风或水的阻力， 从而节省体力。在群队里也能更容易地找到配偶。成群结队也能帮动物完成它们无法单独完成的任务。当成千上万的生物都 同时遵守同样的简单规则时，称为群体智能的复杂行为就会出现。一只蚂蚁无法独自完成很多事，但是一群蚂蚁却能解决复杂的问题，比如筑巢和找到离食物最近的路线。但是有时候会有差错。疾病更容易在群体中散播，一些群居的生物更会在 食物短缺时自相残杀。甚至一些成群结队的好处， 比如提高导航的效率，也可以有灾难性的后果。行军蚁就是一个例子。它们会释放出一种 叫信息素的化学物质，指示邻近的同类跟从它们的踪迹。如果前面的蚁在步向食物，这非常有用。但有时候，前面的蚂蚁偏离了正途。整个蚁群可能跟着信息素绕圈而行，直到力竭身亡。人类是出了名奉行个人主义 但却群居的生物。我们可以从群体性组织学习到什么吗？在科技领域，答案是肯定的。蝙蝠可以教导无人驾驶飞机 怎样在密封的空间里畅行，鱼可以帮助人类设计安全驾驶的软件，而昆虫能够启发机器人协助搜救任务。人类的成群结队也许比较棘手，而且成败取决于动机和领导能力。人类的群体行为有时候会 在极具破坏力的暴民身上体现。但群体行动也可推动 众包的科学突破、艺术表现、或和平的全球革命。

**P540 2017-12-18 How does your immune system work - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=540)

A mosquito lands on your arm, injects its chemicals into your skin, and begins to feed. You wouldn’t even know it was there, if not for the red lump that appears, accompanied by a telltale itch. It’s a nuisance, but that bump is an important signal that you’re protected by your immune system, your body’s major safeguard against infection, illness, and disease. This system is a vast network of cells, tissues, and organs that coordinate your body’s defenses against any threats to your health. Without it, you’d be exposed to billions of bacteria, viruses, and toxins that could make something as minor as a paper cut or a seasonal cold fatal. The immune system relies on millions of defensive white blood cells, also known as leukocytes, that originate in our bone marrow. These cells migrate into the bloodstream and the lymphatic system, a network of vessels which helps clear bodily toxins and waste. Our bodies are teeming with leukocytes: there are between 4,000 and 11,000 in every microliter of blood. As they move around, leukocytes work like security personnel, constantly screening the blood, tissues, and organs for suspicious signs. This system mainly relies on cues called antigens. These molecular traces on the surface of pathogens and other foreign substances betray the presence of invaders. As soon as the leukocytes detect them, it takes only minutes for the body’s protective immune response to kick in. Threats to our bodies are hugely variable, so the immune response has to be equally adaptable. That means relying on many different types of leukocytes to tackle threats in different ways. Despite this diversity, we classify leukocytes in two main cellular groups, which coordinate a two-pronged attack. First, phagocytes trigger the immune response by sending macrophages and dendritic cells into the blood. As these circulate, they destroy any foreign cells they encounter, simply by consuming them. That allows phagocytes to identify the antigen on the invaders they just ingested and transmit this information to the second major cell group orchestrating the defense, the lymphocytes. A group of lymphocyte cells called T-cells go in search of infected body cells and swiftly kill them off. Meanwhile, B-cells and helper T-cells use the information gathered from the unique antigens to start producing special proteins called antibodies. This is the pièce de résistance: Each antigen has a unique, matching antibody that can latch onto it like a lock and key, and destroy the invading cells. B-cells can produce millions of these, which then cycle through the body and attack the invaders until the worst of the threat is neutralized. While all of this is going on, familiar symptoms, like high temperatures and swelling, are actually processes designed to aid the immune response. A warmer body makes it harder for bacteria and viruses to reproduce and spread because they’re temperature-sensitive. And when body cells are damaged, they release chemicals that make fluid leak into the surrounding tissues, causing swelling. That also attracts phagocytes, which consume the invaders and the damaged cells. Usually, an immune response will eradicate a threat within a few days. It won’t always stop you from getting ill, but that’s not its purpose. Its actual job is to stop a threat from escalating to dangerous levels inside your body. And through constant surveillance over time, the immune system provides another benefit: it helps us develop long-term immunity. When B- and T-cells identify antigens, they can use that information to recognize invaders in the future. So, when a threat revisits, the cells can swiftly deploy the right antibodies to tackle it before it affects any more cells. That’s how you can develop immunity to certain diseases, like chickenpox. It doesn’t always work so well. Some people have autoimmune diseases, which trick the immune system into attacking the body’s own perfectly healthy cells. No one knows exactly what causes them, but these disorders sabotage the immune system to varying degrees, and underlie problems like arthritis, Type I diabetes, and multiple sclerosis. For most individuals, however, a healthy immune system will successfully fight off an estimated 300 colds and innumerable other potential infections over the course of a lifetime. Without it, those threats would escalate into something far more dangerous. So the next time you catch a cold or scratch a mosquito bite, think of the immune system. We owe it our lives.

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翻译人员: Jian Wang 校对人员: Riley WANG一只蚊子落到了你的手臂上，把化学物质注射到你的皮肤内， 然后开始大快朵颐。如果没有在叮咬后出现又红又痒的包，你甚至不会察觉它的存在。虽然很烦人 ， 可这个包是一个是重要的信号，它表示你正被你的免疫系统保护着。免疫系统是你身体的保镖， 使你的身体免受感染和疾病的侵害。免疫系统是由细胞、组织 和器官形成的巨大网络，负责组织身体防御 可能危害健康的外来入侵者。没有它，你将会暴露在 数以亿计的细菌、病毒和毒素之中，这些病原体能让 一个小割伤或小感冒变得致命。白细胞是免疫系统中 一个不可或缺的成员，它们也被称作白血球，由我们的骨髓产生。这些细胞在血液和淋巴系统中游荡，血液和淋巴系统是 用于清除毒素和废物的管道系统。我们的身体里有大量白血球，每微升血液中就有 4000 到 11000 个白血球。它们在身体里的作用如同保安，持续不断地在血液、组织 和器官中搜查可疑迹象。免疫系统主要依靠抗原 作为搜查病原体的线索。这些在病原体和外来物质 表面上的分子痕迹标示着入侵者的存在。白血球发现它们之后，只需要几分钟 ， 身体的免疫反应就会被触发。对我们有威胁的物质种类繁多，所以免疫反应必须随机应变。这意味着，要依靠许多 不同种类的白血球，通过不同的方式抵御入侵者。尽管白血球种类繁多，我们仍可以 把它们分为两个主要细胞组，它们能双管齐下地攻击敌人。首先，吞噬细胞输送 巨噬细胞和树突状细胞到血液里，进而触发免疫反应。这些细胞在血液循环中 会通过吞噬的方法将遇到的外来细胞消灭。这让吞噬细胞能够辨别入侵者身上携带的抗原，然后把信息传送给第二个主要细胞组，即 淋巴细胞，它们负责组织身体的防御。一群叫做“T 细胞”的淋巴细胞 开始搜索被感染的身体细胞，然后迅速地消灭它们。与此同时，B 细胞和辅助 T 细胞使用从抗原处收集的信息来制造被称为“抗体”的特殊蛋白质。它们可不容小觑：每个抗原都有一个独特抗体 附着其上，与之相匹配，就像锁和钥匙一样，能够摧毁入侵细胞。B 细胞能生产数以百万计的抗体，这些抗体在身体里循环 ， 并攻击入侵者，直到解除对身体的威胁。与此同时，令人熟悉的症状，比如发烧和肿胀，其实是为了帮助免疫反应而产生的。较高的体温能够 使细菌和病毒更难繁殖和扩散，因为它们对温度很敏感。当身体细胞受损时，它们会释放一种能让 体液渗入周围组织的化学物质，从而造成肿胀。这也会吸引吞噬细胞来吞食入侵者和受伤的细胞。通常来说 ，免疫反应 能在几天内根除威胁。它不会总让你免受疾病之苦， 那并不是它的职责。它真正的职责是阻止威胁在你的身体中 上升到危险的程度。另外，通过对身体持续不断的监视，免疫系统还能提供另一个好处：那就是帮助我们构建长期免疫力。当 B 细胞和 T 细胞识别出抗原，它们能使用这些信息 识别未来的入侵者。所以，当相同威胁再次到来时， 这些细胞就能快速地调动相应的抗体，在感染扩散之前进行拦截。这就是我们能对水痘等特定疾病 产生免疫力的原因。但这并不总能一劳永逸。一些人患有自体免疫疾病，他们的免疫系统会变得敌我不分，并开始攻击正常而健康的身体细胞。这种病的病因不得而知，但是这些疾病会在 不同程度上影响免疫系统，并引发像关节炎，1型糖尿病，和多发性硬化症等问题。不过，对于大多数人来说，健康的免疫系统能在一生中成功抵御大约 300 次感冒 和不计其数的其他潜在感染。没有免疫系统，这些威胁 就会发展成更危险的疾病。所以，你下次得感冒或被蚊子咬时，想想你的免疫系统，我们的生命全靠它保障。

**P541 2017-12-20 How to manage your time more effectively (according to machines) - Br**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=541)

In the summer of 1997, NASA's Pathfinder spacecraft landed on the surface of Mars, and began transmitting incredible, iconic images back to Earth. But several days in, something went terribly wrong. The transmissions stopped. Pathfinder was, in effect, procrastinating: keeping itself fully occupied but failing to do its most important work. What was going on? There was a bug, it turned out, in its scheduler. Every operating system has something called the scheduler that tells the CPU how long to work on each task before switching, and what to switch to. Done right, computers move so fluidly between their various responsibilities, they give the illusion of doing everything simultaneously. But we all know what happens when things go wrong. This should give us, if nothing else, some measure of consolation. Even computers get overwhelmed sometimes. Maybe learning about the computer science of scheduling can give us some ideas about our own human struggles with time. One of the first insights is that all the time you spend prioritizing your work is time you aren't spending doing it. For instance, let's say when you check your inbox, you scan all the messages, choosing which is the most important. Once you've dealt with that one, you repeat. Seems sensible, but there's a problem here. This is what's known as a quadratic-time algorithm. With an inbox that's twice as full, these passes will take twice as long and you'll need to do twice as many of them! This means four times the work. The programmers of the operating system Linux encountered a similar problem in 2003. Linux would rank every single one of its tasks in order of importance, and sometimes spent more time ranking tasks than doing them. The programmers’ counterintuitive solution was to replace this full ranking with a limited number of priority “buckets.” The system was less precise about what to do next but more than made up for it by spending more time making progress. So with your emails, insisting on always doing the very most important thing first could lead to a meltdown. Waking up to an inbox three times fuller than normal could take nine times longer to clear. You’d be better off replying in chronological order, or even at random! Surprisingly, sometimes giving up on doing things in the perfect order may be the key to getting them done. Another insight that emerges from computer scheduling has to do with one of the most prevalent features of modern life: interruptions. When a computer goes from one task to another, it has to do what's called a context switch, bookmarking its place in one task, moving old data out of its memory and new data in. Each of these actions comes at a cost. The insight here is that there’s a fundamental tradeoff between productivity and responsiveness. Getting serious work done means minimizing context switches. But being responsive means reacting anytime something comes up. These two principles are fundamentally in tension. Recognizing this tension allows us to decide where we want to strike that balance. The obvious solution is to minimize interruptions. The less obvious one is to group them. If no notification or email requires a response more urgently than once an hour, say, then that’s exactly how often you should check them. No more. In computer science, this idea goes by the name of interrupt coalescing. Rather than dealing with things as they come up – Oh, the mouse was moved? A key was pressed? More of that file downloaded? – the system groups these interruptions together based on how long they can afford to wait. In 2013, interrupt coalescing triggered a massive improvement in laptop battery life. This is because deferring interruptions lets a system check everything at once, then quickly re-enter a low-power state. As with computers, so it is with us. Perhaps adopting a similar approach might allow us users to reclaim our own attention, and give us back one of the things that feels so rare in modern life: rest.

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翻译人员: Ying Lu 校对人员: Amy H. Fann在1997年的夏天，美国航天局探索者飞船降落 在火星表面，向地球传输令人惊叹不已的， 标志性的图像。但是几天后， 出现了一些严重的问题。传输停止了。探索者出现了拖延现象：虽然排满了工作， 但没做最重要的任务。这是怎么回事？原来在时刻表中 有一个程序错误。每一个操作系统 都有一个时刻表中央处理器转换前 通知处理时间段以及切换到哪个任务。若处理得当，电脑会在 不同任务间切换自如，因此会给人一种它在同时处理 所有事物的幻觉。但是我们都知道如果操作不当 会导致什么后果。如果别无其他， 这至少能给我们稍许安慰。即便是电脑，有时也会崩溃。也许学习关于电脑科学的 任务规划能给我们人类如何处理棘手的 时间问题带来一些启发。第一：我们花在给事情做 优先级排序的时间意味着我们一件具体的 事情都没做。例如，当你查看收件箱 你会浏览所有的信息，选出最重要的。一旦你处理完一个， 你重复相同的动作。看上去非常合理， 但是存在一个问题。这就是计算机学科里著名的 二次时间算法。当一个收件箱有两倍之多， 它们需要两倍时间长来运行你需要花两倍时间来处理！这意味着工作量翻了四倍。操作系统Linux的程序员们在2003年遇到了类似的问题。Linux会根据每个任务的 重要性来进行排序，有时会花费更长的时间来 排序而不是做事。程序员反直觉的做法是 取代完整排名用有限数量的优先“桶”。这个系统会降低下一步 做什么的准确性但是却花了更多的时间 来完成任务。因此关于你的邮件， 总是坚持先完成最重要的会导致崩溃。打开一个比平常多3倍的收件箱会花费长达九倍的时间来处理。你最好按时间顺序来回复， 或者甚至随机回复！令人惊讶的是，有时放弃 用完美的顺序来执行任务也许才是把事情完成的关键。另一点出现在电脑排序时生活中最常见的问题之一： 各种干扰。当电脑从一个任务进行到 另一个任务时，它需要执行称为 上下文切换的任务，给每一个任务标一个书签，将内存中之前的数据移出， 导入新的数据。每一次这样的行为 都会产生代价。此处有一个重要的 权衡问题存在于生产效率和反应能力之间。完成重要任务意味着要 减少上下文切换。但是反应迅速则意味着 对随时发生的任务进行反馈。这两个原则孰轻孰重 令人难以取舍。意识到这个 取舍难题让我们决定在哪取得 这样的平衡。显而易见的解决方式 就是减少各类干扰。退而其次的方式是分组。如果一小时内 没有推送通知或者需要回复的邮件，这是通常你查看它们的频次。 不会更多了。在电脑科学中，这个概念被 命名为中断合并。与其处理随时出现的事情喔，鼠标动了？摁了个键？下载更多的文件？系统分组会将这些 干扰问题放在一起根据它们能等多久。在2013年，中断合并极大地延长了 笔记本电池的寿命。这是因为推迟处理干扰 可以让系统一次性检查完毕，然后快速重新进入 低电量模式。不仅电脑如此， 我们也是。也许采用一个相似的方式能让我们用户重新集中注意力，以及给我们当代生活中 极为珍贵的一个回馈：休息。

**P542 2018-01-05 The tragic myth of Orpheus and Eurydice - Brendan Pelsue**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=542)

It was the perfect wedding, the guests thought. The groom was Orpheus, the greatest of all poets and musicians. The bride Eurydice, a wood nymph. Anyone could tell the couple was truly and deeply in love. Suddenly, Eurydice stumbled, then fell to the ground. By the time Orpheus reached her side, she was dead, and the snake that had bitten her was slithering away through the grass. Following Eurydice’s funeral, Orpheus was overcome with a grief the human world could not contain, and so he decided he would journey to the land of the dead, a place from which no living creature had ever returned, to rescue his beloved. When Orpheus reached the gates of the underworld, he began to strum his lyre. The music was so beautiful that Cerberus, the three-headed dog who guards the dead, lay down as Orpheus passed. Charon, the ferry captain who charged dead souls to cross the River Styx, was so moved by the music that he brought Orpheus across free of charge. When Orpheus entered the palace of Hades and Persephone, the king and queen of the dead, he began to sing. He sang of his love for Eurydice, and said she had been taken away too soon. The day would come when she, like all living creatures, dwelled in the land of the dead for all eternity, so couldn’t Hades grant her just a few more years on Earth? In the moment after Orpheus finished, all hell stood still. Sisyphus no longer rolled his rock up the hill. Tantalus did not reach for the water he would never be allowed to drink. Even the Furies, the demonic goddesses of vengeance, wept. Hades and Persephone granted Orpheus’s plea, but on one condition. As he climbed back out of the underworld, he must not turn around to see if Eurydice was following behind him. If he did, she would return to the land of the dead forever. Orpheus began to climb. With each step, he worried more and more about whether Eurydice was behind him. He heard nothing— where were her footsteps? Finally, just before he stepped out of the underworld and into the bright light of day, he gave into temptation. Orpheus tried to return to the underworld, but was refused entry. Separated from Eurydice, Orpheus swore never to love another woman again. Instead, he sat in a grove of trees and sang songs of lovers. There was Ganymede, the beautiful boy who Zeus made drink-bearer to the gods. There was Myrrah, who loved her father and was punished for it, and Pygmalion, who sculpted his ideal woman out of ivory, then prayed to Venus until she came to life. And there was Venus herself, whose beautiful Adonis was killed by a wild boar. It was as if Orpheus’s own love and loss had allowed him to see into the hearts of gods and people everywhere. For some, however, poetry was not enough. A group of wild women called the Maenads could not bear the thought that a poet who sang so beautifully of love would not love them. Their jealousy drove them to a frenzy and they destroyed poor Orpheus. The birds, nature’s singers, mourned Orpheus, as did the rivers, who made music as they babbled. The world had lost two great souls. Orpheus and Eurydice had loved each other so deeply that when they were separated, Orpheus had understood the pain and joys of lovers everywhere, and a new art form, the love poem, was born. While the world wept, Orpheus found peace, and his other half, in the underworld. There, to this day, he walks with Eurydice along the banks of the River Styx. Sometimes, they stroll side by side; sometimes, she is in front; and sometimes, he takes the lead, turning to look back at her as often as he likes.

**P542 2018-01-05 The tragic myth of Orpheus and Eurydice - Brendan Pelsue**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=542)

翻译人员: Chien Yet Chong 校对人员: Sylvia He“拨动琴弦唱出低徊婉转的旋律， 引得心如铁石的普路托泪湿双颊，让地狱把爱情所求许与他。” ——约翰·弥尔顿，《沉思颂》客人们觉得，这是一个完美的婚礼。新郎是俄耳甫斯， 最伟大的诗人和音乐家。新娘是宁芙仙女欧律狄克, 任何人都能看出这对情侣深爱着彼此。突然，欧律狄克 踉跄一下，摔倒在地。俄耳甫斯赶到她身边时，她已经死了。 而咬她的蛇则从草丛中溜走。在欧律狄克的葬礼之后，俄耳甫斯被无边的悲伤淹没，所以他决定启程前往任何生物都一去不返的冥界， 去拯救他心爱的人。当俄耳甫斯抵达冥界的入口时， 他开始弹起了他的竖琴。他弹奏的音乐如此动听，以致 看守死人的三头犬，克尔柏洛斯，也在俄耳甫斯经过时入眠。有偿帮助亡灵渡过 冥河的船长卡戎，被俄耳甫斯的音乐所感动， 他免费让俄耳甫斯渡过了冥河。当俄耳甫斯进入冥王哈德斯和冥后珀耳塞福涅的宫殿时，他开始唱歌。他唱着他对欧律狄克的爱， 诉说她太早被带离人间。总有一天她， 如同其他生物，将永远居住在冥界，难道哈德斯不能 让她在人间多活几年吗？在俄耳甫斯的歌声终止时， 整个冥界霎时停顿了。西西弗斯不再把巨石 推上山坡，坦塔洛斯不再把手伸向那 永远无法取得的水源。就连凶恶的复仇女神 孚里埃也掉下眼泪。冥王和冥后应允了 俄耳甫斯的请求，但有个条件。当他爬出冥界时，一定不能回头去看欧律狄克 是否跟在后面。如果他回头望，欧律狄克就会 永远地回到冥界。俄耳甫斯开始攀爬。每前进一步，他都更加担心欧律狄克 是否在身后跟着他。他什么也没听到—— 欧律狄克的脚步声在哪儿？最后，在他就要完全踏出冥界并步入阳光时，他向诱惑投降了。俄耳甫斯想重回冥界， 却被拒之门外。和欧律狄克永远阴阳相隔，让俄耳甫斯发誓不再 爱上另外一个女人。反之，他坐在树林间， 唱着有关爱人的情歌。他歌颂被宙斯恩赐为诸神斟酒 的俊美少年加倪墨得斯，他也歌颂因为爱上 其父亲而被神灵处罚的密拉，还有用象牙雕刻出梦中情人然后向维纳斯祈祷直到 雕像变成真人的皮格马利翁，最后则有其俊美的情人阿多尼斯 不幸被野猪杀害的维纳斯本人。俄耳甫斯自身的爱以及伤痛似乎让他能够看透诸神 以及各处凡人的心境。但对一些人来说，诗词并不够。一群叫迈那得斯的女野人无法接受一位把情歌 唱得如此动听，却又拒绝爱上她们的诗人。嫉妒使她们发疯， 摧毁了可怜的俄耳甫斯。作为大自然的歌唱家， 各种鸟儿为俄耳甫斯哀悼，用潺潺流水谱曲的河流 也加入了它们。世界失去了两位伟大的人物。俄耳甫斯和欧律狄克如此深切地相爱， 以致当他们阴阳分离时，俄耳甫斯明白了所有情侣 的痛苦与欢乐，造就了爱情诗这种全新的艺术。当世界为他们默哀时，俄耳甫斯却 跟他的另一半已在冥界安息。直到今天，他跟欧律狄克 依然在冥河畔漫步。有时，他们俩并肩行走；有时，欧律狄克在前头；而有时，俄耳甫斯带头， 并能够随心所欲地回望欧律狄克。

**P543 2018-01-05 What are mini brains - Madeline Lancaster**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=543)

This pencil-eraser-sized mass of cells is something called a brain organoid. It’s a collection of lab-grown neurons and other brain tissue that scientists can use to learn about full-grown human brains. And it can be grown from a sample of your skin cells. Why would we need such a thing? Neuroscientists face a challenge: shielded by our thick skulls and swaddled in layers of protective tissue, the human brain is extremely difficult to observe in action. For centuries, scientists have tried to understand them using autopsies, animal models, and, in recent years, imaging techniques. We’ve learned a lot through all these methods, but they have limitations. Conditions like Alzheimer’s and schizophrenia, and the effect on the human brain of diseases like Zika, continue to hide beyond our view, and our understanding. Enter brain organoids, which function like human brains but aren’t part of an organism. Each one comes from an undifferentiated stem cell, which is a cell that can develop into any tissue in the body, from bone to brain. Scientists can make undifferentiated stem cells from skin cells. That means they can take a skin sample from a person with a particular condition and generate brain organoids from that person. The hardest part of growing a brain organoid, which stumped scientists for years, was finding the perfect combination of sugars, proteins, vitamins, and minerals that would induce the stem cell to develop a neural identity. That was only discovered recently, in 2013. The rest of the process is surprisingly easy. A neural stem cell essentially grows itself, similar to how a seed grows into a plant, all it needs are the brain’s equivalents of soil, water, and sunlight. A special gel to simulate embryonic tissue, a warm incubator set at body temperature, and a bit of motion to mimic blood flow. The stem cell grows into a very small version of an early-developing human brain, complete with neurons that can connect to one another and make simplified neural networks. As mini brains grow, they follow all the steps of fetal brain development. By observing this process, we can learn how our neurons develop, as well as how we end up with so many more of them in our cortex, the part responsible for higher cognition like logic and reasoning, than other species. Being able to grow brains in the lab, even tiny ones, raises ethical questions, like: Can they think for themselves, or develop consciousness? And the answer is no, for several reasons. A brain organoid has the same tissue types as a full-sized brain, but isn’t organized the same way. The organoid is similar to an airplane that’s been taken apart and reassembled at random; you could still study the wings, the engine, and other parts, but the plane could never fly. Similarly, a brain organoid allows us to study different types of brain tissue, but can’t think. And even if mini brains were organized like a real brain, they still wouldn’t be able to reason or develop consciousness. A big part of what makes our brains so smart is their size, and mini brains have only about 100,000 neurons compared to the 86 billion in a full-sized brain. Scientists aren’t likely to grow larger brain organoids anytime soon. Without blood vessels to feed them, their size is limited to one centimeter at most. Finally, mini brains aren’t able to interact with the outside world. We learn by interacting with our environments: receiving inputs through our eyes, ears, and other sensory organs, and reacting in turn. The complex neural networks that underlie conscious thoughts and actions develop from this feedback loop. Without it, the organoids can never form a functional network. There’s nothing quite like the actual human brain, but mini brains are an unprecedented tool for studying everything from development to disease. With luck, these humble organoids can help us discover what makes the human brain unique, and maybe bring us closer to answering the age-old question: what makes us human?

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翻译人员: Riley WANG 校对人员: Yi Fan这团橡皮大小的细胞 被称为类脑器官。它由实验室培养的神经元细胞 以及其他一些脑部组织组成，科学家可以通过它来了解人类大脑。你身上的皮肤细胞 就可以分化出这样的组织。那我们为什么需要这个东西呢？神经科学家正面临着一项挑战，人类大脑受到头盖骨和 周围覆盖的多层组织保护，因此，观察人类大脑 是一件非常困难的事情。几个世纪以来，科学家 尝试通过尸体解剖、动物模型、以及近几年的成像技术来了解大脑。这些方法让我们收获良多，但它们存在着局限性。对于阿尔茨海默症、精神分裂症、和寨卡这种影响大脑的疾病，我们依然不了解其作用机制。类脑器官的功能与人脑类似，但并非生物体的一部分。它们来自于未分化的干细胞，这种细胞可以分化成身体中从骨骼到大脑的任一组织。科学家可以从皮肤细胞中 提取未分化的干细胞。也就是说，从具有特定条件的人 身上提取出一些皮肤组织，就可以培养出这个人的类脑器官。科学家曾耗费数年才实现培养类脑器官，该过程中最大的困难在于找到 糖、蛋白质、维生素和矿物质的最佳配比，只有这样才能诱使 干细胞分化成神经细胞。直到 2013 年， 我们才攻克了这个难关。培养过程中的其他环节 则出奇的简。神经干细胞通常会自我发育，这就像从种子生长成植物，只需要大脑提供类似 土壤、水分、阳光等物质。这种物质包括 一种模拟胚胎组织的特殊凝胶、一个设定在人体温度的恒温箱、以及模拟血液流动的运动。干细胞会发育成为初期的大脑组织，这种类脑组织很小，其中含有神经元细胞，它们彼此相连， 构成了简化版的神经网络。类脑的继续发育遵循 胚胎时期大脑发育的一切步骤。通过观察这个过程， 我们可以了解神经元如何生长，为何我们比起其他物种拥有更多的神经元细胞， 从而拥有更高层次的认知，例如逻辑和推理。在实验室中培养大脑， 即便是迷你版的类脑器官，也引发了一些伦理道德问题。例如，这些大脑是否能够 自行思考或者发展出意识？答案是否定的，原因如下：类脑器官虽然拥有 与正常大脑相同的组织类型，但组织的方式却不相同。类脑就像是一架飞机，先被拆散，后又重新随机组装；虽然你可以继续研究 机翼、发动机和其他部件，但这架飞机却无法飞行。同样，类脑器官能帮助我们 研究不同类型的大脑组织，但是它并不能思考。即便类脑器官与正常大脑 的组织方式一样，它依然无法推理或建立意识。智力在很大程度上取决于脑的大小，小型类脑器官只有 约 10 万个神经元，而正常大脑则有 860 亿个神经元。科学家不太可能在近期 培育出更大的类脑器官。如果没有血管供给养分，类脑器官最多只能 生长到 1 厘米左右。最后一点，类脑器官 无法与外界交流。我们通过与环境互动来学习，通过眼、耳及其他感受器官 接受信息， 再做出反应。有意识的思考和行为的背后是 复杂的神经网络，但神经网络需通过反馈循环才能发展。若没有反馈，类脑器官就 永远不能形成功能性的网络。虽然类脑器官与实际的人脑并不相同，但它作为一个前所未有的工具，能够用来研究 从发育到疾病的任何问题。运气好的话，这些类脑器官 可以帮我们发现决定人类大脑独特性的因素，从而使我们能够 回答长久存在的那个问题：人何而为人？

**P544 2018-01-09 The myth of Oisín and the land of eternal youth - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=544)

In a typical hero's journey, the protagonist sets out on an adventure, undergoes great change, and returns in triumph to their point of origin. But in the Irish genre of myth known as Eachtraí, the journey to the other world ends in a point of no return. While there are many different versions of the otherworld in Irish mythology, the most well-known example occurs in the story of Oisín. Oisín was the son of Fionn mac Cumhaill, the leader of a group of pagan warriors known as the Fianna. As Oisín rode with his companions one day, he was visited by the immortal princess Niamh. The two fell instantly in love and Niamh put Oisín onto her white horse and rode with him to the edge of the Irish sea. As they made for the horizon, the riders sunk into a golden haze. They came to the shores of the gleaming kingdom called Tír na nÓg. This was the home of the Tuatha Dé Danann, the people who ruled Ancient Ireland long before Oisín's time. From the point of his arrival, Oisín's every need was met. He married Niamh in a grand ceremony and was welcomed into her family. When he wished to hear music, his ears filled with bewitching tones. When he hungered, golden plates appeared laden with fragrant food. He admired scenes of great beauty, and colors that he had no name for. All around him, the land and the people existed in a state of unmoving perfection. But what Oisín didn't know was that Tír na nÓg was the land of youth, in which time stood still and the people never aged. In his new home, Oisín continued to hunt and explore as he had in Ireland. But in the land of youth, he possessed a strange, new invincibility. At the end of each day of adventuring, Oisín's wounds magically healed themselves as he slept in Niamh's arms. Although glory and pleasure came easily to Oisín in the land of youth, he missed the Fianna and the adventures they had in Ireland. After three years in Tír na nÓg, he was struck by a deep yearning for home. Before he embarked on his journey back, Niamh warned him that he must not alight from his horse to touch the earth with his own feet. When Oisín reached the shores of Ireland, it felt as if a shadow had fallen over the world. On the hill where his father's palace lay, he saw only a ruin strewn with weeds. His calls for his friends and family echoed from derelict walls. Horrified, Oisín rode until he came upon a group of peasants working in the fields. They were struggling to remove a boulder from their land, and forgetting Niamh's warning, Oisín leapt from his horse and rolled it away with his superhuman strength. The crowd's cheers soon turned into shrieks. In place of the youth was an old man whose beard swept the ground and whose legs buckled under him. He cried out for Finn and the Fianna, but the people only recognized these names from the distant past of 300 years before. Time had betrayed Oisín and his return to mortal lands had aged him irreversibly. Throughout Irish folklore, sightings of the land of youth have been reported in the depths of wells, on the brink of the horizon, or in the gloom of caves. But those who know the tale of Oisín tell of another vision, that of a shining princess carried upon the distant waves by a white horse, still hoping for the return of her doomed love.

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翻译人员: Riley WANG 校对人员: Sylvia He”仙女啊！快来带我离开这无聊的世界， 因为我可以和你乘风而去。。。“-威廉·巴特勒·叶芝 《心灵的欲望之田》在典型的英雄探险故事里主人公踏上历险旅程，经历巨变，最后荣归故里。但在爱尔兰神话故事中英雄前往另一个世界 却有去无回。虽然在爱尔兰神话中， 对于另一个世界有不同说法但最著名的仍要数 奥辛的冒险故事。奥辛是芬恩·麦克库尔之子，芬恩·麦克库尔是费奥纳骑士团的首领。某天，奥辛与同伴骑马同行遇到仙子妮奥芙，二人一见钟情。妮奥芙让奥辛骑上自己的白马一同来到爱尔兰海边。二人向地平线前进， 消失在一片金色的雾霭中。他们来到光芒四射的提尔纳诺国这是统治古爱尔兰的达努之族的故乡。这段历史远早于奥辛所处的时代。奥辛刚来到此地， 他的需求便被一应满足。他与妮奥芙举行了盛大的婚礼 受到她家族的欢迎和接纳，当奥辛想要听音乐时， 他的耳中便响起迷人的旋律，当他感到饥饿时， 盛满喷香食物的金色盘子就会出现，他喜爱这美丽至极的景色 和叫不出名字的缤纷色彩。在他身边，大地和人们 始终处于一种完美状态。但奥辛并不知道 提尔纳诺是青春之地在这里，时间静止，人不会老去。在这里，奥辛与之前在爱尔兰一样 继续打猎和探险，但在青春之地，他在每天结束冒险时都会拥有一股新涌现出的力量。在妮奥芙怀中睡觉时 奥辛的伤口会奇迹般自愈。虽然在青春之地 获得荣耀与愉悦易如反掌但奥辛思念费奥纳骑士团 和在爱尔兰的历险。在提尔纳诺度过三年后 他思乡情切，决定启程回家 临行前妮奥芙警告奥辛不可下马，也不可用脚接触大地。当奥辛到达爱尔兰海边他看到世界仿佛笼罩在阴影之中。在他父亲宫殿曾经坐落的山上 他只看到野草丛生的废墟，他呼唤朋友和家人 只听到残垣断壁处的回声。奥辛感到恐惧，他骑马前行 直至遇上在种地的农民们他们正在奋力搬地里的一块大石。此时，奥辛忘记了妮奥芙的警告从马上一跃而下，用他超乎常人的力量 将石头扔到一边。但农民们的欢呼很快变成了尖叫，因为这个年轻人迅速变成了一个老人，胡须垂地，双腿变形。他大喊着芬恩和费奥纳，但人们只知道这是 存在于三百多年前的名字。时间背叛了奥辛他重返凡人之地， 自己却不可逆转地衰老。在爱尔兰民间故事中很多人声称见过青春之地，在深井中、在地平线尽头、在黑暗的洞穴中。但了解奥辛故事的人们 在讲述另一个版本，遥远的海浪上 一位闪耀光芒的公主骑着白马依然盼望着她一生挚爱的归来。

**P545 2018-01-17 Why is NASA sending a spacecraft to a metal world - Linda T. Elkins-T**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=545)

Somewhere between the orbits of Mars and Jupiter, about 500 million kilometers away from Earth, floats a metallic orb the size of Massachusetts. That’s no moon...it’s 16 Psyche, one of the most massive asteroids in the solar system. And it is the asteroid our droids are looking for. We humans have managed to send robotic spacecraft to all sorts of environments in space – the gas clouds of Saturn and Jupiter, the icy wastes of Europa, and the rocky dunes of Mars. But Psyche’s surface isn’t just hard rock – it’s heavy metal. The asteroid mostly consists of nickel and iron, by far the largest known body with such a composition. But we don’t yet know what it looks like; our best current radar images show a pixelated smudge. That’ll change in 2026, when an unmanned spacecraft sent as part of NASA’s Discovery Program is scheduled to arrive. So why is NASA so interested in Psyche? Are we going to mine all that metal, or build a giant space magnet? Actually, the real reason is right under our feet. The core of the Earth is thought to consist of a solid nickel-iron center with a molten outer layer. But we’re prevented from studying it up close by 2,800 kilometers of solid rock. The deepest we’ve been able to drill is 12 kilometers. Even if we could go further, the pressure at the core is three million times higher than at the surface, with a temperature of 5,000 degrees Celsius. Simply put, a journey to the center of the Earth is out of the question for now. So scientists have had to resort to indirect ways of studying the core, like measuring earthquake waves that pass through it, or studying minerals thought to have formed there. But what if the best way to study Earth’s inner space is by visiting outer space? After all, we have a pretty good idea of how our planets formed. Dust and gas orbiting our young Sun cooled and collided to form a few thousand miniature bodies we call planetesimals. As these continued to orbit, some combined to grow larger, eventually forming our planets. Others experienced impacts that broke them apart into smaller chunks– the asteroids we see today in the belt between Mars and Jupiter. What makes Psyche so special is that it appears to have been a planetesimal well on its way to becoming a planet, with a rocky exterior surrounding a metal core. But its progress was cut short by a series of hit-and-run collisions with other planetesimals that knocked off the rocky crust until only the core remained. Experiencing that many destructive collisions with no additive ones in between is statistically very unlikely, making Psyche an amazingly rare opportunity to study an exposed metallic core. To do that, NASA’s robotic orbiter will be equipped with an array of advanced instruments. A spectrometer will analyze the gamma rays and neutrons produced when Psyche is struck by cosmic rays. Each element in the periodic table releases gamma rays of specific wavelengths, so these measurements will tell us what elements are found on the surface. A magnetometer will measure Psyche’s magnetic field, allowing us to learn more about how Earth’s magnetic field is generated at its core. And of course, an imager will give us a closer look at the surface than ever before. Visiting a whole new kind of world is exciting enough on its own. But the mission to Psyche gives us a unique chance to discover our own planet’s innermost secrets in an orbit far, far away.

**P545 2018-01-17 Why is NASA sending a spacecraft to a metal world - Linda T. Elkins-T**

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翻译人员: Chien Yet Chong 校对人员: Zibo Huang“探索其它世界，才能保卫我们的世界。” ——卡尔·萨根在火星和木星的轨道之间， 距离地球 5 亿公里远的地方，漂浮着一个大小如 马萨诸塞州般的金属天体。那不是月球……是 16 号 小行星，灵神星（Psyche），太阳系中最大的小行星之一。那就是我们的机器人正要 寻找的小行星。我们人类已经成功发射了航天器到太空的各种不同的环境中——土星和木星的气体云、木卫二的冰封荒野、还有火星的岩石沙丘。但是灵神星的表面 并不是坚硬的岩石——而是重金属。这颗小行星主要由镍和铁组成，是所知天体中具有 该金属组合体积最大的一个。但是我们还不知道它长什么样子；我们目前最佳的雷达 图像分辨率还不够。2026 年，这种情况将会有所改善。那时美国国家航空航天局 （NASA）“发现号计划”中所发射的无人航天器将会预期抵达。为什么 NASA 对灵神星 那么感兴趣？我们将会开采那里的金属， 还是制作一个巨型太空磁铁？其实，真正原因就在我们脚下。地核被认为是由固体的 镍和铁为核心，包裹着液态的外层。但是我们脚下 2800 公里厚的坚硬土层 阻碍了我们对地核的进一步研究。我们最深只能挖到 12 公里。就算我们可以挖得更深，地核的压强将比地面高三百万倍，而且温度高达 5000 摄氏度。简而言之，通往地心 的旅程现在是无法进行的。所以科学家需要通过间接 的方式来研究地核，如测量穿透地核的地震波，或研究被认为是在 地核内形成的矿物。然而，如果研究地球内部的最好方法其实是探访外太空呢？毕竟，我们已经知道 地球是怎么形成的了。灰尘和气体围绕着新形成的太阳, 不断的冷却和碰撞形成了数以千计的小型天体， 称之为小行星体。这些小行星体继续围绕太阳转动， 其中一些结合并逐渐变大，最后形成了行星。另一些则经历撞击 而分裂成小块的碎片 ——即如今位于火星和木星 之间的小行星带。灵神星如此特别的原因是，该小行星曾经处于从小行星演变成为行星的过程中，拥有岩石包围的金属核心。但与其他小行星一系列的相撞打断了这次演变，使它的岩石外壳剥离 直到只留下核心。经历了许多破坏性的撞击，其间又不增加任何物质， 这样的情况十分罕见，因此，灵神星为我们提供了极为难得的研究裸露核心的机会。为了进行研究，NASA 的机器轨道飞行器将搭载许多不同的高科技仪器。光谱仪将会分析灵神星在 宇宙射线照射下所产生的伽玛射线和中子。元素周期表内的每个元素都会释放特定波长的伽玛射线，所以测量结果将告诉我们 行星表面含有什么元素。磁力计将测量灵神星的磁场，帮助我们进一步了解地球的磁场是 如何在地核生成。另外还有成像器，能够帮助我们近距离的观察其表面。探访一个全新的世界本身 已经是非常令人振奋的了。而灵神星探访之旅 更是给了我们一个独特的机会，从遥远的外太空探寻 我们星球最深处的秘密。

**P546 2018-01-19 Ugly history - The 1937 Haitian Massacre - Edward Paulino**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=546)

When historians talk about the atrocities of the 20th century, we often think of those that took place during and between the two World Wars. Along with the Armenian genocide in modern-day Turkey, the Rape of Nanking in China, and Kristallnacht in Germany, another horrific ethnic cleansing campaign occurred on an island between the Atlantic Ocean and Caribbean Sea. The roots of this conflict go back to 1492, when Christopher Columbus stumbled onto the Caribbean island that would come to be named Hispaniola, launching a wave of European colonization. The island’s Taíno natives were decimated by violence and disease and the Europeans imported large numbers of enslaved Africans to toil in profitable sugar plantations. By 1777, the island had become divided between a French-controlled West and a Spanish-controlled East. A mass slave revolt won Haiti its independence from France in 1804 and it became the world’s first black republic. But the new nation paid dearly, shut out of the world economy and saddled with debt by its former masters. Meanwhile, the Dominican Republic would declare independence by first overthrowing Haitian rule of eastern Hispaniola and later Spanish and American colonialism. Despite the long and collaborative history shared by these two countries, many Dominican elites saw Haiti as a racial threat that imperiled political and commercial relations with white western nations. In the years following World War I, the United States occupied both parts of the island. It did so to secure its power in the Western hemisphere by destroying local opposition and installing US-friendly governments. The brutal and racist nature of the US occupation, particularly along the remote Dominican-Haitian border, laid the foundation for bigger atrocities after its withdrawal. In 1930, liberal Dominican president Horacio Vásquez was overthrown by the chief of his army, Rafael Trujillo. Despite being a quarter Haitian himself, Trujillo saw the presence of a bicultural Haitian and Dominican borderland as both a threat to his power and an escape route for political revolutionaries. In a chilling speech on October 2, 1937, he left no doubt about his intentions for the region. Claiming to be protecting Dominican farmers from theft and incursion, Trujillo announced the killing of 300 Haitians along the border and promised that this so-called "remedy" would continue. Over the next few weeks, the Dominican military, acting on Trujillo’s orders, murdered thousands of Haitian men and women, and even their Dominican-born children. The military targeted black Haitians, even though many Dominicans themselves were also dark-skinned. Some accounts say that to distinguish the residents of one country from the other, the killers forced their victims to say the Spanish word for parsley. Dominicans pronounce it perejil, with a trilled Spanish "r." The primary Haitian language, however, is Kreyol, which doesn’t use a trilled r. So if people struggled to say perejil, they were judged to be Haitian and immediately killed. Yet recent scholarship suggests that tests like this weren’t the sole factor used to determine who would be murdered, especially because many of the border residents were bilingual. The Dominican government censored any news of the massacre, while bodies were thrown in ravines, dumped in rivers, or burned to dispose of the evidence. This is why no one knows exactly how many people were murdered, though contemporary estimates range from about 4,000 to 15,000. Yet the extent of the carnage was clear to many observers. As the US Ambassador to the Dominican Republic at the time noted, “The entire northwest of the frontier on the Dajabón side is absolutely devoid of Haitians. Those not slain either fled across the frontier or are still hiding in the bush.” The government tried to disclaim responsibility and blame the killings on vigilante civilians, but Trujillo was condemned internationally. Eventually, the Dominican government was forced to pay only $525,000 in reparations to Haiti, but due to corrupt bureaucracy, barely any of these funds reached survivors or their families. Neither Trujillo nor anyone in his government was ever punished for this crime against humanity. The legacy of the massacre remains a source of tension between the two countries. Activists on both sides of the border have tried to heal the wounds of the past. But the Dominican state has done little, if anything, to officially commemorate the massacre or its victims. Meanwhile, the memory of the Haitian massacre remains a chilling reminder of how power-hungry leaders can manipulate people into turning against their lifelong neighbors.

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翻译人员: Chien Yet Chong 校对人员: Viviana Hu“无论是活人还是死者，我们都该为他们作证” -- 埃利·维瑟尔当历史家谈到 20世纪的暴行时，我们往往会想起发生于两次世界大战 或是两次大战之间的那些事。除了现代土耳其的亚美尼亚大屠杀、中国的南京大屠杀、和德国的水晶之夜，还有另一个恐怖的种族清洗活动在一座位于大西洋和 加勒比海之间的岛屿上发生。这个冲突的根源可追溯 到1492年，克里斯托弗·哥伦布 意外地在加勒比海发现一座后来被命名为伊斯帕尼奥拉的岛, 展开了欧洲人的殖民浪潮。该岛的原住民泰诺人 因为暴力和疾病而人口锐减欧洲人则带入大批的非洲奴隶在盈利丰厚的甘蔗园做苦力。到了1777年，该岛已分裂成法国控制的西部 和西班牙控制的东部。1804年发生的奴隶大反抗 使海地从法国争取独立。它成为了世界上 第一个黑人共和国。但海地赔上了极高的代价，经济上被其他国家孤立 又遭法国索赔、负债累累。同时，多米尼加共和国 则宣布独立。他们推翻了海地 在东伊斯帕尼奥拉的统治，又打败了西班牙 和美国的殖民主义。尽管两国共享悠长的历史， 也常常一起合作，多米尼加的许多上层人士 依然视海地为一个种族威胁，危害他们跟西方白人国家 在政治与贸易上的关系。第一次世界大战后，美国占领了该岛上的两国。为了巩固它在西半球的势力美国粉碎了地方反抗势力， 并设立了亲美的地方政府。美占时期的残暴和种族歧视，在多米尼加-海地边界的偏僻地区， 尤为严重，为美国撤退后， 该地发生的种种暴行播下种子。1930年，开明的多米尼加总统 霍拉希奥·巴斯克斯被他的陆军总司令 拉斐尔·特鲁希略推翻。尽管有着四分之一的海地血统，特鲁希略还是 把海地和多米尼加边界的二元文化视为对他的权利的威胁，以及政治革命者们 的发泄渠道。1937年十月二日， 在一个令人寒心的演讲中他毫无保留地说明 他对该地的计划。打着保护多米尼加农民 免受被盗和侵犯的旗帜，特鲁希略宣布杀害300名 居住于边界的海地人，并言之凿凿地承诺这个 “解决方法”将不会间断。接下来的几个星期， 多米尼加军队在特鲁希略的命令下，滥杀上千名海地男女，包括他们在多米尼加出生的孩子。军队主要针对海地黑人，尽管许多多米尼加人本身 也拥有黝黑的皮肤。有些记载称为了辨识两国的公民，杀手会强迫受害者用 西班牙语说“香菜”这个词。多米尼加人会把它念成“perejil”， 颤音的西班牙“r”。而海地人的主要语言克里奥尔语， 是从不使用颤音的“r"的。所以如果某人很难说出“perejil”这个词，他就被视为海地人， 格杀勿论。但现代学者提出 类似这种的测试并不是用来决定谁将 被杀死的唯一方法，尤其是因为有很多住在 边界的人都懂两个语言。多米尼加政府对任何 跟大屠杀有关的新闻严加检查受害者的尸体则被抛入深谷、弃于河中、或焚毁以毁尸灭迹。这就是为什么没有人 知道受害者的确实数目，但现代推测这个数字 介于4千到1万5千人之间。无论如何，大屠杀程度之严重 是众所周知的。就如当时美国驻 多米尼加共和国的大使说的,“达哈翁省西北方边界 的整个地区没有一个海地人。未遭受屠杀的要么跨过边界逃命， 要么依然躲在森林之中。”多米尼加政府尝试拒绝承认罪行并把滥杀归咎于非法 民间义警团，不过特鲁希略还是被 国际社会谴责。最终，多米尼加政府被迫赔偿区区的 52万2千美元给海地。但是由于腐败的官僚制度，只有少量的赔偿金真正落入了 幸存者或受害者亲人手里。特鲁希略和他的政府官员都没有因为这项危害人类罪 的罪行而被处置。大屠杀所留下的影响 仍然是这两国关系紧张的根源。双方的积极分子都在尝试 愈合过去的伤痕。然而多米尼加政府却几乎 没采取什么行动来正式纪念这场屠杀 或其受害者。与此同时，海地大屠杀的记忆 仍然是个刺骨寒心的警示，提醒我们权欲熏心的领导 可以如何操控人民让他们和相处多年的邻国朋友 反目成仇。

**P547 2018-01-21 Can you solve the dark coin riddle - Lisa Winer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=547)

You heard the traveler's tales, you followed the crumbling maps, and now, after a long and dangerous quest, you have some good news and some bad news. The good news is you've managed to locate the legendary dungeon containing the stash of ancient Stygian coins and the eccentric wizard who owns the castle has even generously agreed to let you have them. The bad news is that he's not quite as generous about letting you leave the dungeon, unless you solve his puzzle. The task sounds simple enough. Both faces of each coin bear the fearsome scorpion crest, one in silver, one in gold. And all you have to do is separate them into two piles so that each has the same number of coins facing silver side up. You're about to begin when all of the torches suddenly blow out and you're left in total darkness. There are hundreds of coins in front of you and each one feels the same on both sides. You try to remember where the silver-facing coins were, but it's hopeless. You've lost track. But you do know one thing for certain. When there was still light, you counted exactly 20 silver-side-up coins in the pile. What can you do? Are you doomed to remain in the dungeon with your newfound treasure forever? You're tempted to kick the pile of coins and curse the curiosity that brought you here. But at the last moment, you stop yourself. You just realized there's a surprisingly easy solution. What is it? Pause here if you want to figure it out for yourself. Answer in: 3 Answer in: 2 Answer in: 1 You carefully move aside 20 coins one by one. It doesn't matter which ones: any coins will do, and then flip each one of them over. That's all there is to it. Why does such a simple solution work? Well, it doesn't matter how many coins there are to start with. What matters is that only 20 of the total are facing silver side up. When you take 20 coins in the darkness, you have no way of knowing how many of these silver-facing coins have ended up in your new pile. But let's suppose you got 7 of them. This means that there are 13 silver-facing coins left in the original pile. It also means that the other 13 coins in your new pile are facing gold side up. So what happens when you flip all of the coins in the new pile over? Seven gold-facing coins and 13 silver-facing coins to match the ones in the original pile. It turns out this works no matter how many of the silver-facing coins you grab, whether it's all of them, a few, or none at all. That's because of what's known as complementary events. We know that each coin only has two possible options. If it's not facing silver side up, it must be gold side up, and vice versa, and in any combination of 20 coins, the number of gold-facing and silver-facing coins must add up to 20. We can prove this mathematically using algebra. The number of silver-facing coins remaining in the original pile will always be 20 minus however many you moved to the new pile. And since your new pile also has a total of 20 coins, its number of gold-facing coins will be 20 minus the amount of silver-facing coins you moved. When all the coins in the new pile are flipped, these gold-facing coins become silver-facing coins, so now the number of silver-facing coins in both piles is the same. The gate swings open and you hurry away with your treasure before the wizard changes his mind. At the next crossroads, you flip one of your hard-earned coins to determine the way to your next adventure. But before you go, we have another quick coin riddle for you – one that comes from this video sponsor’s excellent website. Here we have 8 arrangements of coins. You can flip over adjacent pairs of coins as many times as you like. A flip always changes gold to silver, and silver to gold. Can you figure out how to tell, at a glance, which arrangements can be made all gold? You can try an interactive version of this puzzle and confirm your solution on Brilliant’s website. We love Brilliant.org because the site gives you tools to approach problem-solving in one of our favorite ways— by breaking puzzles into smaller pieces or limited cases, and working your way up from there. This way, you're building up a framework for problem solving, instead of just memorizing formulas. You can sign up for Brilliant for free, and if you like riddles a Brilliant.org premium membership will get you access to countless more interactive puzzles. Try it out today by visiting brilliant.org/TedEd and use that link so they know we sent you. The first 833 of you to visit that link will receive 20% off the annual premium subscription fee.

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翻译人员: Chien Yet Chong 校对人员: Sylvia He正片结束后后请继续观看 会有一个额外的谜题。你听说过探险者的传说，你循着那张皱巴巴的地图，现在，经过悠长又危险的探险后，你有一些好消息和一些坏消息。好消息是你成功找到了传说中的的地窖那儿存放着古希腊冥河的钱币而那位拥有这座城堡的古怪巫师竟然慷慨地同意让你 带走这些钱币。但是坏消息是他 却并非如此大方地让你离开地窖， 除非你解开他的谜题。任务看似简单。钱币每一面都铸有 令人生畏的蝎子饰章，一面是银的，另一面是金的。你只需要把它们分为两堆好让每一堆中银面向上的 都有相同的数目。当你想开始时，突然 所有的火炬都灭了你完全陷入漆黑中。你的面前堆放着上百枚钱币，每一枚的两面都有相同的质感。你尝试回想起银面向上 的钱币的所在位置，但都徒劳无功。你毫无头绪了。但是你很确定一件事儿。当火炬还亮着时，你准确地算到那堆钱币中 有20枚银面向上的。你可以怎么做呢？你是否注定永远地跟你 新发现的宝藏留在地窖里？你激怒得想踢那堆钱币一脚以及咒骂带你到此地的好奇心。但那一瞬间，你停下来。你刚意识到有个相当 简单的解决方案。那是什么呢？如果你想要自己解开， 请在这里暂停视频。答案在 3 秒內出現答案：2答案：1你小心翼翼地拿出20枚钱币。哪些钱币不重要： 那堆中任何钱币都行，然后你把每一枚都翻转过来。你仅需这么做。为什么简单的解决方案行得通？其实，开始时有多少枚 钱币并不重要。最重要的是全部钱币中 有20枚是银面向上的。当你从黑暗中抽取20枚钱币，你没办法知道那些银面 向上的钱币哪些最终属于这新的一堆钱币中。但是假设你拿到7枚银面向上的。这表示还有13枚银面向上的留在原本那一堆里。这也表示新的一堆里 有13枚钱币是金面向上的。当你把新的这堆全部都 翻转过来，那会发生什么事呢？最终会有七枚金面向上 和13枚银面向上跟原本那堆银面向上的数目一样。结果是不论你从原本那堆 拿了多少枚银面向上的，要么全部银面向上的， 一些或完全没有。那是因为“互补事件。”我们知道每一枚钱币 只有两种可能性。如果不是银面向上， 那肯定就是金面向上，反过来也一样，任何20枚钱币的组合，金面向上和 银面向上的总和一定要等于20.我们可以使用数学中的 代数来证明。原本那堆中所剩下的 银面向上钱币永远是20减去你放到 新的那堆中银面向上的数目。既然新的那堆钱币的 总和也是20，新的那堆金面向上的数目就是20减去你所抽到 银面向上的数目。当新的那堆中所有的 钱币都翻转过来，本来金面向上的就会 变成银面向上的，所以现在银面向上的数目 会跟原本那堆的一样。闸门打开了，你急忙地 带着你的宝藏离开以免那位巫师改变主意。当你来到下一个岔口时， 你掷一枚辛苦取得的钱币决定你接下来探险旅程 该走的路。在你离开前，我们还有另外 一个简短的钱币谜题给你 ——这题来自这段视频 赞助者的杰出网站。我们这儿有8种钱币组合。你可以无数次地翻转 两个相邻的硬币。每次翻转就会把金的变成银的， 和银的变成金的。你可以着看一眼就知道哪些组合可以全部变成金的吗？如果你要尝试这个互动性 谜题以及确认你的答案，你可上Brilliant的网站。我们喜爱Brilliant.org因为 这网站给你工具以我们最喜欢的方式 来解决问题 ——把谜题分解成小部分 或有限的事例，然后从中慢慢解答问题。这样，你正在建立一个 解决问题的结构，而不是单单牢记公式。你可以免费注册Brilliant账户， 如果你喜欢谜题Brilliant.org的高级会员 让你应用更多互动性的谜题。今天就尝试使用， 你可浏览brilliant.org/TedEd并使用以上链接好让 他们知道你是我们推荐的。首833位点入以上链接的人可享有20%的每年高级 会员费折扣。

**P548 2018-01-26 What happens during a stroke - Vaibhav Goswami**

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Every two seconds, someone somewhere in the world experiences a stroke. And one out of every six people will have one at some point in their lives. Strokes deprive brain cells of oxygen and are one of the most common causes of death and a leading cause of preventable disability. When someone experiences a stroke, quick medical care is critical, and can often help avoid permanent brain damage. But what causes strokes in the first place? And what can doctors do to treat them? The brain makes up just 2% of your body’s mass but consumes more than 20% of the oxygen in your blood. That oxygen is carried to the brain through a system of arteries. Carotid arteries supply the front of the brain, and vertebral arteries supply the back. These are connected to each other, and divide into smaller and smaller vessels that get billions of neurons the oxygen they need. If the blood flow is interrupted, oxygen delivery stops and brain cells die. There are two ways this can happen. Hemorrhagic strokes are when a perforated vessel allows blood to leak out. But the more common type is the ischemic stroke, when a clot blocks a vessel and brings blood flow to a halt. Where do these clots come from? On rare occasions, a sudden change in heart rhythm prevents the upper chambers of the heart from contracting normally. This slows down blood flow, allowing platelets, clotting factors, and fibrin to stick together. The clot can be carried up towards the arteries and blood vessels supplying the brain until it gets to one it can’t squeeze through. This is called an embolism and it cuts off the oxygen supply to all the cells downstream. The brain doesn't have pain receptors, so you can't feel the blockage itself. But oxygen deprivation slows brain function and can have sudden, noticeable effects. For example, if the affected area is responsible for speech, an individual’s words may be slurred. If the stroke affects a part of the brain that controls muscle movement, it can cause weakness, often just on one side of the body. When this happens, the body will immediately try to compensate by diverting blood flow to the affected area, but this isn’t a perfect solution. Eventually, the oxygen-deprived cells will start to die, leading to brain damage that may be severe or permanent. That’s why it’s important to get medical care as fast as possible. The first line of treatment is an intravenous medication called Tissue Plasminogen Activator, which can break up the blood clot and allow blood to flow again in the compromised artery. If it’s delivered within a few hours, this medication greatly increases the chance of surviving the stroke and avoiding permanent consequences. If Tissue Plasminogen Activator cannot be given because the patient is on certain medications, has history of major bleeding, or the clot is particularly large, doctors can perform a procedure called an endovascular thrombectomy. Using a fluorescent dye that illuminates the blood vessels under a strong x-ray, the physician inserts a long, thin, flexible tube called a catheter into an artery in the leg and maneuvers it all the way to the blockage. A retriever is passed through this catheter. It expands and anchors into the clot when it’s just past it. The catheter then pulls the clot out when it’s removed. These treatments need to be delivered as soon as possible to preserve brain function, which means figuring out fast if someone is having a stroke. So how can you tell? Here are three quick things to try: 1. Ask the person to smile. A crooked mouth or facial drooping can indicate muscle weakness. 2. Ask them to raise their arms. If one drifts downward, that arm weakness is also a sign of a stroke. 3. Ask them to repeat a simple word or phrase. If their speech sounds slurred or strange, it could mean that the language area of their brain is oxygen-deprived. This is sometimes called the FAST test, and the T stands for time. If you see any of those signs, call emergency services right away. Lives may depend on it.

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翻译人员: Chien Yet Chong 校对人员: Zibo Huang每两秒，世界某个角落就会有人中风。而每六个人当中就有一个 在一生中的某个时刻中风。中风会使脑细胞缺氧，是最普遍的死因之一，也是可预防残疾的主要原因。当一个人中风时， 迅速得到治疗至关重要，而且通常能够对避免 脑部永久性损伤起到帮助。但是，人究竟为什么会中风？医生又如何医治中风？大脑只占身体质量的百分之二，但却会消耗血液中超过 20% 的氧气。这些氧气通过动脉系统运输到大脑。颈动脉把氧气运输到大脑前半部分，椎动脉则负责后半部分。这两种动脉互相连接，并细分成越来越小的血管，为数十亿个神经元 提供它们所需的氧气。如果血流受阻，氧气运输 停止，脑细胞就会死亡。发生该情况有两种可能：穿孔的血管导致血液流失， 进而引起出血性中风。但是更普遍的是缺血性中风，就是当血凝块阻塞了 血管，使血液循环停滞。这些血凝块是从哪儿来的？在极罕见的情况下， 心律的突然失常阻碍上心房正常收缩。这会使血液流速减慢，导致血小板、凝血因子 和纤维蛋白粘结成块。凝块可以被运输到提供大脑氧气的动脉和血管，直到它抵达某个无法通过的血管。这种现象叫做栓塞，会切断下游所有细胞的氧气供应。大脑并没有痛觉感受器， 所以你是无法感受到血流阻塞的。但是氧气的缺乏会使大脑功能变慢，从而造成突发的，极为明显的影响。例如，如果受影响的区域负责言语，那个人的言词就会模糊不清。如果中风影响到大脑 控制肌肉运动的部分，身体机能将会衰弱， 通常只有身体的一侧受影响。当这种情况发生， 身体将马上实施补救，把血流转移到受影响的部位，但这并不是个完美的解决方案。最终，缺氧的细胞会逐渐死亡，导致严重或永久性的脑损伤。这就是为什么 尽早寻求医治至关重要。中风的第一线治疗方法 是静脉注射一种叫做血浆组织纤溶酶原 活化剂的药物。它可以溶解凝血，使血液重新在受阻的血管流通。如果将药物在几小时内注入身体，可大大地提高中风的生存率，并避免永久性后遗症。如果因某些原因无法使用这种药物，例如病患正服用某些药物、有大出血的病史、或者是血凝块太大，医生也可以进行一种叫 血管内栓塞切除术的手术。病人先服用一种荧光染料， 使血管在强X光照射下发光，然后医生将一条细长、 可弯曲的导管插入大腿中的一条动脉，并操纵导管使之抵达血凝块，再将一个捡拾器穿过这条导管。捡拾器在穿透血凝块时 膨胀并把凝块勾住。导管最后被拉出体外时， 血凝块也跟随着被排出。这些治疗方法必须尽早施行以保护大脑功能，也就是说，需要快速判断 一个人是否中风。那么怎样判断呢？可以尝试这三个快速的方法：一、让对方微笑。不对称的嘴巴或脸部下垂 可能警示着肌肉衰弱。二、让对方举起双臂。如果一只手持续下垂， 也可能是中风的征兆。三、让对方重复一个 简单的词或句子。如果对方的言词听起来 模糊不清或奇怪，那就表示其大脑的语言区域在缺氧。这些测试有时叫 FAST 测试， T 代表时间。如果你发现这些症状中 的任何一个，马上请求紧急救助。生命也许就掌握在你的手中。

**P549 2018-01-29 How did teeth evolve - Peter S. Ungar**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=549)

You may take them for granted, but your teeth are a marvel. They break up all your food over the course of your life, while being strong enough to withstand breakage themselves. And they’re formed using only the raw materials from the food they grind down in the first place. What’s behind their impressive strength? Teeth rely on an ingenious structure that makes them both hard and tough. Hardness can be thought of as the ability to resist a crack from starting, while toughness is what stops the crack from spreading Very few materials have both properties. For instance, glass is hard but not tough, while leather is tough but not hard. Teeth manage both by having two layers: a hard external cap of enamel, made up almost entirely of a calcium phosphate, and beneath it, a tougher layer of dentin, partly formed from organic fibers that make it flexible. This amazing structure is created by two types of cells: ameloblasts that secrete enamel and odontoblasts that secrete dentin. As they form teeth, odontoblasts move inward, while ameloblasts move out and slough off when they hit the surface. For enamel, this process produces long, thin strands, each about 60 nanometers in diameter. That’s one one-thousandth the width of a human hair. Those are bundled into rods, packed together, tens of thousands per square millimeter, to form the shield-like enamel layer. Once this process is finished, your enamel can’t repair itself again because all the cells that make it are lost, so we’re lucky that enamel can’t be easily destroyed. Odontoblasts use a more complex process, but unlike ameloblasts, they stick around, continuing to secrete dentin throughout your life. Despite the differences in teeth across the mammalian order, the underlying process of tooth growth is the same whether it’s for lions, kangaroos, elephants, or us. What changes is how nature sculpts the shape of the tooth, altering the folding and growth patterns to suit the distinct diets of different species. Cows have flat molar teeth with parallel ridges for grinding tough grasses. Cats have sharp crested molars, like blades, for shearing meat and sinew. Pigs have blunt, thick ones, useful for crushing hard roots and seeds. The myriad molars of modern mammals can be traced back to a common form called “tribosphenic," which first appeared during the dinosaur age. In the 19th Century, paleontologist Edward Drinker Cope developed the basic model for how this form evolved. He hypothesized that it started with a cone-like tooth, as we see in many fishes, amphibians, and reptiles. Small cusps were then added, so the tooth had three in a row, aligned front to back, and connected by crests. Over time, the cusps were pushed out of line to make triangular crowns. Adjacent teeth formed a continuous zigzag of crests for slicing and dicing. A low shelf then formed at the back of each set of teeth, which became a platform for crushing. As Cope realized, the tribosphenic molar served as the jumping-off point for the radiation of specialized forms to follow, each shaped by evolutionary needs. Straighten the crests and remove the shelf, and you’ve got the conveniently bladed teeth of cats and dogs. Remove the front cusp, raise the shelf, and you’ve got our human molars. A few additional tweaks get you a horse or cow tooth. Some details in Cope’s intuitive hypothesis proved wrong. But in the fossil record, there are examples of teeth that look just as he predicted and we can trace the molars of all living mammals back to that primitive form. Today, the ability to consume diverse forms of food enables mammals to survive in habitats ranging from mountain peaks and ocean depths to rainforests and deserts. So the success of our biological class is due in no small measure to the remarkable strength and adaptability of the humble mammalian molar.

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翻译人员: Chien Yet Chong 校对人员: Riley WANG“牙齿由坚不可摧的物质组成。 它们可以抵御洪水、大火、甚至数世纪在墓穴中也仍旧存在。” ——玛丽·奥托，《牙齿》你也许不太重视它们， 但是你的牙齿是非凡之物。它们把你一生所吃的食物咬碎，与此同时却足够坚固 使自己不会损坏。组成它们的原材料全部来自于起初磨碎的食物。是什么使牙齿拥有异常的强度？牙齿依靠其巧妙的构造 来使它们坚硬和强韧。坚硬可看作是 抵御出现破裂的能力，而强韧则表示能够 阻止破裂进一步扩散。世上极少有材料兼备这两种特性。举个例子，玻璃坚固却不强韧，皮革则强韧却不坚固。牙齿兼备两种特性 因为它由两层组成:外层由坚硬的牙釉质包围， 几乎完全由磷酸钙组成，牙釉质之下， 有一层更加强韧的牙本质，部分由有机纤维组成， 它们能够使牙齿强韧。这奇妙的构造是由 两种细胞生成的：分泌牙釉的成釉细胞以及分泌牙本质的成牙本质细胞。在形成牙齿时， 成牙本质细胞向牙内部扩散，成釉细胞则向牙的外部生长， 并在抵达牙齿表面时脱落。在生成牙釉质的过程中 会产生细长的纤维状物，每条纤维的直径宽约60纳米。相当于人类发丝直径的千分之一。这些物质集合成捆， 紧密地排列起来，每平方毫米可达到上万个，组成如盾牌般坚硬的牙釉质层。一旦这个过程完成， 你的牙釉不会再自我修复因为所有制造牙釉质的细胞 都已经消失，所以，我们很幸运牙釉质 并不容易遭到破坏。成牙本质细胞则需要更复杂的过程， 但与成釉细胞不同，它们不会消失，会在我们有生之年 继续分泌牙本质。虽然在哺乳目中 各类生物的牙齿不同，但是牙齿的基本生长过程则一样，不论是狮子、袋鼠、大象、还是人类自己。不同之处在于大自然如何塑造 牙齿的形状，改变牙齿的折层和生长模式来契合各个物种不同的饮食习惯。牛的臼齿扁平 有平行的牙脊来咬碎坚韧的草。猫的臼齿呈波形，如锋刃般尖锐 用来撕碎肌肉和韧带。猪有又钝又厚的牙齿， 有利于压碎坚硬的根和种子。现代哺乳类的臼齿千变万化可以追溯到一个同源形式， 叫做“磨楔式齿，"这种牙齿最早 在恐龙时代出现。19世纪，古生物学家 爱德华·德林克·科普发展出了一个基本模型 用以表示该形式的演化过程。他推测牙齿起初都呈尖状，正如我们在鱼类、两栖类 与爬行类动物中所见到的那样。后来，更小的尖端出现， 所以一颗牙齿有成排的三个尖头，从前往后排列，并由凹槽相连接。随着时间推移，这些尖端 逐渐移位，形成了三角形的牙冠。相邻的牙齿则形成连贯性的 之字形的凹槽，用来切碎和咬碎食物。之后，每颗牙齿的后部 都形成了一个低牙架，这为压碎食物提供了一个平台。科普意识到，以磨楔式臼齿 这一模式作为跳板，大量不同的牙齿形式在此基础上衍生，每种牙齿的塑造都由进化的需求完成。把凹槽拉直，移除牙架，你就得到猫狗的尖齿。移除前尖端，提升牙架， 你就得到我们人类的臼齿。轻微扭转调整， 你就可以得到马或牛的牙齿。在科普凭直觉提出的推论中， 有些细节是错误的。但是化石记录显示，有些牙齿样本与他推测的一样并且所有哺乳生物的臼齿 也可以追溯到那个原始形式。如今，哺乳类动物 可以摄入多元化食物这种能力使它们 可以在多种栖息地生存，从高山顶峰到深海底层从热带雨林到炙热沙漠。所以，我们所属的哺乳纲动物 之所以成功，大部分要归功于不起眼的哺乳类臼齿所具有的 惊人的强度和适应性。

**P550 2018-02-02 The myth of Arachne - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=550)

From sailors who were turned into pigs, nymphs that sprouted into trees, and a gaze that converted the beholder to stone, Greek mythology brims with shape-shifters. The powerful gods usually changed their own forms at will, but for mortals, the mutations were often unwanted. One such unnerving transformation befell the spinner Arachne. Arachne was the daughter of a tradesman who spent his days dying cloth the deepest shades of purple. She had a flair for spinning the finest threads, weaving them into flowing fabric, and creating magnificent tapestries. People flocked to watch her hands flying across her loom, as if thread sprung directly from her fingertips. But as praise for her work grew, so did her pride. Arachne could often be heard boasting about her skills, declaring that her talent surpassed anyone else’s—mortal or divine. She refused to see weaving as a gift from the gods. Rather, she flaunted it as her own personal genius. Unfortunately, the goddess of wisdom and crafts, Athena, overheard Arachne making these claims. Planning to teach the ungrateful girl a lesson, Athena disguised herself as an old woman and stole amongst the mortals. She berated Arachne in public— how dare the weaver claim herself greater than the gods? But Arachne only laughed, barely looking up from her loom. Provoked, the old woman threw off her cloak to reveal her true form. If Arachne insisted on defaming the gods, Athena would challenge her to a contest directly. Masking her shock at the appearance of the grey-eyed goddess, Arachne accepted the challenge. Athena drew up her own glittering loom as a great crowd gathered to watch. The weavers began, eyes fixed and shuttles blurring. Athena conjured wisps of cloud from above and slender threads of grass from below in a spectacle of strength. She wove tremendous scenes that showed the power of the gods: Poseidon riding the waves, Zeus firing thunderbolts, and Apollo hurtling across the sky. In Athena’s splendid tapestry, the glory of the gods dwarfed mortal life. But Arachne had no interest in boosting godly egos. Her tapestry showed the gods abusing their power: squabbling amongst themselves, drinking and bragging, and meddling in the lives of mortals. She represented Zeus as a philanderer, transfiguring himself to ensnare women: a swan for Leda, a bull for Europa, a shower of gold for Danae. Arachne then turned to the misdemeanors of other gods, from Pluto’s abduction of Persephone to Bacchus’s wild pursuit of Erigone. Even though she cast the gods in the most unflattering light, Arachne’s work shone with her dazzling skill. Her tapestry was almost alive, filled with movement and lustrous colors that winked triumphantly. When Athena saw Arachne's undeniably better and flagrantly subversive work, she flew into a rage and turned on the human weaver. Arachne’s glee dimmed as she felt her body shrinking and contorting. Her fingers waved wildly as her arms stuck to her sides, and black hair sprouted all over her body. The goddess left Arachne with a single spool of thread unfurling from her belly, a slim reminder of her human talent. For challenging the assumption that the gods were untouchable, Athena had shrunk her adversary into the first spider. To this day, Arachne and her children spin out her penance— or is it undaunted persistence?— in the shadows of giants.

**P550 2018-02-02 The myth of Arachne - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=550)

翻译人员: Chien Yet Chong 校对人员: Sylvia He“艺术家是个容器，容纳来自四面八方 的感情：来自天空，土地，一张纸，来自短暂的影子，甚至蜘蛛的丝。” ——巴勃罗·毕加索从变成猪的海员、 到变成树木的宁芙仙女、以及可以把目睹者 变成石头的凝视，希腊神话充满 有变形能力的人物。强大的诸神通常可以 随意地变形，但凡人的变形 通常是情非得已的。其中一个令人不安的变形发生 在纺纱女郎，阿剌克涅身上。阿剌克涅是个商人的女儿，她的父亲以染深湛的紫色布料为生。阿剌克涅拥有纺最细的线， 把细线编织成布，然后制造出精美绝伦的挂毯的天赋。人们簇拥围观她的双手 在织布机上飞梭，细线如同从她手指中吐出。但当人们越发称赞她的作品， 她也越发变得骄傲。阿剌克涅常常夸耀自己的本领，断言自己的天赋超越 所有的凡人或神灵。她拒绝把编织视为来自 神灵的福赐。反之，她炫耀地说那是 她与生俱来的才华。不幸的是，智慧和手工艺 之女神雅典娜听到了阿剌克涅这些 大胆的言论。为了教训这位忘恩负义的少女，雅典娜乔装成一位老女人， 悄悄地混入凡众。她在众人前严厉地指责阿剌克涅——这位纺织女怎么竟然 大胆地声称自己比诸神伟大？但是阿剌克涅只是大笑， 头也不抬地埋头织布。老妇人被激怒了，于是 抛开斗篷显示了她的真实身份。如果阿剌克涅坚持诋毁诸神，雅典娜就会亲自通过 比赛来挑战她。为了掩饰她对这位灰眼睛 女神的出现的震惊，阿剌克涅接受了挑战。群众蜂拥围观时，雅典娜 变出了她那闪闪发亮的织布机。两位纺织者开始编织，她们 眼睛不眨，梭子嗖嗖地织布。雅典娜收集天上一缕缕的云彩以及地上纤细的绿草， 显示出她令人惊叹的能力。她编织出了显示诸神力量的画面：波塞冬驾驭海浪、宙斯发射雷电，以及阿波罗疾速穿越天空。在雅典娜壮丽的挂毯上， 诸神的荣耀使凡人自惭形秽。但是阿剌克涅并没兴趣 吹嘘众神的自负心。她的挂毯曝露了诸神 如何滥用权力：神灵内讧连连、酗酒和自夸、以及干涉凡人的生活。她把宙斯描绘成好色的， 为了诱捕女人而不断变形的神:为勒达化身为一只天鹅、为欧罗巴化身为一头公牛、为达那厄化身为一阵金雨。然后，她把矛头转向 其他神灵的不正当行为，从冥王普路托拐带珀耳塞福涅到巴克斯痴情地追求厄里戈涅。虽然阿剌克涅 把诸神的丑态暴露无遗，她的作品的确彰显了 她精湛的手艺。她的挂毯栩栩如生、龙飞凤舞、色彩斑斓，如同一面胜利的旗帜。当雅典娜看见阿剌克涅那 优秀无疑但公开亵渎众神的作品时，她怒火中烧， 并迁怒于那位凡人纺织女。得意的阿剌克涅突然黯然失色， 她感到身体始收缩和扭曲。她的手指猛烈地摇摆， 双臂开始紧贴着身体两侧，而全身则长出了黑毛。那位女神给阿剌克涅留下了 一团从腹部延展开的线，暗示着她以前的天赋。因为阿剌克涅挑战了 “诸神至高无上”的这种说法，雅典娜把她的挑战者 变成了世界上第一只蜘蛛。如今，阿剌克涅和她的后代 还在继续进行苦修，吐的丝不知道是代表忏悔——还是代表无畏的毅力。

**P551 2018-02-07 The rise and fall of the Inca Empire - Gordon McEwan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=551)

It was the Western Hemisphere’s largest empire ever, with a population of nearly 10 million subjects. Over an area of more than 900,000 square kilometers, its people built massive administrative centers, temples, and extensive road and canal systems. They did so in an inhospitable, extreme terrain, all without the use of wheels, horses, iron, or even written language. Yet within 100 years of its rise in the fifteenth century, the Inca Empire would be no more. According to legend, the ancestors of the Inca rulers were created by the sun god Inti, and they emerged from a cave called Tambo Toco. Leading four brothers and four sisters was Ayar Manco, who carried a golden staff with instructions to find the place where it would sink into the ground, showing fertile soil. After many adventures and extensive searching, Ayar Manco and his siblings reached the Cuzco Valley, where the staff pierced the ground. After fighting off the fierce local native population, they founded their capital, and Ayar Manco became Manco Capac, the first Sapa Inca, or king of the Incas. Archaeological evidence suggests that the Incas first settled in this valley around 1200 CE. They remained a small kingdom until 1438, when they were nearly overrun by the neighboring Chanka tribe. The Inca king at this time, Viracocha, and his designated heir fled in fear, but one of his other sons remained and successfully rallied the city’s defenses. For his military skill, he became the ninth Inca ruler, assuming the name of Pachacuti, or "Cataclysm." Pachacuti expanded Inca rule throughout the Andes mountains, transforming the kingdom into an empire through extensive reforms. The empire’s territory was reorganized as Tahuantinsuyu, or "four quarters," with four divisions ruled by governors reporting to the king. Although the Inca had no writing, they used a complex system of knotted strings called quipu to record numbers and perhaps other information. A decimal-based bureaucracy enabled systematic and efficient taxation of the empire’s subjects. In return, the empire provided security, infrastructure, and sustenance, with great storehouses containing necessities to be used when needed. Great terraces and irrigation works were built and various crops were grown in at different altitudes to be transported all over the empire. And it was during Pachacuti’s reign that the famous estate of Machu Picchu was constructed. Pachacuti’s son Topa Inca continued the empire’s military expansion, and he eventually became ruler in 1471 CE. By the end of his reign, the empire covered much of western South America. Topa’s son Huayna Capac succeeded him in 1493. But the new ruler’s distant military campaigns strained the social fabric. And in 1524, Huayna Capac was stricken by fever. Spanish conquistadors had arrived in the Caribbean some time before, bringing diseases to which the native peoples had no resistance. Millions died in the outbreak, including Huayna Capac and his designated heir. The vacant throne ignited a civil war between two of the surviving brothers, Atahualpa and Huascar, greatly weakening the empire. In 1532, after finally winning the Inca civil war, Atahualpa and his army encountered the European invaders. Although greatly outnumbered, Francisco Pizarro and his small group of conquistadors stunned the king’s much larger force with guns and horses, neither of which they had seen before. Atahualpa was taken captive and killed about a year later. The Spanish conquerors were awed by the capital of Cuzco. Pizarro described it as so beautiful that “it would be remarkable even in Spain.” Though the capital had fallen and the native population had been destroyed by civil war and disease, some Incas fell back to a new capital at Vilcabamba and resisted for the next 40 years. But by 1572, the Spaniards had destroyed all remaining resistance along with much of the Incas’ physical and cultural legacy. Thus, the great Inca empire fell even faster than it had risen.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=551)

翻译人员: Chien Yet Chong 校对人员: Riley WANG“1491年 印加人统治了全球最伟大的帝国”查尔斯·C·曼 《1491:前哥伦布时代美洲启示录》那是迄今为止西半球最大的帝国,人口多达1千万.领土面积超过90万平方公里,这个帝国的人民, 建造了庞大的行政中心和庙宇,以及四通八达的道路和运河系统。他们在险峻和极端的地形上 建造了这些建筑，没有轮子、马匹、铁器， 甚至文字的帮助。但是，在崛起之后的一百年内，印加帝国在15世纪便消失无踪。根据传说，太阳神因蒂 创造了印加统治者的祖先，他们诞生于 一个叫坦博·托科的洞穴。阿雅·曼科带领着四兄弟和四姐妹，携带一根金杖，通过金杖能否插入土地，来寻找肥沃的土壤。经历多次的探险和广泛的搜索后，阿雅·曼科和他的兄弟姐妹 抵达了库斯科山谷，金杖可以刺入这里的土地。他们打败了当地凶猛的原住民，在此建立了首都。阿雅·曼科成为曼科·卡帕克， 第一位萨帕·印加，印加人的王。考古发现表明，在公元1200年左右， 印加人最早在库斯科山谷定居。直到1438年， 印加国一直是个小国度，这一年， 邻邦昌卡部落几乎将印加王国推翻。当时的印加王，维拉科及其继承人 因害怕而逃跑。但是他的另一个儿子留下来。成功组织起军队防护城市。由于他出色的军事能力， 他成了第九位印加统治者。名号帕查库特克，意为“大地震。“帕查库特克把印加国的领土， 扩张到整个安第斯山脉。通过大量改革把这个国度， 变成一个庞大帝国。他把帝国的领土重组成， 塔宛亭苏尤，意思是“四方之地。"四个分区由总督管理， 直接向王报告。虽然印加人没有文字，他们使用“奇普，” 这是一种复杂的结绳记事系统，用来记录数字和其他信息。印加帝国的官僚采取十进制，这使得政府可以 系统高效地进行征税。作为回报，帝国保障人民安全 ， 建造基础设施，提供物料，建有巨大仓库， 用来贮存紧急时用的必需品。印加人建立了 宏伟的梯田和水利工程，在不同高度的土地上 耕种不同的庄稼，并把这些庄稼运送到帝国全境。在帕查库特克的统治时期，著名的建筑群马丘比丘得以建造。帕查库特克的儿子图帕克·印卡 延续了帝国的军事扩张，并最终在公元1471年成为统治者。在他统治的末期， 印加帝国覆盖了整个南美洲西部。图帕克的儿子，瓦伊纳·卡帕克 在1493年继承了王位。但是，新王讨伐偏远地区的行动 增加了印加社会的负担。1524年， 瓦伊纳·卡帕克发高烧病倒。在此之前，西班牙征服者 已经抵达了加勒比海地区，带来了当地人无法抵抗的疾病。几百万印加人死于瘟疫，包括瓦伊纳·卡帕克 及其指定继承人。空缺的王位引发了幸存下 两位兄弟之间的内战，他们是阿塔瓦尔帕和瓦斯卡尔。内战大大减弱了帝国势力，最终，在1532年， 阿塔瓦尔帕和他的军队赢得内战，但却遇上了来自欧洲的侵略者。虽然侵略者数量不及印加人数众多，但弗朗西斯科·皮萨罗 和他的一小伙侵略者，用印加人前所未见的枪支和马匹，震惊了印加王庞大的军队。阿塔瓦尔帕沦为俘虏 并在大约一年后被杀。印加首都库斯科 令西班牙征服者感到赞叹，皮萨罗描述库斯科的美丽时说 “若它在西班牙也定会超群出众。"虽然首都沦陷了，当地人口也因内战和疾病大大减少，一些印加人撤退到比尔卡班巴 将此地作为新首都，继续抵抗西班牙人，长达40年但到了1572年 ， 西班牙成功歼灭剩余的反抗势力，并同时摧毁了许多印加物质及文化遗产。就这样，伟大的印加帝国灭亡了， 其速度比它的兴起还要迅速。

**P552 2018-02-13 The coin flip conundrum - Po-Shen Loh**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=552)

When the Wright brothers had to decide who would be the first to fly their new airplane off a sand dune, they flipped a coin. That was fair: we all know there’s an equal chance of getting heads and tails. But what if they had a more complicated contest? What if they flipped coins repeatedly, so that Orville would win as soon as two heads showed up in a row on his coin, and Wilbur would win as soon as heads was immediately followed by tails on his? Would each brother still have had an equal chance to be the first in flight? At first, it may seem they’d still have the same chance of winning. There are four combinations for two consecutive flips. And if you do flip a coin just twice, there’s an equal chance of each one -- 25%. So your intuition might tell you that in any string of coin flips, each combination would have the same shot at appearing first. Unfortunately, you’d be wrong. Wilbur actually has a big advantage in this contest. Imagine our sequence of coin flips as a sort of board game, where every flip determines which path we take. The goal is to get from start to finish. The heads/tails board looks like this. And this is the head/head board. There’s one critical difference. Heads/heads has a move that sends you all the way back to the start that heads/tails doesn’t have. That’s why heads/heads takes longer on average. So we can demonstrate that this is true using probability and algebra to calculate the average number of flips it would take to get each combination. Let’s start with the heads/tails board, and define x to be the average number of flips to advance one step. Focus only on the arrows. It has two identical steps, each with a 50/50 chance of staying in place or moving forward. Option 1: If we stay in place by getting tails, we waste one flip. Since we’re back in the same place, on average we must flip x more times to advance one step. Together with that first flip, this gives an average of x + 1 total flips to advance. Option 2: If we get heads and move forward, then we have taken exactly one total flip to advance one step. We can now combine option 1 and option 2 with their probabilities to get this expression. Solving that for x gives us an average of two moves to advance one step. Since each step is identical, we can multiply by two and arrive at four flips to advance two steps. For heads/heads, the picture isn’t as simple. This time, let y be the average number of flips to move from start to finish. There are two options for the first move, each with 50/50 odds. Option 1 is the same as before, getting tails sends us back to the start, giving an average of y+1 total flips to finish. In Option 2, there are two equally likely cases for the next flip. With heads we’d be done after two flips. But tails would return us to the start. Since we’d return after two flips, we’d then need an average of y+2 flips in total to finish. So our full expression will be this. And solving this equation gives us six flips. So the math calculates that it takes an average of six flips to get heads/heads, and an average of four to get heads/tails. And, in fact, that’s what you’d see if you tested it for yourself enough times. Of course, the Wright brothers didn’t need to work all this out; they only flipped the coin once, and Wilbur won. But it didn’t matter: Wilbur’s flight failed, and Orville made aviation history, instead. Tough luck, Wilbur.

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翻译人员: Zibo Huang 校对人员: Sylvia He“喔，唷！世界必须围绕轴心循环，人人跟着转，无论顺转或逆转......” -拜伦，《唐·璜》当莱特兄弟必须对谁先驾驶新型飞机飞离沙丘作出选择时，他们抛出了一枚硬币这很公平：我们知道得到正面和 反面的几率是相同的，但如果这是一个更为复杂的竞赛呢？像将一枚硬币不停地抛出，呈现两次正面时奥维尔胜，先有正面然后背面时威尔伯胜。这样每人仍然拥有相同的胜率吗？貌似他们仍然有相同的胜率。抛硬币两次会有四种不同的组合。如果只将硬币抛出两次 （非连续抛），那么每一种组合 有相同的概率 -- 25%。所以你的直觉告诉你，无论硬币顺序，每一种组合的最先出现的概率都相同。不幸的是，这样想你就错了。事实上，连续抛时威尔伯 拥有更大的优势。想象一下抛硬币正反的排列 是一个图版游戏。每一次硬币的抛出 决定了以后路径的方向。目标是从出发点走到终点，正/反 的图版就像这样，而这是 正/正 的图版。这里有一处至关重要的区别：正/正 会把你送回最初点，而 正/反 则没有。这就是为什么得到 正/正 一般需要更多时间。我们可以通过概率和代数来计算，连续抛时得到每一种组合 需要的平均次数来证明这个结论。让我们从 正/反 图版开始。将 x 定义为前进一步的 硬币平均抛出数。只看着箭头，有两个关键的步骤：停留或前进都拥有 50/50 的概率。选择1 ：如果我们得到反面， 我们就浪费了一次抛的机会，然后我们回到了相同的位置。我们平均需要再抛出 x 次来前往下一步。在第一次抛出的基础上，前往下一步的总抛出数 是平均数 x+1。选择2：如果我们得到正面并向前移动，那么我们只抛出 一次硬币就前往了下一步。现在我们可以将选择1选择2 和他们的概率结合起来，得到这个表达式。解表达式得到平均需要 抛两次硬币前往下一步。因为两个步骤相同，所以我们将平均数 乘以二，平均四次完成图版。对于 正/正 来说， 事情并没有那么简单。这一次，我们将 y 定义 为从开始到结束所需抛出平均数。第一步拥有两个选择， 每一个都有 50/50 的几率。选择 1 和上文相同，得到反面则重新开始。从而完成整个图版的 次数是平均数 x+1。选择2：两个相同 概率的情况前往下一步，抛出正面则游戏结束， 两次抛出完成版图。但是抛出反面则游戏重新开始。所以在2次抛出后重新开始的情况下，我们一共需要平均数 y+2 次抛出才能完成版图。所以我们完整的表达式会是这样：解出等式得到平均数为 6，所以数学告诉我们， 得到 正/正 平均需要 6 次抛出，而得到 正/反则需要 4 次抛出。事实上，长时间的实验 也会得到这个结论。当然，莱特兄弟并不需要解决这个问题。他们只需要抛出一次硬币， 然后威尔伯胜利。但这并不重要， 因为威尔伯的飞行失败了，而奥维尔创造了航空历史。真不走运，威尔伯。

**P553 2018-02-20 The weird and wonderful metamorphosis of the butterfly - Franziska Ba**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=553)

In order to become a butterfly, a caterpillar’s body dissolves almost completely and is rebuilt from its own juices. As inconvenient and even downright dangerous as this process sounds, it’s actually quite common. Butterflies are just a few of the 800,000 insect species that transition from larvae to adults through complete metamorphosis. That’s approximately 85% of insects and 70% of all known animal species. But how exactly does a caterpillar become a butterfly? When a caterpillar hatches from an egg, it has none of a butterfly’s physical traits. It does have groups of cells inside its body called imaginal discs that will eventually become its butterfly parts. For now, these cells remain dormant. Juvenile hormone suppresses their activity, and prevents the caterpillar from beginning metamorphosis too early. Immediately after hatching, the caterpillar begins to feed, building up fat until its rigid skin, called a cuticle, becomes too tight. At this point, a hormone called ecdysone triggers the cuticle to shed, or molt. As the caterpillar grows, it usually molts four times. Then, when it’s nice and plump, the caterpillar’s levels of juvenile hormone drop, which triggers it to stop eating and moving. A final burst of ecdysone prompts the caterpillar’s cells to begin to self-destruct. Soon, the muscles, fat, and other tissues are almost entirely liquefied, though the imaginal discs stay intact and begin to grow. At the same time, a second skin layer called the pupal cuticle forms underneath the first. One more molt exposes the hard exterior of the pupa. Besides the imaginal discs, only a few tissues are spared, including parts of the respiratory system, the heart, some abdominal muscles, and the mushroom bodies of the brain. The caterpillar juice then fuels the development of the imaginal discs into eyes, antennae, legs, wings, genitalia, and other body parts. Once its new body is built, the insect molts one last time, shedding the pupal cuticle. From there, it’s free to fly away a new butterfly. Even after such a dramatic transformation, the butterfly does retain some memories from its caterpillar days. It’s likely the mushroom bodies of the brain carry important knowledge from the caterpillar over to the adult butterfly. How did such an involved developmental process come to be? We don’t know for sure. The leading theory is that the caterpillar is actually a drawn-out version of a life stage that takes place inside the egg for some other insects. According to this hypothesis, over millions of years, the larvae evolved the ability to eat and live outside the egg. Regardless of how complete metamorphosis originated, it’s become part of the life cycles of a dizzying number of insect species. Still, plenty of species get along perfectly well with a simpler developmental process. What survival advantages might complete metamorphosis provide to make up for the added hassle? For one, it keeps larvae and adults from competing for the same habitats and food sources. And while the pupa may seem vulnerable, this immobile stage can actually be a good way to pass parts of the year when food is scarce. To us, a butterfly’s metamorphosis might sound as fantastic as a phoenix rising from its ashes. But these transformations are taking place all around us, all the time. From the Hercules beetle to the honey bee to the garden ant, countless squishy larvae dissolve and emerge as armored, aerodynamic, and nimble adults.

**P553 2018-02-20 The weird and wonderful metamorphosis of the butterfly - Franziska Ba**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=553)

翻译人员: Riley WANG 校对人员: Zibo HuangTED-Ed 支持全世界 有才华的艺术家和动画制作者。视频播放结束后， 请继续观看动画制作者的故事。为了变成蝴蝶， 毛毛虫的身体几乎完全分解，并利用这些液体物质重塑身体。虽然这个过程听起来既麻烦又危险， 但它却非常普遍。有 80 万种昆虫会经历 从幼虫到成虫的完全变态发育，其中蝶类昆虫只占很小的比例。 这 80 万种昆虫大约占全部昆虫的 85%， 占所有已知动物种类的70%。但毛毛虫到底是如何变成蝴蝶的呢？当毛毛虫从卵中孵化出来，它并不具备任何蝴蝶的身体特征，但它的体内拥有一些细胞， 称为成虫盘。成虫盘最终 会发育成蝴蝶的身体部分。现在，这些细胞处于休眠状态。保幼激素抑制着这些细胞的活动，避免毛毛虫过早开始变态发育。从卵孵化后， 幼虫立刻开始进食，积累脂肪， 直到坚硬的表皮开始绷紧。此时，蜕皮激素开始分泌， 促进表皮脱落。在发育过程中， 毛毛虫通常需要蜕皮四次。之后，表皮变得漂亮丰满时，毛毛虫体内的保幼激素水平下降，这会使毛毛虫停止进食和活动。蜕皮激素最后一次分泌促使毛毛虫的细胞进行自我分解。肌肉，脂肪等组织 很快就会接近完全液化，但成虫盘依然保持完好， 并继续发育。与此同时，第二层皮肤蛹会在第一层皮之下形成。再一次的蜕皮使蛹的坚硬外壳裸露。在成虫盘周围 只有很少的组织得到保留，其中包括部分呼吸系统，心脏，一些腹部肌肉和脑蕈形体。幼虫解离形成的液体 为成虫盘的发育提供能量，使其发育成眼睛，触角，腿，翅膀，外生殖器以及其他身体部分。一旦新的身体形成， 会进行最后一次蜕皮，即脱掉蛹，自此 ，一只新蝴蝶诞生了。即便经历了如此巨大的变化，蝴蝶依然能够保留 部分毛毛虫时期的记忆。这很可能是由于脑蕈形体将幼虫时期的重要知识 传递给了成年蝴蝶。为何会有这样的发展过程出现呢？我们目前仍不确定。主流理论认为，毛毛虫实际上 是某个生命阶段的延迟，而对于其他昆虫， 这个过程通常发生在卵中。根据这个猜想， 在数百万年间，幼虫进化出了吃掉卵壳 和在卵壳外生存的能力。不管完全变态发育是如何开始的，它成了大量昆虫生命循环的一部分。对许多物种来说，更简单的发育过程 才是它们所适应的。完全变态发育对生存有什么好处，才能弥补这种额外的麻烦呢？其一，它使得幼虫和成虫免于争夺栖息地和食物。虽然蛹看上去很脆弱，这种静止的状态可以 很好地帮助幼虫渡过食物匮乏的时间。对我们来说， 蝴蝶的变态发育如同凤凰涅槃一般奇妙。但是这些转化 一直都在我们身边进行着。从独角仙到蜜蜂，再到蚂蚁，不计其数脆弱的幼虫经过分解发育成外表更为坚硬、 呈流线型的敏捷成虫。这个视频动画由我们的长期支持者 Avi Ofer 制作。Avi 从 2012 年开始 就一直制作 TED-Ed 视频，这是他在这个平台上的第 20 个视频。如果你想看到更多 由 Avi 制作的 TED-Ed 创意视频，可以查看这个播放列表。如果你想促成 TED-Ed 与更多 像 Avi 这样的艺术家合作，请访问网站：patreon.com/ted， 为我们的非营利性工作捐款。

**P554 2018-02-21 The myth of Thor's journey to the land of giants - Scott A. Mellor**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=554)

Thor—son of Odin, god of thunder, and protector of mankind— struggled mightily against his greatest challenge yet: opening a bag of food. It’d all started when Thor, along with his fleet-footed human servant Thjalfi and Loki, the trickster god, set out on a journey to Jotunheim, land of the giants. Along the way, they’d met a giant named Skrymir, who offered to accompany them and even carry their provisions in his bag. But when they made camp, Skrymir dozed off and Thor couldn’t untie the sack. Frustrated and hungry, Thor tried to wake the giant three times by striking his head with his hammer Mjolnir as hard as he could. But each time, Skrymir thought it was only a falling acorn and went back to sleep. The next morning, Skrymir departed and eventually, the travelers reached a massive fortress called Utgard. Inside the long hall, they met the king of giants, Utgard-Loki, who greeted his guests with a challenge: each of them was to prove they were the best at some particular skill. Loki went first, declaring himself the world’s fastest eater. To test him, the king summoned his servant Logi and the two were placed at either end of a long trough stuffed with food. Loki ate his way inward with blinding speed. But when the contestants met in the center, Loki saw that his adversary had not only eaten just as much food, but also the bones and even the trough itself. Next was Thjalfi, who could outrun anything in the wild. The king summoned an ethereal-looking giant named Hugi, who outraced Thjalfi easily. But the boy would not give up and demanded a rematch. This time, Thjalfi finished close behind and the king admitted he’d never seen a human run so fast. Thjalfi tried a third time, running like his life depended on it, but Hugi was even faster than before. Finally, it was Thor’s turn. The king offered him a drinking horn, saying all his men could drain it in two gulps. Thor raised it to his lips and drank the surprisingly cold and salty mead in the longest gulp he could muster. Then a second. Then a third. But the level of the mead in the horn was only slightly lowered. To test Thor’s renowned strength, the king offered a seemingly easy challenge: lift his pet cat off the ground. But this cat was as tall as Thor. Every time he tried to lift it, it arched its back, and straining with all his godly might, he only managed to lift one paw. Enraged, Thor demanded to wrestle any of the giants. The king summoned the giants’ old nursemaid, Elli. Though the woman looked frail, Thor couldn’t overpower her and grew weaker the longer he struggled, until he was brought to one knee. The three companions prepared to leave, disappointed and humbled. But as the king escorted them out, he revealed that nothing in the castle had been what it seemed. Loki lost the eating contest because his opponent Logi was wildfire itself, devouring everything in its path. Thjalfi couldn’t outrun Hugi because Hugi was the embodiment of thought, always faster than action. And even Thor couldn’t defeat Elli, or old age, which weakens everyone eventually. As for the other challenges, they had also been illusions. The drinking horn was filled with the ocean, and Thor had drained enough to cause the tides. The cat was the serpent that encircles the world, and Thor’s efforts shifted the earth. And Skrymir had been Utgard-Loki in disguise, deflecting Thor’s hammer-blows to form valleys in the surrounding mountains. The giant congratulated them on their prowess, which so frightened him he would never allow them in his land again. Thor and his companions failed the challenges presented to them. But in trying to achieve the impossible, they’d pushed themselves harder than ever before and changed the world in ways no one had expected.

**P554 2018-02-21 The myth of Thor's journey to the land of giants - Scott A. Mellor**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=554)

翻译人员: Carol Wang奥丁之子索尔是雷电之神， 也是人类的保护者，正想方设法解开他遇到过的最大挑战： 打开一个装着食物袋子。故事是这样的，索尔和他的飞毛腿人类侍从希亚费、 奸诈之神洛基一同出发，前往巨人国：约顿海姆。途中，遇到名叫斯克里米尔的巨人，斯克里米尔提出与他们同行，并主动 把索尔的行囊装进自己的袋子里背着。但当他们扎营休息时， 斯克里米尔睡着了，索尔无法解开他的袋子。沮丧饥饿的索尔 用雷神之锤猛击巨人头部三次，试图叫醒他，但巨人每次都以为橡子掉到了头上，又重新睡去。第二天早上，斯克里米尔离开了，索尔一行人终于抵达 一座叫乌特迦的巨大宫殿。在长长的大厅中，他们见到了 巨人之王乌特迦 · 洛奇，他向索尔一行发起了挑战：每人要证明自己是某项技能的最强者。洛基第一个迎战， 称自己是世上吃得最快的人。为了验证他说的话， 国王召来了侍从罗吉，令二人站在装满食物的长条食槽两端，洛基沿着食槽飞快地吃着食物。但当两位挑战者在中点相遇时，洛基才发现，他的对手不仅吃掉了食物，还吃掉了骨头，甚至把食槽也吃了。下一位挑战者是希亚费， 任何动物都跑不过他。国王召来了轻盈缥缈的巨人修基，他轻而易举跑赢了希亚费，但希亚费不肯认输，要求再比一次。这次，希亚费仅以微小差距输掉，就连国王也承认， 他从未见过速度如此快的人类。希亚费又试了第三次，拼命奔跑，但是，修基的速度却比之前还要快。最终，轮到索尔挑战。国王给了他一个角形饮酒器，说自己的手下两口就能喝干。索尔将酒举起到嘴边，喝到的是又凉又咸的蜂蜜酒，他深深地喝了一大口，然后是第二口、第三口，但是，酒却只少了一点点。为了测试索尔的力量， 国王提出了一个看似容易的挑战：从地上举起他的宠物猫。但这只猫与索尔一样高，每当索尔试图将它举起， 这只猫就会弓起背。索尔竭尽全部神力， 却仅能举起一只猫爪。愤怒的索尔要求与任何一个巨人摔跤，国王召来了巨人们的老保姆伊里。虽然老妇看上去十分虚弱， 索尔的力量却不及她，索尔挣扎地越久，就变得越虚弱， 最后竟然无力到单膝跪地。羞愧交加，三人打算离开。但国王在送他们出城堡时，坦言道，城堡中发生的一切 并非表面看上去的那样。洛基输掉吃饭比赛， 是因为他的对手罗吉是野火，所到之处吞噬一切。希亚费跑不赢修基， 因为修基是思想的化身，思想总是快过行动。而伊里则是衰老的象征， 因衰老最终让所有人变得虚弱，即使索尔也不例外。至于其他的挑战，也都是幻象：饮酒的角杯里装的是海洋，索尔喝下去的量，足以掀起海上巨浪；猫则是环绕地球的巨蛇，让索尔举起猫，就等于举起地球；而巨人斯克里米尔， 是乌特迦 · 洛奇的化身，他将索尔的捶打力量 转移到周围的山中，形成了山谷。乌特迦祝贺他们的杰出才能，但这力量让他生畏， 禁止他们再踏上这片土地。索尔和伙伴虽然挑战失败，但在挑战不可能的过程中，他们比以往任何时候更加努力，用别人想象不到的方式改变了世界。若想更深一步了解北欧神话，我们强烈推荐尼尔·盖曼 写的书：《北欧神话》，里面有很多引入入胜的故事，还可前往 audible.com/teded 免费下载该书的有声书。

**P555 2018-02-22 Can you solve the seven planets riddle - Edwin F. Meyer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=555)

Your interstellar police squad has tracked a group of dangerous rebels to a cluster of of seven small planets. Now you must apprehend them quickly before their reinforcements arrive. Of course, the rebels won’t just stay put. They’ll try to dodge you by moving from planet to planet. But you have one major advantage. Every hour, your state-of-the-art cruiser can warp between any two planets, while their beat-up smuggling ship can only jump to an adjacent planet in that same time. These rebels don’t like to stay put. Every time they can relocate, they will. Your scouts tell you that the approaching rebel fleet is 10 hours away. You can’t risk letting the rebels escape. Can you devise a sequence for searching the planets that’s guaranteed to catch them in 10 warps or less, no matter what moves they make? Rounding up the rebels won’t be easy. For one, you have no way of knowing which planet they’re on to begin with. And without that information, it’s hard to determine where they’ll move next. So where do you begin? When tackling problems of this kind it often helps to simplify things, so you can better understand their dynamics. Let’s imagine that this cluster has the same arrangement but no outermost planets, leaving only the four in the center. We still don’t know which planet the rebels start on. But there’s one key feature: the third planet is adjacent to all others, which means the rebels either start there and move somewhere else, or start on one of the other planets and have no choice but to move to planet three. Simply checking planet three twice in a row would do the trick. Adding the three outer planet adds a bit more complexity, but the same strategy remains. We want to check the planets in an order that will eventually corner the rebels. And there’s another insight that can help us: each hour, the rebels move from an even-numbered planet to an odd-numbered planet, or vice versa. This gives us a way to simplify the problem by dividing the planets into two subsets, and tackling each one separately. For starters, let’s assume the rebels begin on an even-numbered planet: either two, four, or six. So we’ll search planet two first. If they’re not there, they must have started on either four or six. which means they can move to three, five, or seven. Planet three at the center gives them the most options for their next move, so we’ll want to check there next. If we don’t find them, they must have been at planet five or seven, meaning they’ll next move to four or six. Let’s now search planet four. If they’re not there, they must have gone to the sixth planet and can only flee to three or seven. If we next scour planet three and don’t find them, we know they went to planet seven and are now cornered. They can only move to planet six, where we’ll apprehend them on our fifth search. Of course, this plan only works assuming that the rebels were on an even-numbered planet in the first hour. But what if that assumption was wrong? In that case, they must’ve started on an odd-numbered planet. And because they move to an adjacent planet every hour, their location must alternate between odd and even-numbered planets. This means that if they were on an odd-numbered planet to start, after five moves, they'd be on an even-numbered planet. So if our first five searches missed them because our assumption that they started on an even-numbered planet was wrong, all we have to do now is repeat the sequence! Searching the planets in order two, three, four, three, six, two, three, four, three, six, leaves the rebels nowhere to run. Thanks to your deductive reasoning, order is restored to the galaxy.

**P555 2018-02-22 Can you solve the seven planets riddle - Edwin F. Meyer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=555)

翻译人员: Christina Wang 校对人员: Monkey Luffy请在谜题解答后继续观赏 以解答额外的谜题。你的星际警队 在一簇由七个小行星组成的星群上追踪到一帮危险的叛徒。在他们的支援来到之前， 你必须尽快地把他们一网打尽。很自然的，这些叛徒不会呆着不动。为了逃避追捕，这些叛徒 会从一个行星逃到另一个行星。虽然如此，你有一个巨大的优势。每个小时，你的超高科技警车可以 扭曲空间，移动到任意一颗行星去。而叛徒破旧的偷渡飞船每个小时只可以 从一颗行星移动到相邻的行星。这些叛徒将不会坐以待毙。他们只要有机会，一定会移动。侦察员通知你，叛徒援军 距离你十小时之外。你绝对不能让叛徒逃走。在只移动十次或以下的条件下，你可想出不论叛徒怎么移动， 保证可以把叛徒逮捕的搜索顺序吗？答案揭晓：2答案揭晓：1答案揭晓：0要把叛徒抓拿归案并非容易。首先，你并不知道叛徒 目前所在的行星。没这个信息，你是很难推断 他们下一步会怎么走的。那么，你该从何着手？当处理这种问题时， 简化问题非常有效，这样你就可以更好地 了解事情的动态。假设那些行星的排列跟这里的一样，但是没有最外围的那些行星， 所以剩下的只有中间那四颗。我们仍旧不知道叛徒 从哪颗行星开始。不过，这儿有个关键的特点：第三颗行星毗邻所有的行星，这表示叛徒要么从这颗开始 然后移动到其他的行星，要么从其他的行星开始然后别无选择地移动到行星三号上。我们只要搜索行星三号两次 就能解决问题。把外围的那些行星加入问题中， 也许会把情况变得稍微复杂，但是同样的方案仍然奏效。我们想出的搜索顺序必须 最终使叛徒走投无路。而这里有另一条信息可帮助我们：每小时，叛徒会从偶数行星移动到奇数行星，或者反过来。知道这点能帮助我们简化问题，也就是把行星分成两组，这样就能单独地处理每一组。作为开始，假设叛徒在偶数行星开始：二号、四号或六号。我们先从行星二号开始搜索。如果他们不在那儿， 那么他们肯定在四号或六号开始，这表示他们会移动到 三号、五号或七号。行星三号位于中央， 会给他们最多移动的选择，所以我们接下来会搜索三号。如果他们不在那儿， 他们肯定是在五号或七号，意味着下一步他们将去四号或六号。现在我们搜索四号。如果他们也不在那儿， 他们肯定是去了六号，而且下一步只可去三号或七号。如果我们接下来搜寻三号 但又找不到他们，我们知道他们去了七号， 并且走投无路了。他们只可以迁移到六号，这表示 我们只需搜索五次就逮捕他们。当然，要这个方案奏效我们必须假设叛徒第一个小时 是在偶数行星开始的。但如果这个假设是错的，怎么办呢？若是这样， 他们肯定是在奇数行星开始的。由于叛徒每个小时 都会移动到相邻的行星，他们的位置肯定是 在奇数和偶数行星中交替。这表示如果他们在奇数行星开始，五次移动后，他们将会到偶数行星。如果我们前五次搜索不成功因为假设他们从 偶数的行星开始是错误的，我们只需做的是重复之前的步骤！跟着这顺序搜索行星：二号、三号、四号、三号、六号、二号、三号、四号、三号、六号，就可以把叛徒逼得走投无路。由于你的推理逻辑， 宇宙秩序得以维持。你的朋友哈利、罗恩和赫敏 是电影爱好者。赫敏甚至知道哈利和罗恩 观看《泰坦尼克号》的次数。她发短信告诉哈利和罗恩说他们俩都看过了《泰坦尼克号》，而他们其中一人比另一人 多看该电影一次。以下一连串短信是哈利和罗恩的回复：哈利：“你比我多看《泰坦尼克号》吗？”罗恩：“我不知道哦！”哈利：“我也不知道，你现在知道了吗？”罗恩：“知道了。”哈利：“真的吗？那么我也知道了。”这儿有个问题给你：罗恩看《泰坦尼克号》的 可能次数的总和是多少？待会儿我们将告诉你如何在 我们最喜爱的网站之一查看答案。我们喜欢 Brilliant 网站是因为它会教你可以适用于各类谜题的 解题技巧和策略。Brilliant 的谜题库不但巨大， 而且非常有趣，这儿精心设计的谜题将帮助你 提高你的问题解决能力。欲知更多，请浏览 Brilliant.org/teded请使用这个链接，这样 Brilliant 就知道你是通过 TED 推荐而来的。另外，首 833 位浏览该链接者 可享有 20% 的年费折扣。此外，如果你仍想知道 那些魔法师观赏《泰坦尼克号》的次数，我们在简介部分中留下了链接， 点击该链接将直接把你带到解答。

**P556 2018-02-22 The science of skin - Emma Bryce**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=556)

Between you and the rest of the world lies an interface that makes up 16% of your physical weight. This is your skin, the largest organ in your body: laid out flat, it would cover close to 1.7 square meters of ground. Its purpose may seem obvious— to keep our insides in. But a look beyond the surface reveals that it plays a surprising number of roles in our lives. First, the basics. Skin is the foundation of the integumentary system, which also incorporates your hair, nails, and specialized glands and nerves. Made up of three layers, the epidermis, dermis, and hypodermis, skin’s thickness varies from 0.5 millimeters at its thinnest and up to four millimeters at its thickest. It also carries out three key functions: protecting, regulating, and sensing the world beyond its limits. On a daily basis, its huge surface processes hundreds, if not thousands, of physical sensations, relying mostly on large, pressure-sensitive skin components called Merkel cells. In your fingertips alone, there are 750 Merkel cells per each square-centimeter of skin, coupled with over 2,500 receptors that give you your sense of touch. This surface is also the body’s first major line of defense. Without it, you’d be a soggy mass of tissue and fluids, fatally exposed to the elements. Skin effectively seals off your insides and also absorbs pressure and shock with flexible collagen that makes up most of its dermal layer. The epidermis is made up mainly of skin cells called keratinocytes that are completely replaced every four weeks. As new cells form at the base of the epidermis, older ones are pushed up. When these cells move upwards, they’re filled with a hardened protein called keratin. Once they reach the surface, they form a tightly-overlapping, waterproof layer that’s difficult for invading microbes to breach. Any harmful microbes that make it into the epidermis will encounter Langerhans cells. This group of protective skin cells detects invaders and communicates their presence to resident immune system T-cells, which react by launching an immune response. A crucial feature of this immune defense is the several thousand species of microorganisms that inhabit the planes, folds, and crevices of your skin. These microbes, which include bacteria and fungi, thrive in the sebum, an oily substance that’s secreted onto the skin’s surface by sebaceous glands nestled inside the dermis. These skin microbes keep the immune system in a state of constant surveillance, ensuring that it’s ready to react if the body really is at risk. Beyond this protective role, your skin is also a sensory organ that helps regulate your body’s temperature, two roles that are closely interlinked. Nerves detect whether your skin is warm or cold and communicate that information to your brain. In return, the brain instructs localized blood vessels to either expand if the body is too warm, releasing heat from the blood through the skin, or to constrict if the body is cold, which retains heat. At any given time, up to 25% of the body's blood is circulating through the dermis, making this process extremely efficient. Under warm conditions, the skin’s sweat glands will secrete sweat via ducts onto the surface, transferring heat out of the body. Hair can also be stimulated to conserve or release body warmth. The average human has 5 million hair follicles embedded everywhere on the body except the palms of your hands and soles of your feet. Ninety to 150,000 of those are on your scalp, where they help shield the large surface area of your head from physical damage and sunburn. When you're cold, tiny muscles called arrector pilli cause hair to stand upright across the body. That’s the phenomenon known as goosebumps and it traps body heat close to your skin. Skin’s vast surface isn’t just a shield; it also enables us to interact and connect with the world. Its multifunctional layer cools us down and keeps us warm. The integumentary system may be many things, but it’s certainly more than skin deep.

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翻译人员: David Zhang 校对人员: Cissy Yun“最精致的衣服是人的皮肤， 当然，社会不仅仅要求你穿着这件衣服一马克·吐温”我们的身体和自然界之间 有一层分界线，占体重的16%，它就是我们身上面积最大的器官： 皮肤。摊开铺平，能覆盖约1.7平方米。皮肤的作用显而易见—— 使我们的身体保持一个整体,但更深入看,会发现皮肤在我们的生命中 起到令人震惊的作用。首先最基本的是皮肤是表皮系统基本组成部分，同时还包括还包括头发、指甲、 特定的腺体和神经。皮肤分为3层：表皮层真皮层和皮下组织。皮肤最薄处为0.5mm，最厚处为4mm。皮肤还具有3个关键作用：保护作用调节作用以及对外部环境的感知作用。每天，我们的身体会处理成百上千次的体表感知，主要由较大的对压力敏感的组织完成叫做梅克尔细胞。在我们的指尖上，每1cm²有750个梅克尔细胞以及构成触感的2500多个受体。皮肤也是身体的第一道防线，没有皮肤， 我们就是一滩组织和体液，致命的暴露于各种环境下。皮肤有效的将你的身体组织 保持在内部，还能够承受外界的压力和冲击。这得益于真皮层的主要组成： 具有高柔韧性的胶原蛋白表皮主要由角质细胞构成，每4星期完全更新一次。随着新细胞在底部形成， 旧细胞会被推出。细胞在向上移动过程中，会被填充一种硬化的蛋白质， 叫做角蛋白。一旦到达表面，它们会形成一层紧密重叠的防水层，使得微生物难以进入。若有害微生物得以侵入,就会遇到郎格汉斯细胞。这种保护性细胞会侦测入侵者，并且将其报告给免疫 T 細胞启动免疫反应。这个免疫防卫机制的最关键一点是，有数千种存在于皮肤表面，褶皱和皮肤小裂缝的微生物。包括细菌和真菌的这些微生物在皮脂内十分活跃，由紧贴在真皮内的皮脂腺分泌到皮肤表面的油性物质。这些皮肤微生物使得 免疫系统一直处于活跃状态，确保在身体处于危险的情况下 能够及时响应。除了充当保护的角色，你的皮肤也是帮助调节你体温的感官，两种功能紧密相连。神经会检测你的皮肤是冷还是暖，并且将感知信息传达给大脑，大脑则进行回应调节局部血管：如果身体热时扩张血管则通过皮肤从血液释放热量，如果身体冷时则收缩血管 以保留热量。在任何时间， 超过25%的身体血液通过真皮循环这使得调节体温这个过程非常有效。感到热时，皮肤的汗腺分泌的汗液 将经由腺体的管道到达表面，将热量带出体外。毛发也可以受刺激， 保留或者释放身体的热量。平均每个人有5百万毛囊，除了你的手掌和脚掌身体的每一个地方都有。在你的头皮上有9万~15万个毛囊头皮会保护很大面积的头部远离物理伤害和晒伤。当你冷时叫做立毛肌的小型肌肉会使你身体的毛发竖起来。这种现象叫起鸡皮疙瘩， 这可以吸收身体附近的热量。皮肤的巨大的表面 不仅仅是一个防护盾，它还使我们与这个世界互连，其多个功能层可以降温和保持体温。表皮系统有很多功能，它对我们身体的帮助， 绝对比表皮更深。

**P557 2018-02-23 A day in the life of an ancient Athenian - Robert Garland**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=557)

It’s 427 BCE and the worst internal conflict ever to occur in the ancient Greek world is in its fourth year. The Peloponnesian War is being fought between the city-states of Athens and Sparta, as well as their allies. The Athenians can’t match the formidable Spartan army on land. So they’ve abandoned the countryside and moved inside the walls surrounding their city and port, now provisioned by a superior fleet and extensive maritime empire. The cramped conditions have taken a toll and a recent plague wiped out a third of the population. But city life goes on. Archias and Dexileia live in the center of Athens. As a painter of high-class pottery, Archias is relatively well-off and takes great interest in the city’s affairs. Dexileia, on the other hand, can't participate in politics or own property. The couple are grateful to the gods that three of their four children, a son and two daughters, have survived past infancy. Many parents see daughters as a liability since they require dowries to find husbands. But Archias is confident that his wealth will allow him to make good matches for them without going bankrupt. Like many Athenians, the family owns slaves. Originally from Thrace, they were captured in war. Thratta does most of the housework and helps raise the children. Philon is a paidagôgos, who supervises the son’s education, teaching him reading and writing. Archias is up early because there’s a meeting of the Ekklêsia, the assembly of citizens, taking place at dawn. Before setting out, he burns incense and pours a libation at the small shrine in the courtyard on behalf of his entire household. Dexileia will remain at home all day, teaching her daughters domestic skills. Later, she’ll retire to the inner courtyard for some fresh air. When Archias arrives at the agora, the civic and commercial heart of the city, he finds the square swarming with his fellow citizens, native-born adult males who have completed military training. Attached to the central monument is a noticeboard with the meeting’s agenda. Today, there’s only one item of discussion: what to do with the people of Mytilene, a city on the island of Lesbos where a revolt against Athenian rule has just been put down. The meeting takes place on a hill west of the acropolis known as the Pnyx. The word means “tightly packed," and the crowd of 5,000 citizens makes it clear why. The heralds purify the hill by sprinkling its boundary with pig’s blood and call for order. As everyone sits on benches facing the platform, the presiding officer opens the meeting with the words: “Tis agoreuein bouleutai?” “Who wishes to address the assembly?” One by one, citizens speak, some advising mercy, others bent on vengeance. A motion is proposed to execute all the Mytileneans and enslave their women and children because they betrayed their Athenian allies during a time of war. A majority raises their right hands in favor. Once the meeting’s over, Archias heads back to the agora to buy food and wine. Hundreds have gathered there to discuss the results, many unhappy with the decision. When Archias returns home, he tells Dexileia about the debate. She thinks that killing the innocent as well as the guilty is harsh and counterproductive, and tells him as much. Around dusk, Archias goes to a friend’s house for a symposium. The nine men drink wine and discuss the meeting well into the night. Archias shares his wife’s opinion urging mercy, and his friends eventually agree. Before dawn, something unprecedented happens. Heralds circulate throughout Athens announcing the council has called another meeting. The second debate is equally heated, but a new resolution, to execute only the leaders of the revolt, narrowly passes. Yet there’s a problem – a ship with orders to carry out the first resolution was dispatched the previous day. And so another ship quickly sets sail to countermand the order – a race of democracy against time.

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翻译人员: Riley WANG 校对人员: Yulin Li“在很多事情上，多人做出的判断好于个人。” —亚里士多德《政治学》公元前 427 年，古希腊帝国 最严重的内战已经到了第四个年头。这场伯罗奔尼撒战争在雅典和斯巴达及其盟国之间展开。雅典人无法在陆地作战中 对抗强大的斯巴达军队，于是他们放弃了乡村地区，转移到高墙环绕的城市和港口，由一支高级舰队和 广阔的海军帝国提供保障。有限的条件带来了恶果，一场近期爆发的瘟疫 夺去了雅典三分之一的人口。但城市生活仍在继续。阿奇亚斯和迪克西莉亚 住在雅典市中心。阿奇亚斯是高档陶器的漆匠，他比较富裕， 对城市事务很感兴趣。迪克西莉亚却无法 参与政治或拥有财产夫妇感激神明， 让他们四个孩子中的三个，一个男孩和两个女孩，都平安长大。许多父母将女儿视为拖累，因为女儿结婚需要嫁妆。但是阿奇亚斯对自己的 财富状况很有自信，相信自己不用破产 也能为女儿找到如意郎君。和很多雅典人一样， 这个家庭也拥有奴隶。这些奴隶都来自色雷斯， 在战争中被抓获。色雷斯人承担绝大多数的家务， 并帮助抚养孩子。菲伦是一个 paidagôgos， 即家庭教师，他监督家中男孩的教育， 教他读书写作。阿奇亚斯起得很早， 因为在黎明时分教会有一场会议，众市民将进行集会。出发前，他点燃一支香，代表全家人在小花园里的神龛中倾倒奠酒。迪克西莉亚全天都待在家中 教女儿家务技能。之后，她到内院稍作休息透透气。集会的广场是城市的市政和商业中心当阿奇亚斯到达这里时， 他发现广场挤满了市民都是已经完成 军事训练的本国成年男性。中央纪念碑上 的一个记事板写有会议议程。今天讨论的事项只有一个：如何处置米蒂利尼人？米蒂利尼是莱斯沃斯岛上 的一个城市，该城对雅典统治的反抗刚遭到镇压。会议地点是在 雅典卫城西边的一座山上，该山名为普尼克斯，意思是紧凑的，5000 民众拥挤在此， 这名字的含义就不言而喻了。传信官用猪血 划出边界以净化此山，要求在场人员安静。每个人都坐在面向平台的长椅上，会议主席宣布会议开始。他说：“Tis agoreuein bouleutai?”意思是“谁希望发表演讲？”市民轮番发表意见。一些人 提倡宽容，另一些则诉诸报复。提议之一是 处决所有米蒂利尼男人，将女人和孩子贬为奴隶，因为他们在战争时期 背叛了雅典一方的盟国。大多数人举起右手表示赞同。会议一结束，阿奇亚斯 会到雅典卫城买食物和酒。上百人已经聚集在此讨论会议结果，许多人对此决议并不开心。阿奇亚斯回到家后， 将辩论告诉迪克西莉亚。迪克西莉亚认为， 杀害无辜和杀害有罪之人二者一样残酷， 并且结果适得其反。她把自己的想法告诉了丈夫。黄昏时分，阿奇亚斯 去朋友家参加讨论。九个男人一边喝酒， 一边讨论会议内容，直至深夜。阿奇亚斯分享了妻子要求仁慈 的意见，朋友最终也表示同意。黎明之前， 意想不到的事情发生了。传信官环绕雅典城，宣布议会已经召集了另一场会议。第二次辩论同样激烈，但是产生了一项新的决议： 只处决反叛的主谋，这项新决议惊险通过。但是，仍然有一个问题——带着执行第一次决议的船只已经在前一天出发。另一艘船立刻出航 前往解除命令——这是一场民主和时间的赛跑。

**P558 2018-02-23 Cannibalism in the animal kingdom - Bill Schutt**

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In the deserts of the American Southwest, spadefoot toad tadpoles hatch in tiny oases. Until they develop into toadlets, they can’t survive outside of water, but these ponds are transient and quickly evaporate. The tadpoles are in a race against the clock to grow up before their nurseries disappear. So nearly overnight, some of the brood explode in size. They use their jack-o-lantern teeth and huge jaw muscles to devour their smaller pond mates. Nourished by this extra fuel, they develop quicker, leaving the pond before it can dry out. The spadefoot toad is far from the only animal to eat members of its own species as a normal part of its life cycle. All of these animals do. If that surprises you, you’re in good company. Until recently, scientists thought cannibalism was a rare response to starvation or other extreme stress. Well-known cannibals, like the praying mantis and black widow spider, were considered bizarre exceptions. But now, we know they more or less represent the rule. While it may seem counterproductive for members of the same species to eat each other, cannibalism can promote the survival of the species as a whole by reducing competition, culling the weak, and bolstering the strong. Some species, like the spadefoot toad, cannibalize in response to environmental pressures. Their situation is precarious, but cannibalism for them isn’t a last-ditch attempt to avoid starvation. Rather, it’s a way to more quickly outgrow a stage where they’re especially vulnerable to predation or dangerous environmental conditions. Other species, including many fish, indiscriminately cannibalize each other during foraging behavior. Fish produce large numbers of tiny young, and adults exhibit about as much individual recognition of their offspring as humans do for a handful of raisins. Fish eggs, larvae, and juveniles are easily available, nutrient-rich meals, and with thousands of eggs in a clutch, plenty are still available to hatch after the adults have snacked. Baby fish aren’t just at risk of being cannibalized by adults— siblings eat each other too. Sand tiger shark eggs develop and hatch inside their mother’s oviducts at different times. When the hatchlings run out of yolk from their own eggs, they eat the other eggs and hatchlings until one baby shark from each oviduct remains. When they emerge, the young sharks are well-nourished, experienced predators who stand a better chance of surviving. Even when they aren’t consumed for nutrition, young animals are especially vulnerable to cannibalism. Hamsters, rats, and other rodent mothers will eat some of their young if they’re sick, dead, or simply too numerous to feed. In other mammals, including bears and lions, males will kill offspring sired by another. That’s because childless females become receptive to mating more quickly than if they were caring for a cub. Rather than waste nutritious meat, the males then eat the dead cubs. Meanwhile, cannibalism is less common in birds than in other groups, but certain species will eat diseased or dead hatchlings as a way of disposing of the bodies before they can attract maggots. When adults eat each other, males are cannibalized more often than females, usually during mating and generally because they’re smaller. Male Australian redback spiders mate with much larger females. Rather than scrambling away after mating, the tiny male does a somersault, bringing his abdomen into contact with his mate’s mouthparts. The female showers him with enzyme-rich gut juice and consumes his abdomen. Males not killed in the initial mating crawl back into the fray, often half-eaten, to mate again, after which they’re dispatched to the spider pantry. So not only does the male provide the female with his sperm, but he also provides her with a nutritious meal to better ensure that she’ll survive to pass on his genes. All in all, it’s clear that cannibalism is as much a part of life in the animal kingdom as other, better-recognized behaviors. As we sink our teeth into the evidence of cannibalism in nature, we might ask ourselves, what else have we missed by applying human standards to the natural world?

**P558 2018-02-23 Cannibalism in the animal kingdom - Bill Schutt**

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翻译人员: Christina Wang 校对人员: Lipeng Chen一个使生命进步的基本法则－－ 繁衍，变化，让强者生存、弱者死亡。－－查尔斯·达尔文，《物种起源》在美国西南部的沙漠，锄足蟾的蝌蚪在小绿洲孵化而出。在长成小青蛙前， 它们不能在脱水的环境中生存，但是它们生活的池塘转瞬即逝， 水分很快就蒸发了。所以这些小蝌蚪需要和时间赛跑，要赶在池塘中的水分蒸发前长大。几乎在一夜之间， 一部分蝌蚪迅速变大。它们用了自己锋利的牙齿 和巨大的鄂部肌肉来吞食身边更小的蝌蚪。通过这额外的食物，它们成长得更迅速， 继而可以在池塘蒸发前离开。锄足蟾远不是动物里唯一把吞食自己同类以生存 作为正常生命周期的一部分。所有这些动物都是。如果你感到很惊讶，你不是一个人。直到最近以前，科学家以为同类相食是一个很稀有的、面对饥饿 或其它极端压力才产生的反应。已知的同类相食者，如螳螂、黑寡妇蜘蛛曾被视为是奇怪的特例。但现今，我们知道它们 或多或少代表了普遍现象。同一物种互相捕食 看起来可能对物种不利，但同类相食也可以 帮助整个物种的存活，通过减少竞争，消灭弱者，让强者更强大。有些动物，比如锄足蟾，是因为环境压力而吞食自己的同类。它们的情况很危急，但对于它们来说，同类相食并不是 为了避免饥荒的孤注一掷。同类相食是更快的长大，跳出一个它们很容易被捕食，或被 危险的环境条件影响的阶段。其它种族，包括很多鱼类，觅食中会无差别的捕食同类。鱼类生产大量的、个体小的幼体，且成年的鱼识别它们自己的后代就和我们识别一把葡萄干一样差劲。鱼卵和幼鱼是 容易获得、营养丰富的一餐，且鱼有着上千个鱼卵，成年的鱼就算吃一部分 也还剩很多可以孵化。幼鱼不只会被同类里成年的鱼吃掉，兄弟姐妹也会互相捕食。沙虎鲨的卵会在不同时间段 在母亲的输卵管里发育和孵化。当幼体用光了自己卵中的卵黄，它们就会吃掉其它卵和幼体直到每个输卵管里 只剩下一个小鲨鱼。出生时，剩下的小鲨鱼就有了 充足的营养和丰富的捕食经验所以更容易存活下来。即便有时不是为了营养，幼年的动物也很容易被同类相食。仓鼠，老鼠，和其它啮齿动物的母亲会吃掉一部分自己的幼鼠 如果它们生了病，死掉了，或者只是她们无法喂养太多幼鼠。其它动物中，包括熊和狮子，雄性会杀死其它雄性的后代。这是因为没有幼崽的雌性 比她们在抚养幼崽的时候容易更容易继续交配。为了不浪费营养丰富的肉， 雄性会吃掉死去的幼崽。同类相食在鸟类中更少见一些，不过某些鸟也会吃生病或死掉的幼雏来处理掉尸体，避免吸引蛆虫。对于成虫间的互相捕食， 雄性比雌性更容易被吃掉，一般在配偶期， 原因通常是雄性体型更小。比如，雄性澳洲红背蜘蛛 会和体型大很多的雌性交配。交配后，小小的雄性不会马上离开， 而是翻个跟头，把自己的腹部移到配偶的口器旁边。接下来，雌性用含有酶的消化液 吃掉雄性的腹部。没有被第一次交配 直接杀死的雄性会回来，一半已被吃掉的情况下，继续交配，然后成为雌性蜘蛛的食物。这样，雄性不只给雌性提供了精子，他还提供了一顿营养丰富的晚餐来确保雌性可以生存， 把自己的基因传下去。总的来说，同类相食无疑是动物王国生命中的一部分，和其它我们更了解的行为一样重要。当我们继续深入探索 自然界中同类相食的证据，我们也应该问问自己，还有什么东西，是因为我们把 人类的标准用在自然界而被我们漏掉？有兴趣了解更多吗？我们强烈推荐本视频作者的书 “Cannibalism: A Perfectly Natural History”

**P559 2018-03-05 A day in the life of a Roman soldier - Robert Garland**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=559)

The year is 15 CE and the Roman Empire is prospering. Most of the credit will go to the emperor, but this success wouldn’t have been possible without loyal soldiers like Servius Felix. Servius enlisted as a legionary eight years ago at age 18, the son of a poor farmer with few prospects. Unlike the majority of legionaries, he doesn’t gamble, so he’s been able to save most of his wages. He’s even kept his viaticum, the three gold coins he received when he enlisted. If he survives until retirement, he’ll receive several acres of land. And he’s grown rather fond of a girl back home whom he intends to marry. But he’ll have to wait until he completes his 25 years of service before that can happen. And the life of a legionary is dangerous and grueling. Today, Servius’s legion, along with three others, has undertaken a “great march” of 30,000 Roman paces, the equivalent of nearly 36 kilometers. Servius’s armor and weapons, including his gladius, scutum, and two pila, weigh over 20 kilograms. And that’s not counting his backpack, or sarcina, which contains food and all the tools he needs to help build the camp – spade, saw, pickaxe, and basket. Although Servius is exhausted, he won’t sleep much tonight. He’s been assigned the first watch, which means looking after the baggage animals and keeping alert against a possible ambush. After he’s done, he lies awake, dreading the day ahead, which will force him to recall his worst nightmare. At dawn, Servius eats breakfast with his seven tent companions. They’re like a family, all bearing scars from the battles they’ve fought together. Servius is from Italia, but his fellow soldiers hail from all over the empire, which stretches from Syria to Spain. So they’re all far from home in the northern land of Germania. Servius’s legion and three others with him today are under the command of Emperor Tiberius’s nephew Germanicus, named for his father’s military successes against the Germanic tribes. Each legion has close to 5,000 men, divided into cohorts of about 500, further subdivided into centuries of around 80-100 men. Each century is commanded by a centurion. An aquilifer, or eagle-bearer, marches at the head of each legion carrying its eagle standard. The centurions march beside the legionaries belting out orders, “Dex, sin, dex, sin," “Right, left, right, left," starting with the right foot as the left is considered unlucky or sinister. Despite the strict discipline, there’s tension in the air. Last year, some legions in the area revolted, demanding better pay and a cut in the length of service. Only their general’s charisma and negotiating skills prevented wholesale mutiny. Today is a “just march,” only 30 kilometers. As the marshes and forests of Germania lie beyond the empire’s road system the men must build causeways and bridges to make headway— something they’ve recently spent more time doing than fighting. Finally, they arrive at their destination, a place Servius knows too well. It’s a clearing on the outskirts of the Teutoburg Forest, where six years ago, during the reign of the Emperor Augustus, Germanic tribes under their chieftain Arminius ambushed and destroyed three legions. Proceeding along a narrow path, the legions were attacked from forest cover under torrential rain with their escape blocked. It was one of the worst defeats the Romans ever suffered and Augustus never lived it down. Servius was one of the few survivors. Servius still has nightmares of his comrades lying where they fell. But now the army is back to bury the dead with full military honors. As he helps in the task, he can’t help wondering whether the bones he handles belonged to someone he knew. Several times he wants to weep aloud, but he pushes on with the task. The glory of the Empire can go to the crows. All he craves is to retire on a small farm with his wife-to-be, if the gods should spare his life for 17 more years.

**P559 2018-03-05 A day in the life of a Roman soldier - Robert Garland**

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翻译人员: Wendy Li 校对人员: Lipeng Chen15世纪，罗马帝国繁荣发展着。这主要归功于帝国皇帝，但是如果没有像Servius Felix一样忠诚的士兵们，这种成功不可能发生。八年前，十八岁的Servius 成为罗马军团的一名士兵，作为一个贫穷农夫的孩子， 他并没有什么前程。不想很多其他的士兵， 他不赌博，所以他存下了他的薪水。他甚至存下了他的入伍费，那是在他入伍时收到的三个金币。如果他能活到他退伍， 他将能收到一些土地。他会喜欢上一个家乡的女孩，一个他想娶回家的人。但是他必须等到他 完成25年的服役之后这些才有可能。军队的生活是危险且疲惫的。今天， Servius的军团 和其他三个团，进行了3万罗马步（古罗马 长度单位）的宏大行军仪式，相当于近36千米。Servius的盔甲和武器，包括他的短剑，长形盾，两个短矛，重20多千克。这还不包括他的 背包或行军包裹，里面装满了食物 和他需要的扎营工具——铲子，锯子，十字镐，和篮子。虽然 Servius很累， 今晚他还是无法睡得很好。他负责第一轮望风，他要注意随行的动物，警觉潜在的埋伏。之后，他躺着但无法入眠， 思索着明天，不得不回忆起他最坏的噩梦。黎明时，Servius和他的七个 同帐篷的士兵一起吃过早饭。他们就像是一家人， 身上有着一起战斗的疤痕。Servius来自意大利，但是他其他的同伴们 来自帝国的其他各个地方，从叙利亚到西班牙，他们都远离家乡 在北日耳曼服役。Servius的军团 和其他三个军团服从于皇帝台比留的外甥 格马尼库斯的命令，他肩负着父亲的英名 对抗日耳曼部落。每个军团有近5000人，被分成500人的队列，又被分成80-100人的百人团。每个百人团有 一个百夫长，每个鹰旗长带领一个军团，手持鹰旗，百夫长在军团旁游行。“dex，sin，dex，sin，”“左，右，左，右，”先迈左脚因为右脚被 认为是不吉利的。尽管有严格的纪律， 气氛还是很紧张。去年，区域内的一些军团起义，要求更好的待遇 和减少服役时长。将军用他的人格 魅力和谈判技巧阻止了大规模暴动。今天是“只有行军”， 仅仅30千米。因为日耳曼沼泽和森林 穿过帝国的道路系统，士兵们必须建筑 堤道和桥梁来通过。有时候他们会花费比战斗 更多的时间来做这些。最后他们到了目的地， Servius对这里了如指掌。这里是顿堡森林郊区，六年前，奥古斯都皇帝 统治着这里。日耳曼部落在酋长 阿米纽斯的带领下，在这里埋伏并摧毁了 三个罗马军团。沿着狭窄的道路前进，军团受到在暴雨中受到袭击，退路被截断。这是罗马人经历过的 最惨的失败之一，也是奥古斯都皇帝 一生的耻辱。Servius是少数的幸存者之一，Servius至今还会梦到 他死去的同伴们躺在那里。但是现在军队回到了这里 埋葬这些献身的战士。当他埋葬他们时，他忍不住想这些骨头 是否属于他认识的人。多少次他想要落泪， 但他忍住了继续完成任务。让帝国的荣耀去见鬼吧！他所想要的不过是和 他未来的妻子退休到一个小农场，如果上帝可以让他活过这17年。

**P560 2018-03-05 Why isn't the world covered in poop - Eleanor Slade and Paul Manning**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=560)

Somewhere near you, an animal is defecating. In fact, each day, the animal kingdom produces roughly enough dung to match the volume of water pouring over the Victoria Falls. So why isn’t the planet covered in the stuff? You can thank the humble dung beetle for eating up the excess. Capable of burying 250 times their body weight in a single night, these valiant insects make quick work of an endless stream of feces. Over 7,000 known species of dung beetle run clean-up duty across six continents —everywhere except Antarctica. A dung beetle’s first task is to locate dung. Some live on the anal regions of larger animals, ready to leap off when they defecate. Others sniff out feces that animals leave behind. A pile of elephant dung can attract 4,000 beetles in 15 minutes. So once a beetle finds dung, it must work quickly to secure some of the bounty for itself. Most dung beetle species fall into one of three main groups: rollers, tunnelers, and dwellers. Dung rollers sculpt a ball of dung, and using their back legs, quickly roll it away from competitors. Potential partners jump on the ball, and once the ball-maker has selected their mate, the pair dig their dung ball into the soil. Once it’s been buried, the female lays a single egg within the dung ball. Tunnelers have a different approach. Digging underneath a pat, some drag dung down into the soil and pack it into clumps known as brood balls, dung balls, or dung “sausages,” depending on their shape and size. Male tunnelers sport a spectacular array of horns to fight each other for control of these tunnels, which they then defend until the female’s laid her egg. Some male tunnelers avoid the fray by masquerading as hornless females and sneaking into tunnels to mate while the guardians’ heads are turned. The third group of dung beetles, dwellers, take the most straightforward approach, laying their eggs directly into a dung pat. This makes their offspring more vulnerable to predation than those of the tunnelers and rollers. As the larvae feed, they riddle the dung pat with tunnels, leaving remains that are quickly colonized by bacteria and fungi and weathered away. Inside a tunnel, ball, or pat, once the larvae hatch, they consume the dung before metamorphosing into a pupa and then an adult beetle. Besides clearing dung, the actions of these beetles have considerable ecological importance. For one, they serve as secondary seed dispersers. Dung from monkeys, wild pigs, and other animals is riddled with seeds from the fruits they eat. When beetles bury their dung balls, they inadvertently protect these seeds from predators and increase the likelihood they’ll germinate. The advantage is so great that one South African plant has evolved to produce seeds that look and smell like dung to trick beetles into burying them. Dung beetles also play important roles in agricultural systems. Livestock, like cows and sheep, produce huge amounts of dung, which contains nutrients that can benefit plants. The beetles break up the dung and tunnel it deep into the soil, bringing the nutrients into close contact with plant roots. Their services to farmers have been valued at $380 million a year in the US and £367 million a year in the UK. Dung beetles can even help us battle global warming by reducing greenhouse gas emissions associated with farming. Microbes living in oxygen-poor livestock dung produce methane, a potent greenhouse gas. But beetles oxygenate pats when they tunnel into them, preventing the microbes from producing methane. The dung beetle spreads seeds, helps farmers, and fights climate change —and accomplishes it all simply by doing its business. Maybe next time you come across some dung in the forest or a field, you’ll be tempted to take a closer look.

**P560 2018-03-05 Why isn't the world covered in poop - Eleanor Slade and Paul Manning**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=560)

翻译人员: Carol Wang 校对人员: Yanyan Hong[一只屎壳郎走进酒吧，问道： “这坨屎有主吗 (stool :屎/凳子)？”]在距你不远的某处， 某个动物正在排便。事实上，动物王国 每天都会产生大量粪便，粪便总量足以与维多利亚 大瀑布的水量媲美。但地球为何没有遍地粪便呢？这要感谢平凡的蜣螂（屎壳郎）， 他们消耗掉了多余的粪便。这些昆虫勇士每天晚上 可埋掉自重 250 倍的粪便，它们快速工作，处理无穷无尽的粪便。已知的蜣螂品种有七千多种， 它们在6个大陆上负责清理工作——遍布南极大陆外的每个地方。蜣螂的第一项任务是找到粪便，一些蜣螂生活在大型动物的肛门附近，大型动物排便，它们就开始工作；其它蜣螂能闻到动物留下的粪便，一坨大象粪便 15 分钟内 就吸引 4000 多只蜣螂，因此，一旦蜣螂发现粪便，它必须快速劳作以占领工作地盘。多数蜣螂可分为三个主要组群：滚粪蜣螂、挖道蜣螂、和居粪蜣螂。蜣螂将粪便滚成球形，用后腿快速滚动粪球，远离竞争者；一些候选配偶则跳上粪球，一旦滚粪球的蜣螂选定了配偶，这对蜣螂就把粪球挖到土里。一旦粪球被掩埋，雌蜣螂 会在粪球中产下一个卵。挖道蜣螂的方式则不同，它们会在小块粪便下挖通道， 再把粪便拽进土里，再将其聚拢成小堆，根据其形状 和大小分为育幼球、粪球、或粪便“香肠”。雄性挖道蜣螂长着一列独特的角，用来对抗其他雄性 以获得这些通道的控制权，它们会守护这些通道， 直到雌蜣螂完成产卵。一些雄性挖道蜣螂会扮成 无角雌蜣螂，来避免争斗，并在守卫蜣螂不注意时， 悄悄溜进通道进行交配。第三组是居粪蜣螂，它们采取了最直接的办法，把卵直接产在粪便中。与挖道蜣螂和滚粪蜣螂相比，这种方式使它们的后代 更容易遭到猎食。当幼虫进食时， 粪便会被钻出一些通道，快速寄生大量细菌和真菌， 最终使粪便分解。在通道、粪球或粪块之内，一旦幼虫孵化出来， 会以粪便为食，直至成蛹，之后发育成为成年蜣螂。除了清理粪便，蜣螂的活动对生态系统也非常重要。首先，它们实现了种子的二次传播。猴子、野猪和其他动物的粪便中，包含大量它们吃的水果的种子。当蜣螂填埋这些粪便时，它们无意中保护这些种子 不会被其它动物们吃掉，增加了种子发芽的几率。蜣螂带来了这种巨大好处，非洲南部的一种植物甚至进化出 能产生形状气味类似粪便的种子，从而欺骗蜣螂填埋自己的种子。在农业系统中，蜣螂也发挥重要作用。牛羊等牲畜会产生大量粪便，其中包含有益植物的营养物质。蜣螂将粪便分解， 并挖地道深埋粪便，将营养物质带到植物根部。在美国，它们每年对农民的贡献 价值可达到 3.8 亿美元；在英国，则可达到 3.67 亿英镑。蜣螂甚至可以帮助我们 对抗全球变暖，它减少了农业相关的温室气体排放。一些微生物生活在 氧含量低的牲畜粪便中，它们产生甲烷，一种主要的温室气体。但蜣螂在粪便中挖道时， 则会带来氧气，使这些微生物无法产生甲烷。蜣螂能够传播种子，帮助农民，并对抗全球变暖 ——它只是通过处理粪便， 就实现了这么多好处。也许下次你在森林 或田里见到它们时，你会想好好地观察一下它们。若你想了解更多关于 自然界铲屎官们的事，强烈推荐 Douglas J Emlyn 的书：《动物武器》。内含更多关于蜣螂引人入胜的事实，并深入探讨世界各地动物的生存策略。请访问网站 ED.TED.COM/BOOKS，阅读我们的完整建议和购书，看看评论部分以了解更多信息。

**P561 2018-03-13 The Cambodian myth of lightning, thunder, and rain - Prumsodun Ok**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=561)

Once, a long time ago, there was a powerful hermit named Lok Ta Moni Eysei. He had three promising students: Moni Mekhala, the brilliant goddess of the seas, Vorachhun, the princely manifestation of the earth, and Ream Eyso, a demon whose heart burned with passionate fire. Lok Ta wished to bestow a gift upon his most deserving student. To determine which of the three that was, he announced a contest: whoever first brought back a glass full of morning dew would be master of this mysterious gift. When dusk came, Vorachhun and Ream Eyso ventured into the forest. They left not one leaf or blade of grass untouched, impatiently shaking the precious fluid into their glasses. When they returned to the hermit’s hut, they found Moni Mekhala sitting patiently with a full glass of morning dew. She had left her shawl out overnight and won the contest by simply wringing out the fabric over her glass. Proud of all his students, and loving them like his own children, Lok Ta surprised all three with gifts. He turned the dew Ream Eyso collected into a diamond axe, Vorachhun’s into a magic dagger, and Moni Mekhala’s into a crystal ball unlike anything ever seen. Soon Ream Eyso grew covetous and decided he must have Mekhala’s prize. He and Vorachhun tried to woo the goddess so they could get the precious gem. But after she rejected their advances and flew off, Ream Eyso resolved to take the crystal ball by force. Ream Eyso flew through the air in search of Moni Mekhala, propelled on by a jealous rage. On his way, he encountered Vorachhun and attacked him, knowing that the righteous prince would never allow him to steal the crystal. The demon gained the upper hand in the heat of battle, and hurled Vorachhun against the side of a mountain. Sure of Vorachhun’s death, Ream Eyso continued his search until he finally found Moni Mekhala. He demanded that she and her friends either submit to him, the most brilliant of Lok Ta’s students and rightful master of the crystal ball, or die like Vorachhun. Mekhala, without fear, refused and flew off into the clouds, hoping to draw the demon away from her friends. Ream Eyso took the bait, ripping through nimbus after nimbus in his crazed pursuit. Once far enough away, Mekhala confronted her pursuer. Ream Eyso made one last demand but the goddess remained unfazed. Enraged, he began to swing his diamond axe. Before he could hurl the weapon, Mekhala threw her crystal into the air. As it climbed the height of the sky, it emitted powerful flashes of lightning that blinded the demon. Ream Eyso let his axe loose in wild desperation. As the weapon flew through the air it cut through clouds, creating deep, rolling peals of thunder. And when the lightning and thunder mixed, precious seeds of water fell from heaven: rain. Mekhala drew close to Ream Eyso, now blind and impotent without his axe. She pondered what she should do to the murderer. Remembering the kindness and love of her teacher, Moni Mekhala chose compassion and flew into the sky. Shortly later, Ream Eyso regained his strength, found his axe, and followed her. Thunder, lightning, and rain continued to dance across the earth. Some drops fell on Vorachhun and revived him, his skin golden like a rice field ready for harvest. Grabbing his magic dagger, he flew into the sky in search of Ream Eyso and Moni Mekhala.

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翻译人员: Chien Yet Chong 校对人员: Lipeng Chen“从那风暴中出来的你，已经不是踏进去时的你了。 这就是风暴这东西的意思。” - 村上春树，《海边的卡夫卡》很久很久以前，有一位法力高超的僧人， 他的名字叫罗克·塔·摩尼·埃塞。他有三位大有可为的徒弟：莫妮·麦卡拉， 聪颖的四海女神，伏拉克春， 大地化身的王子，以及雷阿姆·埃索， 性情暴躁的魔鬼。罗克·塔想要把一份礼物 赐予最优秀的徒弟。为了判断谁是最优越的， 他设了个比赛：第一位带回一个盛满露珠的杯子的将会成为神秘礼物的主人。当晨曦微露，伏拉克春 和雷阿姆·埃索一起踏入森林。他们搜索每一片叶子，每一根草，迫不及待地把每一滴珍贵的露珠 收集进他们的杯子内。当他们回到和尚的棚屋时，却发现莫妮·麦卡拉已经静静地坐着， 跟前放着盛满露珠的杯子。原来前一个晚上她把披肩放在户外。她只需轻易地拧干披肩来获胜。罗克·塔深爱所有的徒弟， 并为他们感到骄傲，就出奇地给他们三人一份礼物。他把雷阿姆·埃索收集的露珠化成 一把金刚石斧头，伏拉克春的露珠为神奇的匕首，以及莫妮·麦卡拉的变成 一颗前所未见的水晶球。很快地，雷阿姆·埃索觊觎麦卡拉的礼物。为了得到那颗珍贵的宝石， 他和伏拉克春尝试追求麦卡拉。但麦卡拉拒绝他们后，就飞走了。雷阿姆·埃索决定用武力 把水晶球抢到手中。雷阿姆·埃索怒气冲冲，飞上天去追捕麦卡拉。途中，他遇见伏拉克春。 早已预料正直的伏拉克春将阻拦他偷取水晶球， 雷阿姆袭击伏拉克春。雷阿姆在这场激烈的斗争中胜出，并用力地把伏拉克春投掷到一座山边。知道伏拉克春已断气后，雷阿姆·埃索继续搜寻， 至终找到了麦卡拉。自诩为罗克塔最优越的门徒 以及水晶球的合法主人，他命令麦卡拉和她的同伴向他屈服，否则将像伏拉克春死于非命。麦卡拉毫无畏惧地拒绝， 飞上了云朵中，希望借此引诱雷阿姆远离她的同伴。雷阿姆·埃索不自觉地受骗， 冲上云霄激愤地继续追踪她。达到一定高度后， 麦卡拉勇敢地对抗她的敌人，雷阿姆·埃索发最后一次通牒， 但该女神仍无动于衷。雷阿姆·埃索火冒三丈， 并开始甩动他的金刚斧。雷阿姆还没完成动作前， 麦卡拉把她的水晶球抛向空中。水晶球急速上升，随之发出强而有力的闪电 把雷阿姆的眼睛弄瞎了。雷阿姆·埃索仓皇中松开手中的斧头。松开的斧头在空中飞梭， 割破朵朵云彩，撕裂的云朵产生洪亮刺耳的雷声。当闪电和雷声交加，珍奇的水滴从天而降，形成了雨水。麦卡拉逼近又失明又无力的雷阿姆·埃索。她思索该如何处置这杀人凶手。想起僧人师傅的慈悲和博爱之心，莫妮·麦卡拉选择仁慈之情， 飞到空中，离他而去。不久之后，雷阿姆·埃索恢复力气， 找获他丢失的斧头后，就跟着麦卡拉。雷声、闪电和雨水继续在大地四处舞动。一些雨滴掉在伏拉克春身上， 他随之复活起来。复活的他有着熟透稻米的金黄色。伏拉克春握着他的神奇匕首，飞到空中寻找雷阿姆·埃索和莫妮·麦卡拉。如果你享受观赏这视频， 何不看看我们不断扩充的神话播放表。如果你喜欢我们的视频， 请签约我们每周上载新视频的频道。

**P562 2018-03-15 Can you solve the buried treasure riddle - Daniel Griller**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=562)

After a massive storm tears through the Hex Archipelago, you find five grizzled survivors in the water. Shivering their timbers, they explain that they’re the former crew of the great pirate Greenbeard, who marooned them after they tried to mutiny. Each was bound up in a different spot on a small island, until the storm washed them out to sea. In gratitude for saving them, they reveal a secret: the island they were on is also where Greenbeard has buried his treasure hoard. But when the sailors try to describe the island, something seems off. All agree it was flat and barren with no prominent features except for some trees. Yet each pirate claims they saw a different number of trees, ranging from two to six. The pirate who saw two trees says the treasure was buried right at his feet. When you fly your hot air balloon over the area to investigate, you see hundreds of small islands, each with exactly six trees. The next storm will be here soon, so you’ll have to hurry and narrow your search. What does the island with Greenbeard’s treasure look like from the sky? And where will the treasure be on that island? Pause here if you want to figure it out for yourself! Answer in 3 Answer in 2 Answer in 1 It might seem like the pirates are delirious from dehydration. But that’s not what’s going on. Remember, each was confined to a separate point on the island, and no two of them could see the same number of trees. That means that for all but one pirate, something was blocking their view. And since there are no other features on the island, that something could only have been other trees. A pirate would see fewer trees when two or more fell along a straight line from their vantage point. So we need to find the island where five different pirates standing in different spots would each see a different number of trees. Virtually every island has a position from which you can see six trees. And on most islands there’s a position where 5 trees can be seen by standing in line with two of them. It turns out that the hardest locations to find are those with fewer visible trees precisely because they require more trees to line up with the viewer’s position. So how can we see just two trees? One way would be if all the trees were lined up in single file, such as on this island. Then, you could stand at the end of the line and see one, stand in the middle and see two, or stand anywhere else and see all six. But there’s no place from which you can see only three, four, or five, so one straight line of trees is out. So what about two lines of trees? So long as the lines aren’t parallel and they intersect over land, there’ll always be a position where the two lines converge from which you could see exactly two trees. And if they’re grouped two and four, or three and three, there are many arrangements in which you could also see three, four, five, and six trees. Fortunately for us, there’s only one island in the archipelago with two non-parallel lines of trees, and it’ll be buried at the intersection of the two lines. You land on this island and dig up a chest containing a massive pile of tree seeds, ready for planting. Was this treasure really worth all that trouble? That’s a matter of perspective.

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翻译人员: Frank Wang 校对人员: Monkey Luffy“一切都是谜，一个谜的答案是另一个谜。” ——拉尔夫·沃尔多·爱默生，《生化的准则·幻觉》一场强烈的暴风雨袭击六角群岛后，你在海上发现了 五名战战兢兢的生还者。恐惧发抖的生还者说他们是绿胡子大海盗的前水手。他们因为叛变而被放逐。他们每人原本被捆绑 在一座小岛上的不同位置，后来暴雨来袭才被冲到海中。为了报答你拯救他们， 他们向你揭示一个秘密：他们被捆绑的岛屿上 藏着绿胡子的宝藏。但是，当水手尝试描述该岛屿时， 每个人所给的描述却不一。每人都同意该岛平坦而且荒芜， 除了一些树木就没有其他明显的特征。但是每一位海盗却说 他们看见不同数量的树，数目从两棵到六棵不等。看到两棵树的海盗说 宝藏就藏在他的位置之下。当你升起热气球搜索该海域时，你看到上百座小岛， 每座都有六棵树。下一场暴雨即将来袭，你必须把握时机，把搜索范围缩小。绿胡子宝藏所在的小岛 的俯视图是怎么样的呢？而且宝藏会在该岛的什么位置呢？如果你想事先自己解答， 请在这儿暂停播放视频。答案：三秒答案：两秒答案：一秒那些海盗似乎因脱水而神志不清。但事实并非如此。记得，每一位海盗都 被绑在该岛的某一位置，而且他们每位都看见不同数目的树。这表示他们当中 只有一位的视野是不被阻挡的。既然岛上没有其他特征，阻挡他们视野的只有岛上其他的树。从海盗的观点来看， 如果两棵或以上的树排成直线，那位海盗可看见的树 的数目就变少了。所以我们想要找的岛屿必须当五位海盗位于不同的位置时，每位所看到的树的数目将会不一样。几乎所有岛屿都有一个位置 是可以看到所有六棵树的。而且大多数岛屿也有个位置 是可以看到五棵树的，尤其是其中两棵排成一条线。最难找到的则是可观察的树木 比较少的位置，原因是因为从观察者的观点， 这些位置需要更多的树木排列成线。那么一个人怎么可以只看到两棵树呢？其中一种排法是如果所有的树 都排成一条线，跟这座小岛的一样。这样，如果你站在尾端， 就可看到一棵树，站在中间就可看到两棵，或站在任何其他位置看到六棵。但是这种排法却无法看到三棵、四棵、或五棵树。所以所有树木排成一条线是不可能的。如果所有的树木排成两排呢？只要这两排树不是平行的， 而且它们的交叉点是在岛上，总有个位置， 也就两条线交汇的地方你是可以看到两棵树的。如果排列是两棵和四棵、或两排各三棵、该岛就有不同的位置能让你看到三棵、四棵、五棵、或六棵树。很幸运的，群岛上只有一座岛有两排树是非平行的，宝藏就埋在这两排树的交叉点。你在这座岛上着陆，把箱子挖出来， 发现里面装着一大堆树种，随时供播种使用。这个宝藏值得你费力搜寻吗？这要看你的观点了。你是否订阅了TED-Ed的谜题系列？如果是，两个月前你几乎被古怪的巫师捉住。上个月，你成功抓拿了正逃避的太空叛徒。你刚刚才抢到绿胡子的种子。接下来的日子还会有更多谜题。我们希望你能轻易地解决任何谜题。而我们则知道一个网站能够帮助你 磨练你的问题解决技巧。Brilliant的问题库含有了 许多富有挑战性的谜题，能帮助你掌握各类解决问题技巧。Brilliant把艰难的问题细分成 容易理解的概念，然后帮助你从中找出惊人的解答。使用Brilliant能够帮你把新的解决方法 应用在异常的情况，以及帮助你解决未来的TED-Ed谜题。请浏览brilliant.org/teded 或者点击链接以开启你的解决问题旅程。创建新的Brilliant账户是免费的。 但是如果你决定创建高级账户，首833位点击这个链接的用户 可享有8折的年费。谢谢。

**P563 2018-03-19 The most successful pirate of all time - Dian Murray**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=563)

At the height of their power, infamous Caribbean pirates like Blackbeard and Henry Morgan commanded as many as ten ships and several hundred men. But their stories pale next to the most successful pirate of all time. Madame Zheng commanded 1800 vessels, made enemies of several empires, and still lived to old age. Madame Zheng began her life as a commoner working on one of the many floating brothels, or flower boats, in the port city of Guangzhou. By 1801, she had attracted the attention of a local pirate captain named Zheng Yi, and the two soon married. Guangzhou’s fishermen had long engaged in small-scale piracy to supplement their meager incomes in the offseason. But a successful peasant uprising in neighboring Vietnam at the end of the 18th century had raised the stakes. The victorious Tây Sơn rebels had unified their country only to face a Chinese invasion and ongoing maritime battles with the Vietnamese rulers they had overthrown. So they commissioned Guangzhou’s pirates to raid the coast and join the fight against their enemies. Serving their Vietnamese patrons turned the Zhengs and other pirates from ragtag gangs aboard single vessels into professional privateer fleets with dozens of ships able to hold their own at sea. In 1802, the Tây Sơn were overthrown and the pirates lost their safe harbor in Vietnam. But instead of scattering, the Zhengs met the crisis by uniting the rival Cantonese pirate groups into a formidable alliance. At its height, the confederation included 70,000 sailors with 800 large junks and nearly 1,000 smaller vessels. Those were organized into six fleets marked by different colored flags. The Zhengs were unlike many other historically-known privateers, such as Henry Morgan or Barbarossa, who acted on behalf of various naval powers. Instead, the Zhengs were now true outlaws, operating without support or approval from any government. Zheng Yi met an untimely end in 1807, but his widow didn’t hesitate to secure their gains. Through skillful diplomacy, Madame Zheng took charge of the confederation, convincing the captains that their best interests lay in continued collaboration. Meanwhile, she appointed Zhang Bao, the young protege of her late husband, as the commander of her most powerful squadron, the Red Flag Fleet. Zhang became not only her right-hand man, but her lover and, soon, her new husband. Madame Zheng consolidated her power through strict military discipline combined with a surprisingly progressive code of laws. Female captives were theoretically protected from sexual assault, and while pirates could take them as wives, mistreatment or infidelity towards them was punishable by death. Under Madame Zheng’s leadership, the pirates greatly increased their power, with 200 cannons and 1300 guns in the Red Flag Fleet alone. Within a few years, they destroyed 63 of Guangdong Province’s 135 military vessels, forcing their commanders to hire more than 30 private junks. Madame Zheng was so feared that Chinese commanders charged with apprehending her spent most of their time ashore, sometimes sabotaging their own vessels to avoid battle at sea. With little to stop them, the pirates were able to mount successful —and often brutal— raids on garrisons, villages, and markets throughout the coast. Using her administrative talents, Madame Zheng established financial offices in cities and villages, allowing her pirates to extract regular protection payments on land and sea alike. This effectively created a state within a state whose influence reached far beyond the South China Sea. At the peak of her power, Madame Zheng’s confederation drove five American schooners to safe harbor near Macao, captured a Portuguese brig, and blockaded a tribute mission from Thailand —all in a single day. But perhaps Madame Zheng’s greatest success lay in knowing when to quit. By 1810, increasing tension between the Red and Black Flag Fleets weakened the confederation from within and rendered it more vulnerable to attack from without. So, when the Chinese government, desperate to stop the raids, offered amnesty in exchange for the pirates’ surrender, Madame Zheng and Zhang Bao agreed, but only on their own terms. Their confederation was successfully and peacefully dismantled in April 1810, while Zhang Bao was allowed to retain 120 junks for personal use and became an officer in the Chinese navy. Now fighting pirates himself, Zhang Bao quickly rose through the ranks of military command, and Madame Zheng enjoyed all the privileges of her husband’s status. After Zhang Bao died in 1822, Madame Zheng returned with their eleven-year-old son to Guangzhou, where she opened a gambling house and quietly lived off the proceeds. She died at the age of 69—an uncommonly peaceful end to a pirate’s life.

**P563 2018-03-19 The most successful pirate of all time - Dian Murray**

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翻译人员: Riley WANG 校对人员: Echo Yang“我不是鸟，没有罗网可以捕捉我： 我是个有独立意志的自由人。”——夏洛蒂·勃朗特《简爱》臭名昭著的加勒比海盗， 如黑胡子和亨利·摩根，在其势力的全盛时期，可以号令十只船，手下的船员多达数百人。但在史上最成功的海盗面前， 他们的故事相形见绌。郑一嫂曾统帅1800只舰船，与数个国家为敌，并且长寿终老。郑一嫂是平民出身，在港口城市广州的 一艘水上妓院（也称花船）工作。直到1801年，她引起了郑一的注意，郑一是当地的一个海盗头目，二人迅速结为夫妻。广州的渔民长期从事小规模的海盗行为，以此补充捕鱼淡季的微薄收入。但在18世纪末，邻国越南一场农民起义的成功，提高了海盗活动的风险。胜利的西山反叛军统一了越南，只剩下来自中国的侵略，并且要与被推翻的越南统治者进行持续不断的海上战争。因此他们为广州海盗提供佣金，令其突袭沿海地区，加入到对抗敌人的斗争中。为越南人工作，使得郑家人和其他海盗从杂乱散漫的单船组织，变成了专业的海军舰队，拥有十几艘能够自主航行的船只。1802年，西山政权被推翻，这些海盗失去了越南的庇佑。但郑家并未四分五裂，而是联合了敌对的广东海盗，双方结成坚定同盟。在全盛时期，这个联盟有多达7万名水手，拥有800只大型帆船，近1000条小型船只。这些船只和人员被编成6只舰队，用不同颜色的旗子标记。历史上的知名海盗，例如亨利·摩根和巴博萨，代表着多种军事力量。与他们不同，郑家成了真正意义上的违法分子。没有任何政府支持或允许他们的活动。郑一最终于1807年去世。在稳固现有所得这一问题上，他的妻子毫不犹豫。郑一嫂通过高超的外交技能，获得了联盟的掌权。说服其他海盗船长，获得最大利益需要持续合作。同时，她指定亡夫的年轻门生张宝，作为最强力的海军队伍--“红旗帮”的指挥者。张宝不仅是郑一嫂的左膀右臂，也成了她的情人，不久之后则成为她的新一任丈夫。郑一嫂通过严格的军事纪律，结合出奇先进的律法准则来巩固自己的权力。女性俘虏受到保护，免于遭受性侵，尽管海盗可以娶这些女子为妻，但若出现虐待或不忠行为，他们都会被处以死刑。在郑一嫂的领导下，海盗们大幅提升了自己的势力，仅红旗帮就有200台大炮和1300支枪。几年间，他们摧毁了广东省135艘军舰中的63艘，迫使这些广东指挥官雇佣30支海盗帆船。郑一嫂令中国将领感到恐惧。那些得令逮捕郑一嫂的将领们 大部分时间都不敢出海，有时甚至破坏自己的舰船 以避免海上战争。没有什么能够阻止海盗们了。他们对沿海地区的驻防部队、村庄和市场等发起快攻，突袭往往能够成功却同样残忍。郑一嫂通过自己的管理才能，在城市和村庄建立了金融机构，使得她手下的海盗能够在陆地和海洋定期收取保护费。这实际是在一国之内建立了新国家。它的影响远不止中国南海区域。在郑一嫂实力鼎盛时期，她的联盟将五艘美国纵帆船驱逐到靠近澳门的安全港，占领一只葡萄牙横帆双桅船，截断了泰国的进贡船只，这些都发生在同一天。但也许郑一嫂最大的成功 在于她知道何时退出。1810年，红旗帮和黑旗帮的 对立愈发剑拔弩张，这从内部削弱了联盟的力量，导致联盟更易受到攻击。中国政府迫切想要结束海盗们的突袭，当他们提出对海盗进行招抚时，郑一嫂和张宝根据个人意愿 同意了政府的招安。1810年4月，海盗联盟成功地和平解散。张宝仍可保留120只帆船自用。他成为了中国海军的将领。张宝现在成了打击海盗的一方，他迅速升官，郑一嫂享受着 丈夫地位带来的一切特权，1822年，张宝去世后，郑一嫂带着11岁大的儿子回到了广州。她在此地开了一间赌坊，并靠此收入生活。她去世时已69岁，这对海盗来说是不同寻常的和平结局。

**P564 2018-03-22 A simple way to tell insects apart - Anika Hazra**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=564)

A whip-like straw. Powerful, crushing blades. A pointed, piercing tube. There are nearly a million known insect species in the world, but most have one of just five common types of mouthparts. And that’s extremely useful to scientists because when they encounter an unfamiliar insect in the wild, they can learn a lot about it just by examining how it eats. Scientific classification, or taxonomy, is used to organize all living things into seven levels: kingdom, phylum, class, order, family, genus, and species. The features of an insect’s mouthparts can help identify which order it belongs to, while also providing clues about how it evolved and what it feeds on. The chewing mouthpart is the most common. It’s also the most primitive— all other mouthparts are thought to have started out looking like this one before evolving into something different. It features a pair of jaws called mandibles with toothed inner edges that cut up and crush solid foods, like leaves or other insects. You can find this mouthpart on ants from the Hymenoptera order, grasshoppers and crickets of the Orthoptera order, dragonflies of the Odonata order, and beetles of the Coleoptera order. The piercing-sucking mouthpart consists of a long, tube-like structure called a beak. This beak can pierce plant or animal tissue to suck up liquids like sap or blood. It can also secrete saliva with digestive enzymes that liquefy food for easier sucking. Insects in the Hemiptera order have piercing-sucking mouthparts and include bed bugs, cicadas, aphids, and leafhoppers. The siphoning mouthpart, a friendlier version of the piercing and sucking beak, also consists of a long, tube-like structure called a proboscis that works like a straw to suck up nectar from flowers. Insects of the Lepidoptera order— butterflies and moths— keep their proboscises rolled up tightly beneath their heads when they’re not feeding and unfurl them when they come across some sweet nectar. With the sponging mouthpart, there’s yet another tube, this time ending in two spongy lobes that contain many finer tubes called pseudotracheae. The pseudotracheae secrete enzyme-filled saliva and soak up fluids and dissolved foods by capillary action. House flies, fruit flies, and the other non-biting members of the Diptera order are the only insects that use this technique. But, there’s a catch. Biting flies within Diptera, like mosquitoes, horse flies, and deer flies, have a piercing-sucking mouthpart instead of the sponging mouthpart. And finally, the chewing-lapping mouthpart is a combination of mandibles and a proboscis with a tongue-like structure at its tip for lapping up nectar. On this type of mouthpart, the mandibles themselves are not actually used for eating. For bees and wasps, members of the Hymenoptera order, they serve instead as tools for pollen-collecting and wax-molding. Of course, in nature, there are always exceptions to the rules. The juvenile stages of some insects, for example, have completely different kinds of mouths than their adult versions, like caterpillars, which use chewing mouthparts to devour leaves before metamorphosing into butterflies and moths with siphoning mouthparts. Still, mouthpart identification can, for the most part, help scientists—and you —categorize insects. So why not break out a magnifying lens and learn a little more about who’s nibbling your vegetable garden, biting your arm, or just flying by your ear.

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翻译人员: Lipeng Chen弯曲、鞭子般的长管。破坏力强大的爪子。尖锐的刺管。在这个世界上有着 数以百万种的昆虫物种，然而多数昆虫都离不开 五种最普遍的口器。而这样的特征对科学家来说就很有帮助，因为当他们发现了 一种他们不熟悉的新昆虫物种时，就能通过观察它们吃东西的方式 来很好的对它们进行研究。科学分类，更准确的说：“生物学分类”，是用 7 个级别来分类所有的生物的：界、门、纲、目、科、属、还有种。而昆虫口器的特征就能 帮助我们定位它属于哪一个目，同时也能告诉我们它如何进化 以及它的食物来源。咀嚼式口器是最常见的一种类型。这也是最为原始的一种类型——其它所有的口器都被认为是从这一种的模样进化而来的。它具有的特征就是 这样一对爪子模样的下颌骨，在其内侧有着用来碾碎、咀嚼用的牙齿，通常吃的东西是 树叶或者是其它的昆虫。这样的口器你可以在膜翅目的蚂蚁身上找到，直翅目的蚱蜢，蜻蜓目的蜻蜓，和鞘翅目的甲虫。第二种是刺吸式口器， 由一支叫做喙的长管组成。这支喙可以刺入植物和动物组织来吸取植物液或者是血液。它同时也可以分泌出具有消化酶的唾液来更好的消化食物以帮助吸取。半翅类的昆虫就具有这样刺吸式的口器，其中包括臭虫、蝉、蚜虫、叶蝉。虹吸式口器，一种比较友好一点的刺吸式口器，也是由一根称作长嘴的的管状组织构成，它就像一根吸管一样吸取花中的花蜜。鳞翅类的昆虫——蝴蝶或者是蛾——当它们不在进食时就会把口器紧紧 卷起来收在它们的头部下方，而当它们开始吸食花蜜时就会将其展开。舔吸式口器，另外一种喙管，不过这次末端是两个海绵似得垂体，其中包含了许多很细的管子，叫做拟气管。拟气管通过毛细管作用来分泌充满酶的唾液，渗入它们的食物。家蝇、果蝇、以及许多其它双翅目不叮咬的昆虫，都是使用这一方式的昆虫。不过，有一个问题。双翅目中会叮咬的昆虫，例如蚊子、马蝇、鹿虻、是有着刺吸式的口器而非舔吸式的。最后，嚼吸式口器， 是一种像舌头般的由下颌钳和前段喙管结合而成的口器，这样的构造是为了舔食花蜜。在这种类型的口器中，下颌钳其实并没有在进食中被使用到。对于属于膜翅类的蜜蜂和黄蜂，这一部分的器官更多会 作用于花粉的采集和蜂巢的模制。当然，在自然中，总还是会有许多例外。例如许多昆虫的幼虫时期，有着和成年时期完全不同的口器类型，比如毛虫在变成蝴蝶和飞蛾之前会用咀嚼式口器来吞食叶子，而蝴蝶和飞蛾则是虹吸式口器。然而，口器的识别在很大程度上还是能够帮助科学家—— 包括你——来分类昆虫哒。所以为什么不赶快开始拿出一个放大镜来多研究一下到底是谁在啃你菜园的菜，谁在叮你的胳膊，或者说是谁在你耳边飞过。

**P565 2018-03-22 What causes body odor - Mel Rosenberg**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=565)

A pungent blend of onions, cheese, and cat urine with hints of... is that…wet goat? Most of us don’t need more than one whiff to identify that generally unpleasant, characteristic smell we call body odor. But it’s a surprisingly complex phenomenon influenced by our genetic makeup, age, diet, and hygiene. So what is this odor, exactly? Where does it come from? And can we do anything about it? To start, you just need two things to produce that familiar scent: your armpit’s own secretions and the bacteria that feed on them. Most people associate body odor with sweat, and it’s an important piece of the puzzle. Your body has millions of sweat glands, and they come in two major types: eccrine glands are found all over your skin and secrete mainly water and salt. Apocrine glands, on the other hand, develop at puberty in your armpits and a few other places on your body. The sweat they secrete is full of proteins and fats. By themselves, these secretions are usually odorless. That’s where bacteria come in. Every square centimeter of our bodies is covered with thousands of bacteria. Many microorganisms thrive in moist environments, like our armpits. There, you can find about a million bacteria per square centimeter, one of the highest concentrations anywhere on the skin. Lurking in this throng of microorganisms are species of Corynebacteria, Staphylococci, Micrococci, and others. When these bacteria feed on the proteins and fats in apocrine sweat, they turn the odorless compounds into new ones that can smell very unpleasant. Some of the worst offenders may be sulfur-containing chemicals; those give body odor its oniony aroma. Carboxylic acids are in the mix, too, adding notes of cheese. These molecules waft up from the armpit and can be sucked directly into our noses, where they’re trapped and detected by an array of specialized receptors. Those can recognize odor molecules at concentrations of less than one in a million. So what determines how strong your body odor might be? It depends on the resident microbial populations in your armpit, and the nutrients that your glands provide them with. Your genes help determine what compounds you produce, and in what quantity, so everyone has a slightly different set. In fact, a gene variant that virtually eliminates body odor is common in people of East Asian descent. Adrenaline increases the ratio of apocrine to eccrine sweat, so body odor can be more intense when you’re nervous. Bacterial composition and concentration also varies between individuals and plays a part. Even what you eat can have a small effect on how you smell. So how can we deal with body odor? Washing the armpits with soap and water helps but won’t remove all the bacteria since many are buried in deeper layers of the skin. Deodorants, however, inhibit bacterial activity and mask odors at the same time. Antiperspirants work by forming tiny gel plugs that block sweat glands, drying out the armpits. While we continue to battle body odor, scientists are trying to understand it. We don’t know why the brain often interprets these particular odors as off-putting. But some researchers have proposed that secretions from the armpit could have a positive function, too, like cementing social bonds and providing a means of chemical communication. We don’t know yet if that’s the case. For now, body odor seems to be just another smelly part of the human condition.

**P565 2018-03-22 What causes body odor - Mel Rosenberg**

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翻译人员: Riley WANG 校对人员: Ran Lan"气味是一名强大的巫师..." - 海伦·凯勒一股刺激的味道混合着 洋葱、芝士、猫尿还有点别的什么..这…是羊膻味儿么？大多数人只需要轻轻一闻就能辨别出这种 令人不悦的独特味道，我们称之为体臭。但它实际是一个出奇复杂的现象其影响来自基因构成、年龄、 饮食和卫生情况。这种气味到底是什么呢？它是怎么产生的？我们能拿它怎么办？首先，产生这种熟悉的气味 需要两个东西：腋窝的分泌物以及分泌物上滋生的细菌。大多数人会将体臭和汗联系在一起，这是体臭之谜的重要一环。你的身体中拥有数百万个汗腺 主要分成两类：一种是遍布全身的小汗腺，分泌的主要是水和盐；另一种是大汗腺 在青春期时发育位于腋窝和身体其他几个部位。大汗腺分泌的汗液中 有大量蛋白质和脂肪。这些分泌物本身通常是无味的但分泌物会产生细菌。在我们的身体上 每平方厘米都覆盖着数千个细菌。许多微生物会在潮湿的环境中兴旺发达，比如腋窝那里每平方厘米 约有100万个细菌，这是我们体表细菌最集中的地方之一。这一大群微生物中藏着的细菌有：棒状杆菌、葡萄球菌、微球菌和其他细菌。这些细菌以大汗腺的汗液中的 蛋白质和脂肪为食，他们将无味的化合物转变成 很难闻的新化合物，一些罪魁祸首可能是含硫化合物，洋葱味的体臭就是这么来的羧酸也混在其中 增加了芝士的味道。这些分子从腋窝散发出来 可以直接吸入我们的鼻子中。大量的特殊神经末梢 会捕捉并探测到这些气味。它们会识别气味分子即使密度只有百万分之一。那体臭的强度取决于什么呢？这取决于腋窝处寄生的的微生物总数以及汗腺为这些微生物 提供的营养物质种类。你的基因决定了 产生出的化合物类型和数量大小，因此每个人的情况都有点差异。事实上，有的基因变种几乎可以消除体味，这在东亚人身上非常普遍。肾上腺素会提高大汗腺 相对小汗腺的汗液比率，所以在你紧张之时 体臭会更加严重。细菌组成和细菌密度 因人而异都有重要作用。甚至你吃了什么 都会稍微影响你的体味。那么我们如何解决体臭问题呢？用香皂和水清洗腋窝有一定作用 但无法去除所有细菌，因为很多细菌 都存在于皮肤的更深层。香体剂会抑制细菌活动 并同时掩饰气味，止汗剂通过产生细小的啫喱 堵塞住汗腺从而使腋窝保持干燥。在我们持续与体臭作斗争之时 科学家们正试图了解它。我们尚不清楚为何大脑会认为 这些特定气味令人讨厌，但是一些研究者提出腋窝的分泌物也存在积极作用，例如巩固社交联系，提供一种化学层面的交流。我们不知道这是否属实。现在，体味似乎只是人类境况另一个臭烘烘的部分？

**P566 2018-04-05 The rise and fall of the Byzantine Empire - Leonora Neville**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=566)

Most history books will tell you the Roman Empire fell in the fifth century CE. But this would’ve come as a great surprise to the millions of people who lived in the Roman Empire up through the Middle Ages. This medieval Roman Empire, which we usually refer to today as the Byzantine Empire, began in 330 CE. That’s when Constantine, the first Christian emperor, moved the capital of the Roman Empire to a new city called Constantinople, which he founded on the site of the ancient Greek city Byzantion. When the Visigoths sacked Rome in 410 and the Empire’s western provinces were conquered by barbarians, Constantine’s Eastern capital remained the seat of the Roman emperors. There, generations of emperors ruled for the next 11 centuries. Sharing continuity with the classical Roman Empire gave the Byzantine empire a technological and artistic advantage over its neighbors, whom Byzantines considered barbarians. In the ninth century, visitors from beyond the frontier were astonished at the graceful stone arches and domes of the imperial palace in Constantinople. A pair of golden lions flanked the imperial throne. A hidden organ would make the lions roar as guests fell on their knees. Golden birds sung from a nearby golden tree. Medieval Roman engineers even used hydraulic engines to raise the imperial throne high into the air. Other inherited aspects of ancient Roman culture could be seen in emperors’ clothing, from traditional military garb to togas, and in the courts, which continued to use Roman law. Working-class Byzantines would’ve also had similar lives to their Ancient Roman counterparts; many farmed or plied a specific trade, such as ceramics, leatherworking, fishing, weaving, or manufacturing silk. But, of course, the Byzantine Empire didn’t just rest on the laurels of Ancient Rome. Their artists innovated, creating vast mosaics and ornate marble carvings. Their architects constructed numerous churches, one of which, called Hagia Sophia, had a dome so high it was said to be hanging on a chain from heaven. The Empire was also home to great intellectuals such as Anna Komnene. As imperial princess in the 12th century, Anna dedicated her life to philosophy and history. Her account of her father’s reign is historians’ foremost source for Byzantine political history at the time of the first crusade. Another scholar, Leo the Mathematician, invented a system of beacons that ran the width of the empire— what’s now Greece and Turkey. Stretching more than 700 kilometers, this system allowed the edge of the Empire to warn the emperor of invading armies within one hour of sighting them at the border. But their advances couldn’t protect the Empire forever. In 1203, an army of French and Venetian Crusaders made a deal with a man named Alexios Angelos. Alexios was the son of a deposed emperor, and promised the crusaders vast riches and support to help him retake the throne from his uncle. Alexios succeeded, but after a year, the population rebelled and Alexios himself was deposed and killed. So Alexios’s unpaid army turned their aggression on Constantinople. They lit massive fires, which destroyed countless works of ancient and medieval art and literature, leaving about one-third of the population homeless. The city was reclaimed 50 years later by the Roman Emperor Michael Palaiologos, but his restored Empire never regained all the territory the Crusaders had conquered. Finally, in 1453, Ottoman Emperor Mehmed the Conqueror captured Constantinople, bringing a conclusive end to the Roman Empire. Despite the Ottoman conquest, many Greek-speaking inhabitants of the Eastern Mediterranean continued to call themselves Romans until the early 21st century. In fact, it wasn’t until the Renaissance that the term “Byzantine Empire” was first used. For Western Europeans, the Renaissance was about reconnecting with the wisdom of antiquity. And since the existence of a medieval Roman Empire suggested there were Europeans who’d never lost touch with antiquity, Western Europeans wanted to draw clear lines between the ages. To better distinguish the classical, Latin-speaking, pagan Roman Empire from the medieval, Greek-speaking, Christian Roman Empire, scholars renamed the latter group Byzantines. And thus, 100 years after it had fallen, the Byzantine Empire was born.

**P566 2018-04-05 The rise and fall of the Byzantine Empire - Leonora Neville**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=566)

翻译人员: Ziwen Yan 校对人员: Lipeng Chen很多历史书告诉我们 罗马帝国在公元5世纪逐渐没落。但这个事实会让生活在中世纪罗马帝国的百万居民们震惊。中世纪的罗马帝国，在今日又称为拜占庭帝国，在公元 300 年建立。康斯坦丁，这时的第一任基督徒国王将罗马帝国的首都迁到君士坦丁堡，这个新首都建在古希腊城市拜占庭的遗迹上。当西哥特人在 410 年攻陷罗马城罗马帝国的西边领域也被野蛮人占领时，康斯坦丁建立在东边的首都被保存了下来。正是在君士坦丁堡，罗马国王们 延续了长达11个世纪的统治。和历史悠久的罗马帝国共存的拜占庭帝国比它的邻国多了几分科技和艺术的优势，拜占庭人将邻国们看作野蛮人。在第九世纪，来自远方的游者们被君士坦丁堡皇宫里优美的拱门和穹顶而震撼。一对黄金狮子守在皇座两侧；藏在狮身内的风琴会将客人们吓倒在地。黄金鸟在附近的黄金树上歌唱中世纪的罗马工程师们甚至利用水利发动机将皇座举向空中。其他流传下来的古罗马文化在国王的衣着上也有体现，从传统的战袍到日常长袍。在法庭上，罗马帝国的法律也被保留了下来。劳动阶层的拜占庭人过着和古罗马帝国人民相似的生活；农民们在固定的领域进行贸易，比如说瓷艺，皮革加工，捕鱼，编制，或者制造丝制品。但当然，拜占庭帝国没有在罗马帝国的桂冠下止步不前。他们的艺术家发明创造了 大量华丽的马赛克与大理石雕刻。他们的建筑师们筑造了大量的教堂，其中最著名的一所叫做圣索菲亚大教堂，这座教堂有着被形容为从天堂吊下的穹顶。拜占庭帝国也同样是许多智者的家乡， 如安娜·科穆宁那。作为一名12世纪的公主，安娜为哲学和历史奉献了她的一生。安娜对于自己父亲统治的记载是历史学家们研究第一次十字军东征时期 政治历史的重要资料来源。另一位学者，数学家利奥发明了能跨越整个国家宽度的烽火——也就是如今的希腊和土耳其。这个系统横跨700公里以上，在军队入侵时可以让边疆的士兵警告城内国王，从发现敌情到通报的过程只需要1小时。但是他们先进的发明无法永远保护国家。1203 年， 法国和威尼斯的十字军军队和一个名叫亚历克西斯·安哲洛的人达成了协议。亚历克西斯是一个被废黜国王的儿子，他许诺十字军们大量的财富只要十字军帮助他从自己叔叔手里抢回皇位。亚历克西斯成功继位， 但过了一年，他被造反的人民废黜然后杀害。没有拿到报酬的十字军 向君士坦丁堡发泄了怒火。他们多次纵火，摧毁了大量中世纪的艺术文学收藏，三分之一的人口流离失所。君士坦丁堡在 50 年后被 罗马国王麦克尔八世重新夺回，但是并没有完全收复以前十字军们所占领的领地。终于在 1453 年， 奥斯曼帝国国王 穆罕默德二世攻陷君士坦丁堡，宣告了罗马帝国决定性的终结。尽管罗马帝国已被奥斯曼帝国占领，许多讲希腊语的地中海东岸居民继续称自己为“罗马人”， 直到21世纪初。事实上，在文艺复兴时期“拜占庭帝国”的叫法才第一次出现。对于西欧人来说，文艺复兴代表着重温古代智慧。从中世纪罗马帝国的存在就能看出有些欧洲人从来没有忘记古代的成就。西欧人试图画出清晰的界线来分清传统的、拉丁语普及、异教徒的罗马帝国与中世纪， 希腊语普及， 基督教的罗马帝国，学者们将后一种命名为拜占庭。因此， 在罗马帝国没落的100年后， 拜占庭帝国诞生了。

**P567 2018-04-06 What causes headaches - Dan Kwartler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=567)

In ancient Greece, headaches were considered powerful afflictions. Victims prayed for relief from Asclepius, the god of medicine. And if pain continued, a medical practitioner would perform the best-known remedy— drilling a small hole in the skull to drain supposedly infected blood. This dire technique, called trepanation, often replaced the headache with a more permanent condition. Fortunately, doctors today don’t resort to power tools to cure headaches. But we still have a lot to learn about this ancient ailment. Today, we’ve classified headaches into two camps— primary headaches and secondary headaches. The former are not symptomatic of an underlying disease, injury, or condition; they are the condition. But we’ll come back to them in a minute because while primary headaches account for 50% of reported cases, we actually know much more about secondary headaches. These are caused by other health problems, with triggers ranging from dehydration and caffeine withdrawal to head and neck injury, and heart disease. Doctors have classified over 150 diagnosable types, all with different potential causes, symptoms, and treatments. But we’ll take just one common case —a sinus infection—as an example. The sinuses are a system of cavities that spread behind our foreheads, noses, and upper cheeks. When our sinuses are infected, our immune response heats up the area, roasting the bacteria and inflaming the cavities well past their usual size. The engorged sinuses put pressure on the cranial arteries and veins, as well as muscles in the neck and head. Their pain receptors, called nociceptors, trigger in response, cueing the brain to release a flood of neuropeptides that inflame the cranial blood vessels, swelling and heating up the head. This discomfort, paired with hyper-sensitive head muscles, creates the sore, throbbing pain of a headache. Not all headache pain comes from swelling. Tense muscles and inflamed, sensitive nerves cause varying degrees of discomfort in each headache. But all cases are reactions to some cranial irritant. While the cause is clear in secondary headaches, the origins of primary headaches remain unknown. Scientists are still investigating potential triggers for the three types of primary headaches: recurring, long-lasting migraines; intensely painful, rapid-fire cluster headaches; and, most common of all, the tension headache. As the name suggests, tension headaches are known for creating the sensation of a tight band squeezed around the head. These headaches increase the tenderness of the pericranial muscles, which then painfully pulse with blood and oxygen. Patients report stress, dehydration, and hormone changes as triggers, but these don’t fit the symptoms quite right. For example, in dehydration headaches, the frontal lobe actually shrinks away from the skull, creating forehead swelling that doesn’t match the location of the pain in tension headaches. Scientists have theories for what the actual cause is, ranging from spasming blood vessels to overly sensitive nociceptors, but no one knows for sure. Meanwhile, most headache research is focused on more severe primary headaches. Migraines are recurring headaches, which create a vise-like sensation on the skull that can last from four hours to three days. In 20% of cases, these attacks are intense enough to overload the brain with electrical energy, which hyper-excites sensory nerve endings. This produces hallucinations called auras, which can include seeing flashing lights and geometric patterns and experiencing tingling sensations. Cluster headaches, another primary headache type, cause burning, stabbing bursts of pain behind one eye, leading to a red eye, constricted pupil, and drooping eyelid. What can be done about these conditions, which dramatically affect many people’s quality of life? Tension headaches and most secondary cases can be treated with over-the-counter pain medications, such as anti-inflammatory drugs that reduce cranial swelling. And many secondary headache triggers, like dehydration, eye strain, and stress, can be proactively avoided. Migraines and cluster headaches are more complicated, and we haven’t yet discovered reliable treatments that work for everyone. But thankfully, pharmacologists and neurologists are hard at work cracking these pressing mysteries that weigh so heavily on our minds.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=567)

翻译人员: Riley WANG 校对人员: Lipeng Chen头痛欲裂惴惴不安中，生命暧昧不明的流淌着， 时间有其魔力，明日或今时——W.H.奥登在古希腊， 头痛被认为是严重的疾病。头痛者会请求医药之神 阿斯克勒庇俄斯缓解疼痛。如果疼痛依然存在，医生将会实行那项著名的疗法——在头骨上钻一个小洞， 让感染的血液流出。这种可怕的方法 称为头部穿孔（环锯术）。在缓解头痛的同时， 这种方法带来的是更永久的病痛。运气好的话，如今的医生不会 诉诸强力工具来治疗头痛。但对于这种古老的病痛， 我们要了解的仍有很多。如今，我们将头痛分为两大类：原发性头痛和继发性头痛。原发性头痛并不是 某种潜在疾病或受伤的表现；它本身就是一种疾病。但我们过一会儿再聊这种疼痛，这是因为虽然原发性头痛 占到了头痛病例的50%，但我们对继发性头痛的了解更多。继发性头痛的原因 在于其他健康问题。触发疼痛的因素可能是 缺水、戒断咖啡因、头部或颈部受伤、以及心脏疾病。医生将其分成了150种可诊断类型，每种都有不同的潜在原因、 症状以及对应治疗方法。我们拿最普遍的鼻窦炎作为例子。鼻窦是一个腔系统，分布在我们的前额、 鼻子以及面颊上半部。当鼻窦被感染时，免疫系统会使该区域升温，从而杀灭细菌， 这使得腔体比平时红肿许多。充血肿胀的鼻窦 会给颅内动脉和血管增压，脖子和头部的肌肉 也同样感受到更大压力，肌肉的痛觉感受器由此触发，向大脑传递大量神经肽。它们会使颅内血管充血， 使大脑肿胀发热。这种不适感会协同 高度敏感的头部肌肉共同产生酸痛和阵阵抽痛。并非所有的头痛都来自于肿胀，紧张的肌肉、发炎且敏感的神经都会引起不同程度的不适感。但所有头痛都是 对某些颅内刺激物做出的反应。虽然继发性头痛的病因现已明了，但原发性头痛的起因 却仍不得而知。科学家仍在研究 哪些触发因素会引起以下三种原发性头痛：反复出现、持久的偏头痛，痛感强烈接连不断的丛集性头痛，以及最普遍的紧张性头痛。从名字可以看出，紧张性头痛可以制造出头部被一条带子紧紧勒住的痛感。这些头痛加剧了 颅骨骨膜肌肉的敏感性，它随血液和氧气疼跳动， 产生疼痛。据病人反映，他们都经历了 压力、缺水、荷尔蒙变化，但是这些与症状并不完全相符。举例来说，缺水产生头痛时 大脑额叶通常会缩小，导致前额肿大。但这与紧张性头痛的 疼痛位置并不相符。科学家推断头痛的真正原因包括血管痉挛，以及过度敏感的疼痛感受器，但没人对此有十足的把握。与此同时，大多数头痛的研究 都集中在更严重的原发性头痛上。偏头痛会反复发作， 使头骨产生被钳子夹痛的感觉。这种疼痛可以持续4小时到3天。在20%的偏头痛病例中，这种疼痛产生的电能量 能够超过大脑的负荷，使得感受神经末梢高度兴奋。这会使人产生称作光晕的幻觉，包括看到闪亮的灯光、几何图形和感受到刺痛。丛集性头痛是另一种主要的头痛，能够在一只眼睛后产生烧灼刺痛，会导致眼红、 瞳孔收缩、眼皮发沉。这些病症严重影响了 人们的生活质量，那么该如何解决它们呢？对于紧张性头痛 和大多数继发性头痛而言，非处方止痛药可以缓解症状，例如消炎药可以减少颅内肿胀。许多导致继发性头痛的触发因素，例如失水、眼睛疲劳、压力等，可以采取主动预防的方式避免。偏头痛和丛集性头痛则更加复杂。我们目前还未发现对所有人 都行之有效的可靠疗法。但庆幸的是， 药剂师和神经学家正在努力攻克这些 对大脑至关重要的难题。

**P568 2018-04-10 The surprising reasons animals play dead - Tierney Thys**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=568)

Imagine you’re being attacked by a ferocious predator. With no chance of escape, you do what any courageous, self-respecting possum would do: curl into an immobile state called catatonia, stick out your tongue, drool, and ooze some foul-smelling liquid from your anal glands. Disgusted, your assailant loosens its grip, decides you’re not the dinner it was looking for, and departs. After 10 minutes, you resurrect and merrily saunter on. From lemurs to lizards, ants to amphibians, sharks to chickens, hundreds of animals "play dead" as a survival tactic. Nicknamed "playing possum" after its star performer, feigning death is also called thanatosis. That’s from Thanatos, the ancient Greek deity of death. But most scientists call it tonic immobility, or TI. How and why TI occurs depends on the species and situation. Spewing stench and adopting odd postures are common and often play important roles. Other animals sacrifice their neighbors: quail chicks that freeze while their kin run amok have a better chance of survival when pursued by a cat. Speaking of cats, feline mothers can pinch the napes of their kittens’ necks and induce another kind of immobility called clipnosis. This keeps their kittens quiet and easy to transport. Most of the physiological mechanisms underlying these theatrics originate in the parasympathetic nervous system, better known for controlling cycles of resting and digesting. In possums, the parasympathetic nervous system causes their heart rates to drop by nearly half, respiration by a third, and body temperatures by more than half a degree Celsius for up to an hour. The neurotransmitter dopamine also plays a part. Flour beetles with low dopamine levels play dead more frequently than those with high levels, and anything blocking dopamine receptor sites can lengthen catatonia. But maintaining a death ruse isn’t easy. The performers are constantly gauging their surroundings for cues on when it’s safe to rise. Chickens, for instance, can sense when a predator’s eyes are upon them. Researchers know this because when they used a stuffed hawk in an experiment, their chicken subjects came out of their catatonia quicker when the hawk’s eyes were averted. Other animals use TI for purposes other than defense. When the sleeper cichlid feels peckish, it sinks to the lake floor and lies motionless, its splotchy coloration making it seem like a rotting carcass. If a small scavenger investigates, this undead trickster strikes. Some animals even feign death as a sexual ploy. Male nursery spiders offer gifts of silk-wrapped insects in hopes of wooing females. But those females are known to eat love-seeking males. By playing dead while the female eagerly devours her snack, these males can cautiously revive and improve their chances of successfully mating. So TI can work to an animal’s advantage, unless someone else knows its secret. California orcas can flip over young great white sharks, inducing TI for so long the immobilized sharks, who must move to respire, essentially suffocate. Humans can also flip sharks into TI. By stroking a shark’s electrically-sensitive snout and gently turning it over, researchers can induce TI that lasts up to 15 minutes. That’s enough time to insert tags, remove hooks, and even perform surgeries. There are risks however: TI can hamper respiration and induce hyperglycemia, a sign of stress. So this technique should only be used when necessary. Humans can also experience TI when they freeze with fear during violent assaults. Recognizing this ancient, involuntary form of self-defense has significant implications when trying to understand why some victims don’t flee or fight in the face of danger. So, studying TI in non-human animals not only helps us better understand some odd behaviors, it can also help us better understand our own, sometimes counterintuitive, responses to violence.

**P568 2018-04-10 The surprising reasons animals play dead - Tierney Thys**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=568)

翻译人员: Chien Yet Chong 校对人员: Cynthia Li“缄默是最响亮的声音。”——无名氏想象你被一只凶猛的捕食者攻击。在走投无路的情况下，你采取的行动将和 任何勇敢、自爱的负鼠一样：卷曲身躯，进入一种称为紧张症 的静止状态，伸出舌头，流口水，然后从肛门的分泌腺释放出 难闻的体液。看见这个情况，深感恶心的 攻击者松开它的爪子，意识到你并不是 它所寻找的美味晚餐，最后离你而去。在十分钟后，你苏醒， 然后愉快地继续漫步。从狐猴到蜥蜴、蚂蚁到两栖动物、鲨鱼到鸡、数以百计的动物都使用“装死”来 作为它们的生存战略。“模仿负鼠”——以负鼠命名的俗语——装死在英语也叫“thanatosis”（拟死）。这个词源自于桑纳托斯， 古希腊神话中的死神。但是大多数科学家都称装死为 “紧张性麻痹”，或者简称 TI。TI 发生的原因和过程 因物种品种和情况而异。最常见和最重要的手法是 释放恶臭味以及做古怪的姿势。有些动物则选择牺牲邻近的同类：当被猫追捕时，静止不动的雏鹌鹑比拼命逃命的有更高的生存率。说到猫，母猫轻咬小猫的颈背可以引发另一种成为 “夹子催眠”的麻痹现象。母猫这样做可以确保 小猫在被移动时保持冷静。导致这些现象的大多数生理机制源自于副交感神经系统，这系统主要控制休息和消化。对负鼠来说，副交感神经系统降低其心跳率接近一半，其呼吸率接近三分之一，以及其体温约 0.5 摄氏度为期约一个小时。多巴胺这种神经传递素也起重要的作用。拥有较低多巴胺的面象虫比拥有较高多巴胺的更常装死，此外，任何能够阻挡多巴胺感受器的物质 可以延长紧张症。但是维持装死姿态并不容易。装死的生物必须时刻寻找线索来判断周围是否安全。举个例子，鸡可以察觉掠食者 是否正在注视着它们。研究家知道这个事实因为当他们 使用老鹰标本来做实验时，鸡会在假老鹰的眼睛转过去后更快地从紧张症中苏醒。除了防御，一些动物也使用 TI 做其他用途。当非洲慈鲷感觉饥饿时，它就会沉下湖底并静止不动地躺着,其身上的斑点让它看起来如同死尸。如果小型的食腐动物接近检查时， 这条不死的骗子将袭击它们。一些动物更用装死为交配策略。为了取悦雌盗蛛， 雄盗蛛会把被蛛丝包裹的昆虫赠送给它们。但是雌盗蛛也会吃掉寻爱的雄盗蛛。这些雄盗蛛会趁雌盗蛛享用礼品时装死，并谨慎地苏醒以提高它们交配的成功率，所以 TI 对动物来说非常有利。 不过其他动物也会用其来从中得益。加利福尼亚虎鲸可以把年幼 的大白鲨翻转过来，诱发鲨鱼的 TI 机制， 导致必须不断游动来呼吸的鲨鱼因为长时间静止 而窒息死亡。人类也可以把鲨鱼翻转过来诱发 TI。研究家不断抚摸鲨鱼 对电力敏感的鼻口部，并轻轻地把它翻过来，就可以导致长达 15 分钟的 TI 发生。这让研究家有足够的时间植入标签，移除鱼钩，甚至进行手术。但这并非全无风险：TI 可以影响呼吸以及导致高血糖—— 压力其中一个征兆。所以这种手法应该只在必要时使用。人类也会经历 TI, 尤其是在面对暴力袭击时 因恐惧而静止不动。对这古老，不由自主 的自卫方法的认知可大大地帮助我们了解为什么一些受害者在面临危险时 不逃跑或反击。所以，研究非人类动物的 TI 机制不只帮助我们更清楚地了解 一些古怪的行为，也帮助我们更透彻地了解我们本身在面临暴力时有时违反直觉的反应。你喜爱动物吗？查看我们有关毛茸茸以及 不那么可爱的动物的视频播放表。

**P569 2018-04-10 Why can't you divide by zero - TED-Ed**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=569)

In the world of math, many strange results are possible when we change the rules. But there’s one rule that most of us have been warned not to break: don’t divide by zero. How can the simple combination of an everyday number and a basic operation cause such problems? Normally, dividing by smaller and smaller numbers gives you bigger and bigger answers. Ten divided by two is five, by one is ten, by one-millionth is 10 million, and so on. So it seems like if you divide by numbers that keep shrinking all the way down to zero, the answer will grow to the largest thing possible. Then, isn’t the answer to 10 divided by zero actually infinity? That may sound plausible. But all we really know is that if we divide 10 by a number that tends towards zero, the answer tends towards infinity. And that’s not the same thing as saying that 10 divided by zero is equal to infinity. Why not? Well, let’s take a closer look at what division really means. Ten divided by two could mean, "How many times must we add two together to make 10,” or, “two times what equals 10?” Dividing by a number is essentially the reverse of multiplying by it, in the following way: if we multiply any number by a given number x, we can ask if there’s a new number we can multiply by afterwards to get back to where we started. If there is, the new number is called the multiplicative inverse of x. For example, if you multiply three by two to get six, you can then multiply by one-half to get back to three. So the multiplicative inverse of two is one-half, and the multiplicative inverse of 10 is one-tenth. As you might notice, the product of any number and its multiplicative inverse is always one. If we want to divide by zero, we need to find its multiplicative inverse, which should be one over zero. This would have to be such a number that multiplying it by zero would give one. But because anything multiplied by zero is still zero, such a number is impossible, so zero has no multiplicative inverse. Does that really settle things, though? After all, mathematicians have broken rules before. For example, for a long time, there was no such thing as taking the square root of negative numbers. But then mathematicians defined the square root of negative one as a new number called i, opening up a whole new mathematical world of complex numbers. So if they can do that, couldn’t we just make up a new rule, say, that the symbol infinity means one over zero, and see what happens? Let's try it, imagining we don’t know anything about infinity already. Based on the definition of a multiplicative inverse, zero times infinity must be equal to one. That means zero times infinity plus zero times infinity should equal two. Now, by the distributive property, the left side of the equation can be rearranged to zero plus zero times infinity. And since zero plus zero is definitely zero, that reduces down to zero times infinity. Unfortunately, we’ve already defined this as equal to one, while the other side of the equation is still telling us it’s equal to two. So, one equals two. Oddly enough, that's not necessarily wrong; it's just not true in our normal world of numbers. There’s still a way it could be mathematically valid, if one, two, and every other number were equal to zero. But having infinity equal to zero is ultimately not all that useful to mathematicians, or anyone else. There actually is something called the Riemann sphere that involves dividing by zero by a different method, but that’s a story for another day. In the meantime, dividing by zero in the most obvious way doesn’t work out so great. But that shouldn’t stop us from living dangerously and experimenting with breaking mathematical rules to see if we can invent fun, new worlds to explore.

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翻译人员: Varlum Wei 校对人员: Lipeng Chen在数学世界里，当我们改变规则时， 有可能产生许多奇怪的结果。但其中有一条规则，我们很多人 都被告诫说不要去打破它：不要把零当除数去除。为什么将这一日常数字与基本运算结合起来会导致问题呢？通常，随着除数的变小，得到的结果就会变大。10 除以 2 等于 5，10 除以 1 等于 10，10 除以百万分之一等于一千万，以此类推。所以看起来似乎是如果你除以一个小至趋于 0 的数字，得到的结果可能就会无限大。那么 10 除以 0 结果是不是无限大呢？这听起来似乎很合理。但我们所知道的是，如果我们用 10除以一个趋于 0 的数字，结果会趋于无穷大。这与 10 除以 0等于无穷大是不同的。为什么不同呢？我们仔细来看看除法的真正含义吧。10 除以 2 可以理解成，“有多少个 2 相加等于 10，”或者说，“2 乘以什么等于 10？”除以某个数其实就是乘以这个数的倒数，如下面这些例子：如果我们用任何一个数乘以已知数 X，我们可能会问，是否可以乘以一个新的数让我们得到开始时的数字。如果有的话，这个新的数字就叫 X 的倒数。例如，如果你用 3 乘以 2，得到 6，然后你可以用 6 乘以 1/2 得回原来的数 3。所以，2 的倒数是 1/2，10 的倒数是 1/10。你可能会注意到，任何一个数与其倒数相乘结果总是 1。如果我们想除以 0 的话，我们需要找到它的倒数，那应该是 1/0。这个数乘以 0 的话会等于1。但是因为所有数字乘以 0 结果仍然是 0，那 1/0 这样的数字是不可能的，所以 0 没有倒数。然而这样就解决问题了吗？毕竟，数学家们以前还是破例了。例如，长期以来，负数是不能取平方根的。但后来数学家们取 -1 的平方根为一个叫 i 的新数字，在数学领域里，这为复杂数字打开了全新的世界。所以，如果他们可以那样做的话，我们不能创建一个新的规则吗，即，无穷大等于 1/0，看看会怎样？我们试试，假设我们对无穷大一无所知。基于倒数的定义，0 乘以无穷大一定等于 1。那意味着 0 乘以无穷大再加上 0 乘以无穷大应该等于2。现在，根据乘法分配律，可以将等式左边的式子整理成(0 + 0) 乘以 1/0。既然 0 + 0 一定是等于 0，那可以缩简成 0 乘以 1/0。很遗憾，我们一开始已经得到答案这等于 1 了，然而等式另一边答案仍然是 2。所以，1 等于 2。太奇怪了，这也不一定错；只是在我们正常的数字世界里，这不对。在数学上，还是有方法可以证明其是合理的，如果 1, 2 或其它任何一个数字都等于 0 的话。但是无穷大等于 0对于数学家或其他任何人来说 最终并不那么有用。事实上，有个叫黎曼球面的东西它涉及到通过不同的方法来除以 0，但今天我们且不谈这个。同时，很显然，直接除以 0并没有什么意义。但那不应该阻止我们在生活中去冒险及打破数学规则去进行实验，以看看我们是否能创造 新的有趣的世界去探索。

**P570 2018-04-16 Why are fish fish-shaped - Lauren Sallan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=570)

In tropical seas, flying fish leap out of the water, gliding for up to 200 meters using wing-like fins, before dipping back into the sea. In the Indo-Pacific, a hunting sailfish can reach speeds of 110 kilometers per hour. That’s 11 times faster than Olympic swimming champion Michael Phelps. It can then stick up its spiny dorsal fin like a brake, grinding to a dead halt, mid-swim. Each of these physical feats is made possible by a fish’s form, which in most species is a smooth, elongated body, fins, and a tail. These features are shared across thousands of fish species, each introducing its own variations on the theme to survive in unique habitats. What makes these features so commonplace in fish, and what does it reveal about the more than 33,000 fish species that inhabit earth’s rivers, lakes, and seas? Fish can be split into two main groups, according to the type of motion they favor. The first is body and caudal fin driven motion, and most fish species, about 85%, fall into this group. Here, the body and tail are the primary propelling forces, with fins mainly playing a stabilizing and steering role. This configuration suits many open-water species, which need speed, thrust and control for constant, efficient swimming. Eels lie at one extreme of this group. Known as anguilliform swimmers, their entire bodies undulate to generate a wave-like motion. Compared to anguilliform fish, species like salmon and trout, known as subcarangiforms, use about two-thirds of their body mass to generate motion, while carangiform swimmers, such as mackerel, only use about a third. Typically, the less of its mass a fish uses to generate motion, the more streamlined its shape. At the other end of the spectrum from eels are ostraciiform species like boxfish, and thunniform swimmers like tuna. In these fish, the tails, also known as caudal fins, do the work. A tuna’s tail is attached by tendons to multiple muscles in its body. It powers the body like an engine, forcefully catapulting the bullet-like fish to speeds up to 69 kilometers per hour. The second major fish group relies on median and paired fin motion, meaning they’re propelled through the water predominantly by their fins. Fins allow fine-tuned movement at slow speeds, so this propulsion is typically found in fish that have to navigate complex habitats. Bottom-dwelling fishes, like rays, fall into this group; using their huge pectoral fins, they can lift themselves swiftly off the sea floor. That conveniently allows them to inhabit shallow seas without being buffeted about by waves. Similarly, shallow-water flatfish use their entire bodies as one big fin to hoist themselves up off the sand. Ocean sunfish lack tails, so they move around slowly by beating their wing-like median fins instead. Similar movements are shared by many reef species, like the queen angelfish, surgeonfish, and wrasse. Their focus on fins has taken the demand off their bodies, many of which have consequently evolved into unusual and inventive shapes. There are fishes within both groups that seem to be outliers. But if you look closer, you’ll notice that these common traits are disguised. Seahorses, for instance, don’t appear fish-shaped in any conventional way, yet they use their flexible dorsal fins as makeshift tails. A pufferfish may occasionally look more like a lethal balloon, but if it needs to swim rapidly, it’ll retract its spines. Handfish look like they have legs, but really these limb-like structures are fins, modified to help them amble across the sea floor. For fish, motion underpins survival, so it’s become a huge evolutionary driver of form. The widespread features of fish have been maintained across tens of thousands of fish species, not to mention other ocean-dwelling animals, like penguins, dolphins, sea slugs, and squids. And that’s precisely because they’ve proven so successful.

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翻译人员: Echo Yang 校对人员: Lipeng Chen“一条鱼/两条鱼/红的鱼/蓝的鱼。” - 苏斯博士在热带海域，小飞鱼跃出水面，用翅膀般的鱼鳍，能最远滑行200米，然后再钻入海面。在印度洋，正在捕食的旗鱼速度可高达 110 千米每小时，这可比奥运游泳冠军 迈克尔·菲利普斯的速度还要快 11 倍。然后它能竖起带刺的背鳍，像刹车一样，在游泳时慢慢停下来。下面这些身体特征大致形成了鱼类的形状，在大多数物种中，鱼类拥有 光滑细长的躯干，鱼鳍和鱼尾。成千上万的鱼类都拥有这些特征，而每一中鱼为了 在不同的栖息地生存产生了进化差异。为什么对于鱼类来说这些特征如此常见，以及对于栖息在地球的河流、湖泊以及海洋的超过 33000 种鱼类，这又揭示了什么？鱼类可以大致分为两种，按照它们偏好的运动类型划分。第一种是躯干/尾鳍驱动运动，大多数鱼类，大约 85% 的鱼类属于这一类型。在这一类中，躯干和鱼尾提供主要的推动力，鱼鳍主要起到保持平衡和调节方向的作用，大多数生活在开阔水域的鱼类符合这一构造。在持续高效的游动中， 它们需要这一构造保持速度、推力和控制力。鳗鱼属于这一类型的极端物种。作为著名的鳗行式游泳健将，它们的整个身体来回摆动形成波状运动。对比鳗行式鱼类，类似鲑鱼和鳟鱼的鱼类，被称为亚鲹行式，使用三分之二的体重产生运动，而类似马鲛鱼的鲹行式游泳健将，只使用身体的三分之一。一般来说，越少使用体重产生运动的鱼类，它的形状越靠近流线型。与鳗行式相反的另一个极端种类是 摆动尾鳍推进，比如箱鲀，以及鲔行式游泳健将，比如金枪鱼。这些鱼类依靠尾部，通常称作尾鳍，进行运动。金枪鱼的尾鳍通过筋腱连接着身体多处肌肉，它像发动机一样向身体提供动力，强有力地像子弹一样推进，速度可高达 69 千米每小时。另一种主要的鱼类类型主要依靠中鳍对鳍推进，意思是它们主要通过鱼鳍在水中推进，鱼鳍保证低速的微调运动，所以，采用这种推进方式的鱼类，它们通常需要探索复杂的生活环境。底栖鱼类，像蝠鲼，属于这一类型。使用巨大的胸鳍， 它们能将自己迅速从海底浮起来。这让它们能够轻而易举地在浅海生存，而不会被海浪击翻。同样地，浅海比目鱼使用它们整个身体作为一整个鳍把自己从海沙上抬起来。翻车鱼的尾部比较小，所以它们通过拍击翅膀状的胸鳍缓慢移动。很多栖息在礁石的鱼类也使用这种运动方式，像是额斑刺蝶鱼、刺尾鱼、以及隆头鱼。它们的鱼鳍起到主要作用， 从而减少对躯干的需求。因此它们中的很多种类 进化出了罕见的、创造性的形状。有些鱼介于两个种类之间， 感觉又有点不伦不类的，但如果你仔细观察，你会发现普遍的鱼类特性仍然存在。比如说海马， 不具备任何传统意义上的鱼类的形状，但是它们能利用它们灵活的背鳍代替尾部。河豚经常看上去更像是一个致命的气球，但如果它需要快速游走，它会缩回脊柱。斑点长手鱼看上去像有腿，但其实它们像腿一样的结构是鱼鳍，经过改良之后， 鱼鳍会帮助它们在海底缓慢爬行。对鱼类来说，运动是生存的基础，所以也成为了鱼形进化的驱动力。鱼类的普遍特征，在成千上万的鱼类得以维持，更不用说其他海栖类动物。像企鹅、海豚、海参、以及章鱼。鱼类特征需要精确维持， 因为我们证明了这些特征是多么成功。喜欢科学吗？你可查看此播放列表，里面有 TED-Ed 最受欢迎的5个科学视频。你可以在评论区留言，告诉我们，下期节目你希望我们解决哪方面的科学话题。（音乐）

**P571 2018-04-19 How the world's first metro system was built - Christian Wolmar**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=571)

It was the dawn of 1863, and London’s not-yet-opened subway system, the first of its kind in the world, had the city in an uproar. Digging a hole under the city and putting a railroad in it seemed the stuff of dreams. Pub drinkers scoffed at the idea and a local minister accused the railway company of trying to break into hell. Most people simply thought the project, which cost more than 100 million dollars in today’s money, would never work. But it did. On January 10, 1863, 30,000 people ventured underground to travel on the world’s first subway on a four-mile stretch of line in London. After three years of construction and a few setbacks, the Metropolitan Railway was ready for business. The city’s officials were much relieved. They’d been desperate to find a way to reduce the terrible congestion on the roads. London, at the time the world’s largest and most prosperous city, was in a permanent state of gridlock, with carts, costermongers, cows, and commuters jamming the roads. It’d been a Victorian visionary, Charles Pearson, who first thought of putting railways under the ground. He’d lobbied for underground trains throughout the 1840s, but opponents thought the idea was impractical since the railroads at the time only had short tunnels under hills. How could you get a railway through the center of a city? The answer was a simple system called "cut and cover." Workers had to dig a huge trench, construct a tunnel out of brick archways, and then refill the hole over the newly built tunnel. Because this was disruptive and required the demolition of buildings above the tunnels, most of the line went under existing roads. Of course, there were accidents. On one occasion, a heavy rainstorm flooded the nearby sewers and burst through the excavation, delaying the project by several months. But as soon as the Metropolitan Railway opened, Londoners rushed in to ride the new trains. The Metropolitan quickly became a vital part of London’s transport system. Additional lines were soon built, and new suburbs grew around the stations. Big department stores opened next to the railroad, and the railway company even created attractions, like a 30-story Ferris wheel in Earls Court to bring in tourists by train. Within 30 years, London’s subway system covered 80 kilometers, with lines in the center of town running in tunnels, and suburban trains operating on the surface, often on embankments. But London was still growing, and everyone wanted to be connected to the system. By the late 1880s, the city had become too dense with buildings, sewers, and electric cables for the "cut and cover" technique, so a new system had to be devised. Using a machine called the Greathead Shield, a team of just 12 workers could bore through the earth, carving deep underground tunnels through the London clay. These new lines, called tubes, were at varying depths, but usually about 25 meters deeper than the "cut and cover" lines. This meant their construction didn’t disturb the surface, and it was possible to dig under buildings. The first tube line, the City and South London, opened in 1890 and proved so successful that half a dozen more lines were built in the next 20 years. This clever new technology was even used to burrow several lines under London’s river, the Thames. By the early 20th century, Budapest, Berlin, Paris, and New York had all built subways of their own. And today, with more than 160 cities in 55 countries using underground rails to combat congestion, we can thank Charles Pearson and the Metropolitan Railway for getting us started on the right track.

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翻译人员: Yingyu Liu 校对人员: Lipeng Chen1863 年伊始，伦敦尚未通车的全世界第一条地铁线路使整个城市哗然。在城市底下打洞并且安装轨道是不可想象的事情。酒吧里的常客取笑这种想法，当地的牧师指责地铁开发公司在自掘坟墓。大多数人认为这个耗资过亿美元的的项目绝对不会成功。然而，它却成功了。在 1863 年 1 月 10 日，三万人在伦敦地下试乘了四英里长的世界上第一条地下铁路。在历经三年施工和不少挫折之后，大都会铁路即将正式投入运营。市领导们非常欣慰。他们已想尽办法尝试减少道路交通拥堵。伦敦作为当时世界上最大最繁荣的城市，正处于一种长期交通瘫痪的状态。马车、街边小贩、牛、以及日常通勤的人，让道路变得异常拥挤。维多利亚地空想家查尔斯·皮尔森第一个想到将铁路挪到地下。他在 1840 年代间不停游说当局开建地下铁路。然而，他的反对者认为这个想法是不切实际的。因为当时的铁路短到仅仅能够穿过山洞，怎么可能修建可以穿过城市中心的铁路呢？问题的答案很简单，那就是：明挖回填技术工人们需要挖出巨大的壕，然后用砖块进行进行封顶，而后对沟壑进行回填。由于此种方法是对路面是破坏式的，且需要损毁地上的建筑物，大多数地铁线埋藏于已建成的城市道路之下。当然，事故也时有发生。曾经有一次，大暴雨冲毁了附近的污水池，污水填满挖好的沟壑，导致施工进度推迟了数月。然而，当大都会地铁投入运营时，伦敦人争相体验这些新的地铁。大都会地铁很快成为了 伦敦交通枢纽的重要组成部分。新的地铁线路很快建成起来，新的乡镇在地铁站周围孕育而生。大型购物中心也在地铁站旁边林立，地铁公司甚至在地铁站周边打造娱乐设施，比如在伯爵宫建造了三十层高的摩天轮，以吸引游客乘地铁来游玩。三十年间，伦敦地铁系统延伸至80公里。地铁在城市中心区为地下铁路，到郊区则为建在堤坝上的地上线路。然而，伦敦仍在不断壮大，每个人都希望和地铁系统连接上。十九世纪八十年代末，伦敦因楼房、污水管、 和电缆外露而变得过于拥挤，原因是明挖回填技术。因此，人们需要设计新的设备。运用大头盾构机，只要12名工人组成的团队就可以在伦敦的地下深处挖掘隧道。这些新建的地铁线叫做管道，它们的深度不同， 但通常比明挖回填的隧道深25米。这意味着它们的建造不会对地表造成影响，也就是说，可以在建筑物下面进行挖掘。第一条深层隧道地铁线名为：城市及南伦敦铁路在 1890 年投入运营，并大获成功。近十条地铁线路在接下来的二十年间陆续建成。这项革命性的新技术甚至被用于挖掘几条从伦敦泰晤士河下经过的地铁线。二十世纪初期，布达佩斯特、柏林、巴黎、和纽约都建成了城市地铁线路。今天 55 个国家的 160 多座城市利用地下铁路线来应对地上交通堵塞。我们应该谢谢查尔斯·皮尔森和伦敦大都会铁路让我们走上这条光明的大道！

**P572 2018-04-23 The rise and fall of the Assyrian Empire - Marian H Feldman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=572)

Before the sun never set on the British Empire, before Genghis Khan swept the steppe, before Rome extended its influence to encircle the Mediterranean Sea, there was ancient Assyria. Considered by historians to be the first true empire, Assyria’s innovations laid the groundwork for every superpower that’s followed. At its height, in the 7th century BCE, the Assyrian Empire stretched across modern Iraq, Syria, Lebanon, Israel, and parts of Turkey, Iran, and Egypt. Its wonders included a vast library and large botanical and zoological park. But the story of Assyria’s rise to dominance began many centuries earlier, in the Late Bronze Age, in a city called Ashur. Ashur was a tin and textiles trading center located along the Tigris River in northern Iraq. It shared its name with a god thought to be an embodiment of the city and later of the entire empire. For the administration-minded Assyrians, politics and religion were closely linked. Around 1300 BCE, a high priest named Ashur-uballit I took the title of king and initiated a tradition of military campaigns, effectively transforming Assyria from a city-state to a territorial state. This meant that a single administrative entity oversaw many places, cultures, and peoples. For the next 150 years, Assyria extended its reach and thrived. In the 12th century BCE, a mysterious catastrophe that still bewilders archaeologists caused the Assyrians to lose much of their territory. A few hundred years later, however, Assyrian kings began a new round of conquests. This time, they honed their administrative system into an empire that would last generations. Assyrians were military innovators and merciless conquerors. During their conquests, they used siege tactics and cruel punishments for those who opposed them, including impalement and flaying. The growth of their empire was due, in part, to their strategy of deporting local populations, then shifting them around the empire to fulfill different needs. This broke peoples’ bonds with their homelands and severed loyalties among local groups. Once the Assyrians conquered an area, they built cities connected by well-maintained royal roads. Often, when a new king came to power, he would build a new capital. With each move, new palaces and temples were erected and lavishly decorated. Although kings claimed absolute power, we know that an extensive system of courtiers, provincial officials, and scholars influenced affairs. At least one woman, Sammuramat, ruled the kingdom. Assyrian rulers celebrated their military excursions by having representations of their exploits carved into the walls of their newly built palaces. But despite the picture of a ruthless war state projected by these records, the Assyrian kings were also interested in the cultural traditions of the region, especially those of Babylonia, a separate state to the south. Babylonia had been a cultural leader for millennia, stretching back to the beginning of writing at the end of the 4th millennium BCE. Assyria saw itself as the inheritor and protector of this tradition. Assyrian rulers supported scholars in specialties ranging from medicine to magic, and the capital cities, like Ninevah, were home to elaborate parks and gardens that housed plants and animals from around the empire. One of Assyria’s final rulers, Ashurbanipal, sent scholars throughout Babylonia to gather up and copy ancient literary works. Ashurbanipal’s library took the form of clay tablets inscribed with cuneiform in the languages of Akkadian and Sumerian. The library was lost during the final sack of Ninevah in 612 BCE. But thanks to a 19th century archaeological excavation, many masterpieces of ancient literature, including the Epic of Gilgamesh and the Babylonian Creation Epic, survive today. After centuries of rule, the Assyrian Empire fell to the Babylonians and Medes between 612 and 609 BCE. Yet the innovations that the Assyrians pioneered live on. Their emphasis on constant innovation, efficient administration, and excellent infrastructure set the standard for every empire that’s followed them in the region and across the globe.

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翻译人员: Christina Wang 校对人员: Monkey Luffy“亚述很快意识到了一个惨痛的事实： 帝国就像庞氏骗局...它们必须不断扩张才能避免瓦解。” ——Paul Kriwaczek, 《巴比伦》在日不落帝国升起之前， 在成吉思汗横扫大草原之前，在罗马帝国将自己的权力 扩展到地中海周边之前，古亚述帝国就已经存在了。历史学家认为 它是第一个真正的帝国，因为亚述的创新为所有 以后的超级大国奠定了基础。在鼎盛时期的公元前七世纪， 亚述帝国已经横跨现在的伊拉克、叙利亚、黎巴嫩、以色列、部分的土耳其、伊朗、还有埃及。它的大型图书馆和动植物园 也是古亚述的奇景之一。不过古亚述帝国崛起的故事 开始于很多世纪前，在青铜器世纪的晚期， 一个叫阿舒尔（亚述古城）的城市。阿舒尔是一个 锡器和纺织品的交易点，位于底格里斯河的岸边， 在伊拉克北部。阿舒尔也是一个神的名字， 被认为是代表了这个城市；后来，代表了整个帝国。对于很有行政头脑的亚述人来说， 政治和宗教是密切相关的。公元前 1300 年左右，一个名叫 阿舒尔·乌巴里特一世的大祭司取得了王位，并开始了 战争扩张的传统，把亚述从一个城邦 变成了领土国家。这意味着单单一个行政体监管了许多地区、文化、和民族。接下来的 150 年里， 亚述扩张了领土，发展繁荣。公元前 12 世纪时，一场至今仍迷惑着 考古学家的神秘灾难造成亚述失去了大部分的领土。不过几百年后，亚述国王开始了新一轮的扩张。这次，他们改善了行政系统，使得他们成为了 能够代代延续的帝国。亚述人是军事创新者， 也是无情的征服者。在征战时，他们采用了围城战术， 并对反抗者施加了残酷的惩罚，包括刺刑和剥皮。亚述帝国的壮大，一部分是由于他们将本地人口驱逐到帝国的其它部分 来满足不同需求。此举打破了人们与故乡的联系，并切断了地方团体之间的忠诚。当亚述人征服了一个地区，他们会建立城市，并通过 维护良好的皇家道路连接在一起。经常，当新国王上任时， 他会建立一个新的首都。每一次迁都时，都会建起 金碧辉煌的宫殿和寺庙。尽管国王拥有绝对的权力，我们知道亚述也有着一个 大规模的，包括了朝臣、地方官员、和学者的系统，影响着国家事务。至少有一位女性，萨穆·莱姆特， 统治过亚述王国。亚述统治者庆祝军事征程的方式是把代表了掠夺的内容刻到新宫殿的墙上。虽然这些记录描绘了 一个无情的战争国家，亚述国王们也对 不同地区的文化传统有着兴趣，特别是巴比伦尼亚， 南边的一个独立国家。巴比伦尼亚千年以来 都是文化的引领者，最早可追溯到公元前四千年末期书写的发明。亚述把自己视为 这项传统的继承者和保卫者。亚述统治者帮助了各种学者，研究范围从医学到魔法都有，而首都，像是尼尼微，有着设计精妙的公园和花园，收藏了帝国各地的动植物。亚述末期的统治者之一， 亚述巴尼拔，遣派了学者到巴比伦尼亚 来收集和复制古文学作品。亚述巴尼拔的图书馆用的是 粘土制成的板子，刻着阿卡得和苏美尔的楔形文字。公元前 612 年，在最后尼尼微 被掠夺时，图书馆遗失了。不过，通过 19 世纪的考古挖掘，许多古代文学的巨作，包括《吉尔伽美什史诗》 和《巴比伦创世史诗》，得以留存至今。经过了数百年的统治，亚述帝国败于巴比伦尼亚和米底，于公元前 612 到 609 年亡国。然而亚述人开拓的发明延续了下来。他们强调的不断创新、高效率的行政管理、和出色的基础设施为后来在这个地区、 乃至全世界的帝国建立了标准。有没有一些东西是 所有帝国共同具有的？跨越文化和大陆， 哪些主题不断浮现？观看此视频列表 来得出你的结论，或者把你的想法发到留言区。

**P573 2018-04-24 How to build a dark matter detector - Jenna Saffin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=573)

More than two kilometers below the surface of northern Ontario, suspended in 345,000 liters of ultra-pure water, there’s a perfect sphere. It contains 3600 kilograms of liquid argon, cooled to -180 degrees Celsius. Scientists continuously monitor this chamber from above ground, looking for a glimmer of light in the darkness. Because down here, deep beneath the Earth’s surface and cocooned in a watery shield, that light would indicate the presence of one of the universe’s greatest mysteries: dark matter. All the matter we can see, planets, stars and galaxies, doesn’t create enough gravitational pull to explain the universe’s larger structure. It’s dark matter, which is estimated to make up 25% of the known universe. But despite its prevalence, so far we haven’t been able to detect it directly. It’s no small challenge. Dark matter was so named because it doesn’t interact with any type of light, visible or otherwise, which means our usual observation tools simply don’t work when trying to observe it. But while dark matter may not be visible in the electromagnetic spectrum, it’s still matter, so we should be able to measure its interactions with other matter. And if our current model of physics is correct, billions of sub-atomic dark matter particles are passing through the Earth every second. Despite the prevalence of dark matter, its interactions are predicted to be rare and extremely weak. To detect these interactions, dark matter experiments need to be incredibly sensitive. With such sensitive equipment, the ever-present background radiation on Earth’s surface would create so much noise in the data that any dark matter particles would be completely overwhelmed. It would be like trying to hear a pin drop on a busy city street. To solve this problem, scientists have had to dig deep into the Earth. Dark matter experiments are set up in specialized underground labs, either in mines or inside mountains. The rock that makes up the Earth’s crust works like a filter, absorbing radiation and stopping disruptive particles. The ultra-pure water in which the detector is suspended adds an additional layer of radiation filtering. This shielding ensures that only the particles scientists are looking for can make their way into the detectors. Once these particles reach an experiment’s inner vessel, scientists have a chance of detecting them. The detector media are chosen because they’re exquisitely sensitive detectors that can be purified extremely well. These could be a liquid noble gas, germanium and silicon crystals, a refrigerant, or other materials. When radiation interacts, it leaves tell-tale signs, such as light or bubbles, which can be picked up by the sensors inside the detector. The detector media are held in a central chamber made of glass or a special type of acrylic. These chambers have to be able to hold the substance inside without interacting with it while withstanding incredible pressure from the water outside. The inner vessel is surrounded by powerful sensors designed to detect even the tiniest blips of light, or the sound vibrations caused by a single bubble. Each sensor records data 24/7, and experiments run for months and years at a time, generating terabytes of data every day. Building dark matter detectors is as much a feat of engineering as it is a feat of physics. By the time an experiment is ready to start collecting data, years or decades of work and investment have already gone into it, to the tune of tens of millions of dollars. As of 2017, no dark matter particles have been directly detected. That’s not entirely surprising. Physicists expect these interactions to be incredibly rare and difficult to detect. In the meantime, scientists continue to develop new technologies and increase detector sensitivity, closing in on where dark matter is hiding. And when they find it, we’ll finally be able to bring the universe’s darkest secrets into the light.

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翻译人员: Lipeng Chen在安大略湖北部湖面以下超过2000米处，345000升超纯净的湖水中，悬浮着一个完美球体。这个球体中含有3600千克的液态氩，已被冷却至零下180摄氏度。科学家们在地面上 持续不断地监控着这个球体，期望在黑暗之中寻找到丁点儿光亮。因为在水下，在地下深处被水包裹的地方，亮光将有可能意味着 宇宙间最神奇的物质之一，暗物质的存在。我们能看见的所有物体，星球、星星以及星系，所产生的引力都不足以解释宇宙更为宏大的结构。据猜测，暗物质构成了我们所知宇宙的25%。虽然暗物质普遍存在，但是时至今日， 我们都未能直接探测到暗物质。这并非一个轻松的挑战。暗物质之所以叫做暗物质， 是因为它并不和任何光源产生作用，否则它就能被看见，这也意味着我们通常的探测工具在探测暗物质时并不适用。虽然暗物质不能在电磁频谱下被观测到，它仍然是一种物质，我们应该可以探测到它与其他物质之间的互动。如果我们当前的物理模型是正确的，那么数百万的亚原子暗物质粒子每分每秒都在地球上穿行。虽然暗物质普遍存在，据预测它们与外界的互动十分罕见， 即便是有也很微弱。为了探测这类互动，暗物质实验也将十分细微。实验采用的装置也将十分敏锐，地球表面一直存在的背景辐射将会对数据产生巨大的噪音干扰，如此一来，任何暗物质粒子都会被彻底掩盖。这就像是要在喧嚣的街道上 听到一枚针掉落的声音。为了解决这个问题，科学家们只能深深探索地表以下。暗物质实验场所建立在专门的地下实验室中，或在矿场中，又或在深山里。组成地壳的岩石就像是过滤器一样，它们吸收辐射并防止对粒子产生破坏。而探测器悬浮在水中，这些水相当于又增加了一层辐射过滤网。这些防护能够保证 只有科学家们想要寻找的粒子才能够被探测器捕捉到。当这些粒子进入到实验容器内时，科学家们就有机会检测它们。这些探测媒介十分敏锐，可以得到十分纯净的结果。这些可能是液态惰性气体、锗、晶体硅、制冷剂、或是其他材料。辐射作用会释放出一些信号，例如光亮或气泡，这些信号就会被探测器中的传感器捕捉到。探测媒介被放置于一个由玻璃或某种特殊丙烯酸树脂制成的容器中。这些容器可以存放物质，但又不同其中的物质发生反应，同时还能承受外界水源的巨大压力。容器内到处都是强大的传感器，这些传感器甚至可以 探测到最微弱的一丝亮光，或者又一个气泡造成的声音振动。每个传感器都全天候地记录数据，每次实验将持续数月甚至数年，实验每天都会产生兆兆字节级别的数据。打造暗物质探测器需要极为精巧的工程，正如暗物质本身也是 物理中极为精巧的一部分。在投入数年甚至数十年的研究工作之后，实验才能做好准备，可以开始收集数据，而此实验的投资都需要数千万美元。2017年，还没有暗物质被直接检测到。这一点都不令人感到意外。物理学家们认为暗物质与外界的 互动极其稀少并且很难被检测到。与此同时，科学家们继续开发新的科技，提升探测器的灵敏度，越来越向暗物质靠近。当他们寻找到暗物质时，我们则终于云开见日， 揭开了宇宙间最神秘的谜团。

**P574 2018-04-25 How do brain scans work - John Borghi and Elizabeth Waters**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=574)

As far as we know, there’s only one thing in our solar system sophisticated enough to study itself: the human brain. But this self-investigation is incredibly challenging; a living brain is shielded by a thick skull, swaddled in layers of protective tissue, and made up of billions of tiny, connected cells. That’s why it’s so difficult to isolate, observe, and understand diseases like Alzheimer’s. So how do we study living brains without harming their owners? We can use a trio of techniques called EEG, fMRI, and PET. Each measures something different and has its own strengths and weaknesses, and we’ll look at each in turn. First is EEG, or electroencephalography, which measures electrical activity in your brain. As brain cells communicate, they produce waves of electricity. Electrodes placed on the skull pick up these waves, and differences in the signals detected between electrodes provide information about what’s happening. This technique was invented almost 100 years ago, and it’s still used to diagnose conditions like epilepsy and sleep disorders. It’s also used to investigate what areas of the brain are active during learning or paying attention. EEG is non-invasive, relatively inexpensive, and fast: it can measure changes that occur in just milliseconds. Unfortunately, it’s hard to determine exactly where any particular pattern originates. Electrical signals are generated constantly all over the brain and they interact with each other to produce complex patterns. Using more electrodes or sophisticated data-processing algorithms can help. But in the end, while EEG can tell you precisely when certain activity occurs, it can’t tell you precisely where. To do that, you’d need another technique, such as functional magnetic resonance imaging, or fMRI. fMRI measures how quickly oxygen is consumed by brain cells. Active areas of the brain use oxygen more quickly. So watching an fMRI scan while a person completes cognitive or behavioral tasks can provide information about which regions of the brain might be involved. That allows us to study everything from how we see faces to how we understand what we’re feeling. fMRI can pinpoint differences in brain activity to within a few millimeters, but it’s thousands of times slower than EEG. Using the two techniques together can help show when, and where, neural activity is occurring. The third, even more precise, technique is called positron emission tomography and it measures radioactive elements introduced into the brain. That sounds much scarier than it actually is; PET scans, like fMRI and EEG, are completely safe. During a PET scan, a small amount of radioactive material called a tracer is injected into the bloodstream, and doctors monitor its circulation through the brain. By modifying the tracer to bind to specific molecules, researchers can use PET to study the complex chemistry in our brains. It’s useful for studying how drugs affect the brain and detecting diseases like Alzheimer’s. But this technique has the lowest time resolution of all because it takes minutes for the tracer to circulate and changes to show up. These techniques collectively help doctors and scientists connect what happens in the brain with our behavior. But they’re also limited by how much we still don't know. For example, let's say researchers are interested in studying how memory works. After asking 50 participants to memorize a series of images while in MRI scanners, the researchers might analyze the results and discover a number of active brain regions. Making a link between memory and specific parts of the brain is an important step forward. But future research would be necessary to better understand what’s happening in each region, how they work together, and whether the activity is because of their involvement in memory or another process occurring simultaneously. More advanced imaging and analysis technology might one day provide more accurate results and even distinguish the activity of individual neurons. Until then, our brains will keep measuring, analyzing, and innovating in pursuit of that quest to understand one of the most remarkable things we’ve ever encountered.

**P574 2018-04-25 How do brain scans work - John Borghi and Elizabeth Waters**

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翻译人员: Ye He 校对人员: Scarlett Ren罂粟红，苹果香，云雀在歌唱， 都只发生在大脑中。——Oscar Wilde据我们目前所知， 在我们整个太阳系中，唯一一个复杂到能够研究 它自身的东西，就是我们的大脑。但是这个自我研究的过程非常困难。大脑被保护在坚硬的颅骨里，被层层保护性组织包围住，而且由上亿个极小的 相互连接的细胞所组成。这就是为何很难去解析，观察， 并了解像老年痴呆症这种大脑疾病。那我们怎样才能在不伤害人体的情况下， 去研究一个活生生的大脑呢？我们可以使用这三种技术： 脑电图（EEG)，功能性磁共振成像 (fMRI)，以及正电子发射型 计算机断层显像 (PET) 。每一个技术测量不同的指标， 并且都有自己的长处与短处，我们会带你去逐一了解每项技术。首先是脑电图（EEG）， 英文全称为 electroencephalography，它测量大脑内的电生理活动，当脑细胞互动时， 它们会产生生物电波。这些电波能被放置于 头皮上的电极记录下来，不同电极之间记录到的信号差异可以提供脑内活动的信息。这项技术在近 100 年前被发明出来，至今仍然被用来诊断 如癫痫和睡眠障碍等疾病。它还被用来测量当大脑 在学习或专注状态时，哪个区域是活跃的。EEG 是无创的，相对廉价，而且很快。它能记录毫秒间发生的变化，但是这种技术很难精确定位任何活动模式的来源。电信号在全脑不断地生成，并且交互生成复杂的模式。使用更多的电极或复杂的 数据处理算法能有所帮助。但是到头来，EEG 虽能精确地 告诉你特定活动是何时发生的，却不能告诉你是在哪里发生的。为了解决这个问题，你需要另一种技术，比如功能磁共振成像，简称 fMRI。fMRI 测量脑细胞消耗氧气的速度。活动的脑区消耗氧气更快，所以当观察一个人在进行认知 或行为任务的 fMRI 扫描时，能观察到大脑的哪个区域 可能参与了任务。这有助于我们研究很多问题， 从我们如何观察面孔到我们如何理解我们当前的感受。fMRI 能探测到几毫米内 大脑活动的差异，但它比 EEG 慢了几千倍。将这两种技术结合，有助于揭示神经活动 在何时及何地发生。第三种，更加精确， 它是正电子放射断层成像技术（PET），能够测量进入脑内的放射性元素。它其实没有听起来那么可怕；PET 扫描和 fMRI 及 EEG 一样完全安全。在 PET 扫描时，少量放射性 的物质，称为示踪剂，被注射进血液中，然后医生监测它在脑内的循环。通过变化示踪剂来 结合特定的分子，研究人员能用 PET 研究 脑内复杂的化学变化。这有助于研究药物如何影响大脑，以及检测疾病，如阿尔茨海默症。但是这项技术的时间分辨率是最低的，因为示踪剂需要数分钟 来循环，显示变化。这些技术共同帮助医生和科学家将脑活动与行为活动联系起来。但是它们仍受限于我们所未知的。举例来讲，研究人员想研究记忆 是如何工作的。通过让 50 名被试者在进行 MRI 扫描时记忆一系列图片，研究者能分析这些实验结果，并且发现一系列激活的脑区。将记忆和特定脑区联系起来，是一项重大的进步。但是在未来，我们仍需要研究如何更好地理解每个脑区发生了什么，它们是如何协同工作的，以及这些激活是否因为 它们参与了记忆活动，又或是参与了 另一个同时发生的活动。更多先进的成像和分析技术在未来可能会提供更精确的结果，甚至能区分单个神经元的活动。在那之前，我们的大脑 将继续测量，分析和创新为了能够理解我们遇到的最非凡的事情之一。

**P575 2018-04-25 Which is stronger - Glue or tape - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=575)

The oldest glue in the world is over 8,000 years old and comes from a cave near the Dead Sea. Ancient people used this glue, made from a mixture of animal bone and plant materials, to waterproof baskets and construct utensils. And for thousands of years after, plants and animals were the glue that held human civilization together. Today, we have enough types of tape and glue to build and repair almost anything. But what gives glue and tape their stickiness? And is one stronger than the other? Adhesives can be made from synthetic molecules or natural proteins and carbohydrates like the vegetable starch dextrin, the milk protein casein, and the terpenes in tree resin. In order to work, glue and tape need both adhesive bonds and cohesive bonds. Adhesive bonds occur between an adhesive’s molecules and the molecules of whatever it’s sticking to. Cohesive bonds happen between a glue or tape’s own molecules, holding it together. Most glues consist of adhesive polymers dissolved in a solvent that prevents them from sticking to the inside of the bottle. The strong smell of many glues comes from the solvent, which evaporates when exposed to air. Some glues use water as a solvent, but others use chemicals that can be harmful to inhale. Glues with two or more components that chemically react instead of just drying can create stronger bonds. Both the adhesive and cohesive bonds of glue are strong, but the drying process makes them irreversible. This is why, if a glued surface is broken after it dries, it can’t be reattached without new glue. By contrast, when tape is applied to a surface, it forms weaker, reversible bonds, so you can peel a piece of tape off a surface and use it again. These weak bonds, called Van der Waals forces, can occur between any two materials, but only if they’re extremely close together, closer than the naked eye can see. Tape usually consists of a backing coated with a combination of a rubber or rubber-like "stretchy" component, and a compound called a tackifier. That’s the "sticky" component. A tape’s stickiness is determined by the proportion of elastic component and tackifier, the thickness of adhesive spread onto the backing, and the type of backing material. No chemical reaction occurs when tape is pressed onto a surface. Instead, the soft adhesive flows into the cracks and grooves of the surface. This ability to slide into cracks and then stay in place is called viscoelasticity. Once the viscoelastic adhesive fills these microscopic crevices, it is close enough to form Van der Waals forces. So what’s the world’s strongest adhesive? Well, there’s no one answer. In terms of absolute strength of adhesive bonds, glue is stronger than tape, but no single adhesive works well in all circumstances. Of the glues, cyanoacrylates, or super glues, may form the strongest bonds, but two-component epoxy glues have much higher resistance to heat and shearing, and are compatible with a wider range of surfaces. So, if you wanted to dangle an anvil in the air, super glue might be your best bet. But if you’re doing so over an active volcano, you’d want an epoxy instead. And in order to work at all, glues need enough real estate where surfaces touch. If for some reason you wanted to make a chain of bowling balls, duct tape would be better. Engineers weigh similar, if less absurd, factors all the time. Choosing the right glue to withstand the heat inside an engine is a matter of life and death. And though the strength of duct tape’s adhesive bonds can’t compete with those of epoxy glues, tape does have the advantage of instantaneous stickiness in an emergency. Glue may be necessary to get a rocket to space, but when it comes to extraterrestrial repairs, stick to duct tape: liquid glues don’t work in zero gravity.

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翻译人员: 宽 彭 校对人员: Monkey Luffy最古老的胶在 8000 年 之前就已经出现了，来源于死海附近的某处洞穴。古人用这些由兽骨和 植物原料的混合物制成的胶，做防水的篮子和建筑用具。几千年之后，植物和动物仍是 将人类文明连接起来的“胶”。如今，我们有种类充足的胶水和胶带 来建造和修复几乎任何东西。但是什么赋予了胶带和胶水粘性呢？是否其中一个的粘性比另一个强呢？粘着剂可以由人造分子或天然蛋白和碳水化合物制作而成。比如植物淀粉，糊精，又如牛奶蛋白——酪蛋白和树脂中的萜烯。为了发挥作用，胶水和胶带需要粘合纽带和聚合纽带。粘合骨架形成于粘着剂分子，和与它粘连的任意分子之间聚合纽带发生于胶带或者胶水自身分子之间，将他们聚合。大部分的胶水由溶于溶剂的黏着聚合物组成，防止它们粘附在容器的内壁。许多胶水强烈的气味 来自于它的溶剂，当暴露于空气中时会发生挥发；有些胶水用水来当溶剂，其它则用吸入有害的化学试剂来当溶剂。含有两种或更多成分，不仅仅是变干还能发生化学反应的胶水，可以创造更强的纽带。胶水的聚合纽带和粘合纽带都很强，但是干燥的过程使得它们不可逆，这就是为什么，如果一个涂有胶水的表面在其干燥后破裂，没有新的胶水它就不能重新附着。相反的，当胶带被用于一个表面，它形成弱的，可逆的纽带，所以你可以从表面撕一片胶带下来并重新使用它。这些弱的纽带名为范德华力，发生于任意两种材料之间，但只在两者极其接近时起作用，比肉眼可见还要更近。胶带通常由包被了聚合物的附着物，如橡胶聚合物或是橡胶状的有弹性的聚合物，和一种名为增粘剂的化合物组成，这就是所谓的粘性组分。一个胶带的粘性取决于弹性成分和增粘剂的比例、和粘着剂在附着物上的扩散厚度、以及附着物材料的种类。当胶带被铺展在表面上，没有化学反应的发生。相反的，柔软的粘着剂流入表面的缝隙和凹槽之中，这种流入缝隙并保留的能力 被称做粘弹性。一旦具有粘弹性的粘着剂充满了这些微小的裂缝，距离近到足够产生范德华力。所以，什么是世界上最强的粘着剂？好吧，其实没有答案。就粘着纽带的绝对力量而言，胶水要强过胶带，但没有单独的一种粘着剂能适用于所有环境，对于胶水，氰基丙烯酸酯，或是万能胶，它们或许能产生最强的纽带，但双组分环氧树脂胶水对热和剪切有更高的抗性，并且与更广泛的表面相匹配。所有如果你想把一个铁砧悬挂在空中，万能胶或许是你最好的选择。但如果你想在活火山这样做，相反的，你会需要环氧树脂胶。并且为了起效充分，胶水需要足够的接触面积，如果某些理由促使你去做一串保龄球，管道胶带会更加合适。工程师也是如此权衡问题，要少出错，就应考虑所有因素。选择合适的胶水来忍受引擎中的热量，是十分重要的事情！尽管管道胶带粘着纽带的力，不能与环氧树脂胶水的力相媲美，但胶带确实有着能够在紧急情况下立马产生粘性的优势。为了将火箭运送到太空，胶水是必需的；但在地外维修的过程中用管道胶带吧，液体胶水在失重环境下无法工作。

**P576 2018-05-01 What causes constipation - Heba Shaheed**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=576)

Visiting the bathroom is part of the daily human experience. But occasionally, constipation strikes, a condition that causes a backup in your digestive system. The food you eat can take several days to exit your body. And for many, constipation can become chronic, meaning regularly passing lumpy hard stools accompanied by straining. What's behind this unsettling phenomenon? Constipation arises in the colon, also known as the large intestine. This muscular organ is split into four sections: the ascending, transverse, descending, and sigmoid colon, which connects with the rectum and anus. The small intestine delivers stool consisting of ingested food, bile, and digestive juices to the large intestine. As this stool moves through the colon, the organ siphons off most of the water it contains, transforming it from liquid to solid. The longer this transmission takes, the more reabsorption occurs, resulting in increasingly solid stool. Once it reaches the sigmoid colon, a final bout of reabsorption occurs before it enters the rectum, distending its walls and telling the internal anal sphincter to relax. This is the point where you can usually decide whether to physically expel or retain the stool. That’s regulated by the pelvic floor muscles, particularly the puborectalis and external anal sphincter. The puborectalis forms a sling-like formation around the rectum called the anorectal angle. And when you voluntarily relax your external anal sphincter, the stool is finally expelled. When you’re constipated, however, a desire to visit the bathroom isn't enough to coax your body into action. Usually there's two factors behind this problem: the stool’s slow movement through the colon and/or pelvic floor dysfunction. In the first, stool moves excessively slowly through the intestines, causing over-absorption of liquid, which makes the stool dry and hard. With pelvic floor dysfunction, stool becomes difficult to eliminate from the rectum because of tightened pelvic floor muscles, or due to a pelvic organ prolapse, usually through childbirth or aging. Both of these problems make the anorectal angle more acute and it becomes difficult to expel waste. To identify constipation precisely, researchers have developed metrics, such as the Bristol Stool Chart. Most people who look at that chart will be able to tell they’ve experienced constipation before. When you’re on the toilet, you should ideally be in a squatting position. With your buttocks firmly on the toilet seat, you can elevate your feet on a stool and lean forwards with a straight back, which straightens the anorectal angle and eases the passage of waste. Going a day without a bowel movement isn’t necessarily cause for alarm. But if you are experiencing chronic constipation, simple dietary and lifestyle changes, like fibrous vegetables, regular exercise, abdominal massage, and 6 to 8 cups of water per day may help restore your daily trip to the toilet.

**P576 2018-05-01 What causes constipation - Heba Shaheed**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=576)

翻译人员: Qikai Guo 校对人员: Echo Yang去洗手间是人日常生活的部分。但是便秘偶尔会发生，便秘会引起消化系统阻塞。你吃的食物会花几天来排出身体。大部分时候便秘是慢性的，意味着你经常要用力排出 粗硬的粪便。那这令人不悦的体验是 如何产生的呢？便秘产生于结肠， 通常也叫大肠。这个肌肉发达的器官 由四部分组成：上行结肠横行结肠下行结肠还有乙状结肠它连接了直肠和肛门。小肠把含有摄取的食物、胆汁和消化液的粪便运送到大肠。随着这些粪便在结肠中移动，结肠会吸取出其中的大部分水分，把它从液体转为固体。转化的时间越长，重吸收程度越大， 粪便也会变得越来越硬。等它到达乙状结肠后，会在进入直肠前被最后一次重吸收，并扩大直肠壁 指示肛门内侧括约肌放松。这时候通常你会思考 是要上厕所，还是憋着。这通常由盆底肌控制，确切地说是耻骨直肠肌，以及肛门外侧括约肌。耻骨直肠肌与直肠 形成类似吊索的结构，叫做肛肠角。当你主动放松肛门外侧括约肌时，粪便就会被排出。然而当你便秘时，想上洗手间的冲动不足以 让你的身体做出反应。这通常由两个原因引起：粪便在结肠的移动过于缓慢，或骨盆底功能紊乱， 抑或两者同时。第一种， 粪便在肠道中移动的过于缓慢，导致过度吸收液体 使粪便变干变硬。而骨盆底功能紊乱时，粪便变得很难从直肠中排出。原因可能是盆底肌过分紧张或者骨盆器官下垂。这种情况大多是因为分娩或是人体老化，两者都会使肛肠角更小，粪便也会难以排出。为了更好地认识便秘，研究者发明了一些比如 布里斯托排便表的衡量法。大部分人看到图表都会说他们之前有过便秘。当你坐在马桶上时， 理想状态下你应该是蹲姿。臀部应牢坐在马桶上时，你可以把脚抬放在小凳子上，向前倾让背挺直，这样会挺直肛肠角 让排便更通畅。一天不排便并不会有很大，但如果你被慢性便秘折磨，只需改善饮食和生活习惯，比如摄入高纤维蔬菜，定期运动，按摩腹部，以及每天6-8杯水，都会对你每日的排便有所帮助。

**P577 2018-05-02 How does hibernation work - Sheena Lee Faherty**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=577)

Onboard the spacecraft, the astronauts preset the timer, enclose themselves in capsules, and fall into a deep hibernation that’ll carry them several hundred years into the future. This is a familiar scene in many sci-fi films, but could humans ever actually hibernate in real life? Researchers interested in this question turn to the animal kingdom, where hibernation is commonplace, occurring in over 200 species that we know of. Take the Arctic ground squirrel. Native to the North American tundra and northern Russia, this animal burrows beneath the permafrost and slips into a state of suspended animation, its body temperature plummeting to a frigid -2.9 degrees Celsius. Others, like the female black bear, can multitask, giving birth and lactating while they’re hibernating through the winter. The fat-tailed dwarf lemur prepares for its long dormancy by gorging on food and storing the majority of its fat reserves in its tail, doubling its body weight. After hibernation, it emerges looking as svelte as ever. So why do these animals go to such extremes? Hibernation is a necessity, a survival tactic for making it through the harsh winter months when dwindling food and water reserves threaten survival. For many years, experts believed hibernation happened only in arctic and temperate environments. But more recently, they’ve discovered animals hibernating even in arid deserts and tropical rainforests. As hibernation kicks in, animals’ heartbeats usually slow to about 1 to 3% of their original speed, like the dwarf lemur’s, which drops from its usual roughly 180 beats per minute to just around four. Breathing also declines dramatically to just one breath every 10 to 21 minutes in the lemur’s case. And black bears, like most hibernators, don’t urinate or defecate the entire hibernation season. Hibernating animals appear to stay alive by having just enough blood and oxygen moving around their bodies. And scans of hibernating animals reveal that their brain activity has just about flat-lined. But hibernation isn’t a long winter’s nap. As far as researchers know, in lemurs and ground squirrels anyway, the animals aren’t even sleeping for most of it. Hibernation is actually made up of regular bouts of reduced metabolic rate and body temperature known as torpor. Animals can be in torpor for a few days to five weeks, after which they resume normal metabolic rate and body temperature for about 24 hours, before going back into torpor again. The phenomenon is known as an interbout arousal, and why it occurs is still a mystery. The behaviors inherent in hibernation, like going five weeks without sleep, or dropping to near-freezing body temperatures would be potentially fatal to non-hibernating species like us. To find out how hibernators are able to do this, researchers turned their attention to those animal’s genomes. So far, they’ve discovered that hibernation is controlled by genes that turn off and on in unique patterns throughout the year, fine-tuning the hibernator’s physiology and behavior. For example, ground squirrel, bear and dwarf lemur studies have revealed that these animals are able to turn on the genes that control fat metabolism precisely when they need to use their fat stores as fuel to survive long periods of fasting. And the genes in question are present in all mammals, which means that researchers could study hibernating mammals to see how their unique control of physiology might help humans. Understanding how hibernators deal with reduced blood flow could lead to better treatments for protecting the brain during a stroke. Figuring out how these animals avoid muscle deterioration might improve the lives of bedridden patients. And studying how hibernating animals control their weight with ease could illuminate the relationship between metabolism and weight gain in humans. And yes, more research in this area might someday make human hibernation a real possibility. Imagine our surprise if the key to intergalactic travel turns out to be ground squirrels, black bears, and dwarf lemurs.

**P577 2018-05-02 How does hibernation work - Sheena Lee Faherty**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=577)

翻译人员: Zijian Xiao 校对人员: Junnan Li在宇宙飞船上， 宇航员通过预调时间装置，把他们封进密闭的胶囊中，进入深度的休眠状态，然后穿梭数百年的时光到达未来。这是许多科幻电影中常见的桥段，但是人类在现实生活中 真的能休眠吗？科学家们对这个问题饶有兴趣。 对于动物们来说，休眠是再正常不过的了，光是我们知道的休眠的物种 就超过 200 种。拿北美苔原地区本土的北极地鼠，和俄罗斯北部的北极地鼠举例，这种生物会在冻土层下面挖洞，然后迅速进入暂停活动的状态，它们的体温会迅速 下降至零下 2.9 摄氏度。此外，像雌黑熊在冬眠时 还能进行其他生理活动，比如分娩和哺乳，肥尾鼠狐猴则是靠摄取大量食物，和它们尾巴中储存的相当于 身体重量的大量脂肪来度过冬眠的，冬眠结束后， 它们看起来又像平时一样瘦小。那么，为何这些动物会这样做呢？因为休眠对它们来说太重要了，这是确保它们能够度过 严寒数月的一种生存策略，冬季里稀缺的食物 和水会威胁它们的生存。多年来，专家们认为，动物的休眠只会发生 极地和温带地区。但近年来，科学家们发现，动物甚至在干旱的沙漠中 和热带雨林也会进行休眠。一旦动物进入休眠状态，它们的心率会下降至 正常速率的 1% 至 3%。拿鼠狐猴的心跳来说，心跳会从每分钟约 180 次，下降到约每分钟 4 次。呼吸活动也显著降低，对狐鼠来说甚至每 10-21 分钟 只需要呼吸一次。而黑熊，还有大多数休眠动物，整个休眠期都不需要排尿和排便。当有足够的血和氧在身体内循环时，休眠的动物会重新苏醒过来。通过对休眠动物进行扫描显示，它们的大脑活动比较平缓。但是休眠并不像冬眠那样，就研究者所知，至少对狐鼠和地松鼠来说是这样的。对大多数动物来说甚至并没有睡着，休眠实际上是为了补偿 经常性出现的新陈代谢率降低，和体温降低引起的倦怠感。动物们这种非活跃状态 甚至可能经历数天到五周。在这之后，它们又会恢复到 正常的新陈代谢率和体温，直到下一次倦怠期来袭，中间大约间隔 24 小时。这种现象被称为阵间觉醒。至于为什么会出现这种现象， 目前仍然是个谜。休眠期中出现的 一些固定的生理行为，比如持续五周左右不睡觉，或者体温骤降等，对于我们这些没有休眠行为 的物种来说可能有潜在的致命威胁。为了查明休眠动物是如何做到的，研究者们把注意力转向了 这些动物的基因组。到目前为止，他们已经发现， 贯穿全年的休眠活动的开始和结束，都受到独特的基因模式的控制，基因组能完美协调休眠动物 的生理活动和行为。举个例子，对地松鼠， 熊和鼠狐猴的研究表明，当这些动物需要消耗储存的脂肪时， 这些动物可以调动基因来精准控制脂肪代谢，储存的脂肪如同燃料，来支持长时间的断食。我们所讨论的这种基因， 在所有哺乳动物体内都有。这意味着研究者可以 通过研究休眠的哺乳动物，来查明它们对生理上的 独特控制如何尽可能造福人类。了解休眠是如何减缓血液流动的，有可能改善大脑在中风时的治疗。弄清楚这些动物 是如何防止肌肉退化的，也许可以提高卧床不起 的病患的生存率。研究休眠动物如何通过 放松来控制它们的体重，可以用来解析人体新陈代谢 和体重增长之间的关联。是的，这个领域的研究越多，也许有天能实现让人类进行休眠。设想一下，实现人类 星际旅行的关键线索就藏在地松鼠、黑熊和鼠狐猴身上， 简直太令人惊奇了！

**P578 2018-05-02 How squids outsmart their predators - Carly Anne York**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=578)

In the ocean’s depths, two titans wage battle: the sperm whale and the colossal squid. Sperm whales use echolocation to hunt these squid for food, but even against this gigantic animal, squid can put up an impressive fight. Scientists know this because on the bodies of washed-up whales, they frequently find huge, round suction scars, emblazoned there by large, grasping tentacles. Ranging in size from this giant’s impressive 14 meters to the 2.5 centimeters of the southern pygmy squid, these creatures fall into the group of animals known as cephalopods. There are about 500 squid species worldwide, and they live in all the world’s oceans, making them a reliable food source for whales, dolphins, sharks, seabirds, fish, and even other squid. Indeed, squid themselves are fearsome ocean predators. But their most extraordinary adaptations are those that have evolved to help them thwart their predators. Squid, which can be found mainly in estuarine, deep-sea, and open-water habitats, often swim together in shoals. Being out in the open without anywhere to hide makes them vulnerable, so as a first line of defense, they rely on large, well-developed eyes. In the colossal squid, these are the size of dinner plates, the largest known eyes in the animal kingdom. When it’s dark or the water is murky, however, squid rely on a secondary sensory system, made from thousands of tiny hair cells that are only about twelve microns long and run along their heads and arms. Each of these hair cells is attached to axons in the nervous system. Swimming animals create a wake, so when the hairs on the squid’s body detect this motion, they send a signal to the brain, which helps it determine the direction of the water’s flow. This way, a squid can sense an oncoming predator in even the dimmest waters. Aware of the threat, a squid can then mask itself from a predator. Squid skin contains thousands of tiny organs called chromatophores, each made of black, brown, red or yellow pigments and ringed in muscle. Reflecting cells beneath the chromatophores mirror the squid’s surroundings, enabling it to blend in. So, when the muscles contract, the color of the pigment is exposed, whereas when the muscles relax the colors are hidden. Each of these chromatophores is under the individual control of the squid’s nervous system, so while some expand, others remain contracted. That enables countershading, where the underside of the squid is lighter than the top, to eliminate a silhouette that a predator might spy from below. Some predators, however, like the whales and dolphins, get around this ruse by using sound waves to detect a squid’s camouflaged form. Not to be outfoxed, the squid still has two more tricks up its sleeve. The first involves ink, produced inside its mantle. Squid ink is made mostly of mucus and melanin, which produces its dark coloring. When squid eject the ink, they either use it to make a large smokescreen that completely blocks the predator’s view or a blob that roughly mimics the size and shape of the squid. This creates a phantom form, called a pseudomorph, that tricks the predator into thinking it’s the real squid. As a final touch, squid rely on jet propulsion to rapidly shoot away from their hunters, reaching speeds of up to 25 miles per hour and moving meters away in mere seconds. This makes them Earth’s fastest invertebrates. Some squid species have also developed unique adaptive behaviors. The deep-sea vampire squid, when startled, uses its webbed arms to make a cape it hides behind. The tiny bobtail, on the other hand, tosses sand over its body as it burrows away from prying eyes. The Pacific flying squid uses jet propulsion for another purpose: to launch itself right out of the water. Squids’ inventive adaptations have allowed them to proliferate for over 500 million years. Even now, we’re still uncovering new species. And as we do, we’re bound to discover even more about how these stealthy cephalopods have mastered survival in the deep and unforgiving sea.

**P578 2018-05-02 How squids outsmart their predators - Carly Anne York**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=578)

翻译人员: Yuntao Li 校对人员: Lipeng Chen在海洋深处， 两位狠角色正在龙争虎斗———只抹香鲸和大王乌贼。巨头鲸会用回声定位 来捕食大王乌贼，但就算是面对如此强劲的对手， 大王乌贼也不甘示弱。科学家得出此结论是因为他们 经常能从搁浅的鲸鱼身上发现由强吸力造成的 巨大的圆形伤疤，那是被巨大的触角 吸附后留下的印记。大小可以从令人惊叹的 14 米长的大王乌贼到 2.5 厘米长的 南太平洋侏儒鱿鱼，这些生物在动物中属 头足类的无脊椎动物。全球大概有 500 余种 鱿鱼种类，生存区域遍布全球海域，这让它们成为鲸鱼、海豚、鲨鱼、海鸟、鱼，甚至是其他鱿鱼的完美食物来源。虽然鱿鱼是海中的可怕的掠食者，但他们在进化史上最令人惊叹的，还是它们已经进化得 可以对抗它们的捕食者。鱿鱼，通常成群的出没在浅滩上， 河口、深海以及开放性水域。但没有躲避的地方， 暴露在外让它们非常脆弱。所以它们把进化完全的大眼睛 作为它们的首要防范机制。它们的眼睛可以达到主餐盘大小，大王乌贼拥有动物中最大的眼睛。但是，当光线不足或是水域浑浊时，大王乌贼会依靠它的第二传感系统。数以千记的微小毛细胞， 长度仅 12 微米，长在它们头和触角上。每一根毛细胞都附着在 神经系统的轴突上。有动物游过时，会造成一层层波动。当乌贼身上的毛细胞感受到波动时， 会向大脑发送信号，信号会帮助大脑判断 水纹波动的方向。这样， 即使是在光线非常微弱的环境下，鱿鱼们还是可以 预测到掠食者的方向。在预知到危险的情况下， 鱿鱼可以伪装自己不被捕食者发现。鱿鱼的皮肤包含上千个 环绕着肌肉的色素细胞，每个细胞都呈黑、棕、红或黄色。长在色素细胞下的反射细胞会映射鱿鱼周围的环境， 以便它们伪装自己。所以，当肌肉收缩时，颜色显露出来，当肌肉松弛放松时，颜色就会消失。每一个色素细胞都是受鱿鱼的 神经细胞单独控制的。所以这些细胞可以 部分收缩，部分放松。这让鱿鱼可以进行“反荫蔽”，鱿鱼的肚子颜色会比背部颜色浅。这样就不会造成剪影， 以防捕食者从下方偷袭。但是有些捕食者，比如鲸鱼和海豚，会利用声波来检测鱿鱼的伪装。为了不被以智取胜， 鱿鱼还是留了两招。第一就是它的身体可以分泌出墨汁。鱿鱼的墨汁大部分是由粘液和生成黑色的黑色素构成。当鱿鱼喷出墨汁时，亦是会喷出大片的黑色墨汁来完全阻挡住捕食者的视线，亦或是吐出和鱿鱼体型 形状大致一样的墨团。墨团会行成一个叫做 “伪形”的假鱿鱼来迷惑捕食者， 让他们以为“伪形”是真的鱿鱼。最后，鱿鱼会依靠使劲喷射让自己快速地逃离捕食者所在地点，它们的喷射速度可以 达到每小时 25 英里，在短短几秒钟的时间内就移动数秒。鱿鱼是地球上最快的无脊椎动物。一些品种的鱿鱼 还进化出了适应性行为。深海的吸血乌贼在受到惊吓后，会用带蹼的触手 支出一个屏障让自己躲在后面。微小的尾巴同时把 沙子扔在自己的身体上，就像挖洞一样远离窥视的双眼。太平洋褶柔鱼把 喷射推进用在其他用途：把自己发射到水面之外。鱿鱼那如同发明创造般的进化让他们在超过 50 亿年的 时间里繁衍生息。甚至现在，还有很多鱿鱼 是我们没有发现的。就像我们做的那样，我们必然会发现更多有关 这些隐秘的头足类动物是如何如大师般生活在无情深海中。与这个播放列表一起潜入深海吧！

**P579 2018-05-03 Can you solve the false positive riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=579)

Mining unobtainium is hard work. The rare mineral appears in only 1% of rocks in the mine. But your friend Tricky Joe has something up his sleeve. The unobtainium detector he’s been perfecting for months is finally ready. The device never fails to detect unobtainium if any is present. Otherwise, it’s still highly reliable, returning accurate readings 90% of the time. On his first day trying it out in the field, the device goes off, and Joe happily places the rock in his cart. As the two of you head back to camp where the ore can be examined, Joe makes you an offer: he’ll sell you the ore for just $200. You know that a piece of unobtanium that size would easily be worth $1000, but any other minerals would be effectively worthless. Should you make the trade? Pause here if you want to figure it out for yourself. Answer in: 3 Answer in: 2 Answer in: 1 Intuitively, it seems like a good deal. Since the detector is correct most of the time, shouldn’t you be able to trust its reading? Unfortunately, no. Here’s why. Imagine the mine has exactly 1,000 pieces of ore. An unobtainium rarity of 1% means that there are only 10 rocks with the precious mineral inside. All 10 would set off the detector. But what about the other 990 rocks without unobtainium? Well, 90% of them, 891 rocks, to be exact, won’t set off anything. But 10%, or 99 rocks, will set off the detector despite not having unobtanium, a result known as a false positive. Why does that matter? Because it means that all in all, 109 rocks will have triggered the detector. And Joe’s rock could be any one of them, from the 10 that contain the mineral to the 99 that don’t, which means the chances of it containing unobtainium are 10 out of 109 – about 9%. And paying $200 for a 9% chance of getting $1000 isn’t great odds. So why is this result so unexpected, and why did Joe’s rock seem like such a sure bet? The key is something called the base rate fallacy. While we’re focused on the relatively high accuracy of the detector, our intuition makes us forget to account for how rare the unobtanium was in the first place. But because the device’s error rate of 10% is still higher than the mineral’s overall occurrence, any time it goes off is still more likely to be a false positive than a real finding. This problem is an example of conditional probability. The answer lies neither in the overall chance of finding unobtainium, nor the overall chance of receiving a false positive reading. This kind of background information that we’re given before anything happens is known as unconditional, or prior probability. What we’re looking for, though, is the chance of finding unobtainium once we know that the device did return a positive reading. This is known as the conditional, or posterior probability, determined once the possibilities have been narrowed down through observation. Many people are confused by the false positive paradox because we have a bias for focusing on specific information over the more general, especially when immediate decisions come into play. And while in many cases it’s better to be safe than sorry, false positives can have real negative consequences. False positives in medical testing are preferable to false negatives, but they can still lead to stress or unnecessary treatment. And false positives in mass surveillance can cause innocent people to be wrongfully arrested, jailed, or worse. As for this case, the one thing you can be positive about is that Tricky Joe is trying to take you for a ride.

**P579 2018-05-03 Can you solve the false positive riddle - Alex Gendler**

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翻译人员: Yuntao Li 校对人员: Lipeng Chen挖掘稀有元素是很难的事。稀有矿物仅仅存在于 矿井中那 1% 的石头里。但是你的朋友狡猾的乔 有他的秘密武器。他改进了近几个月的 稀有元素检测器终于准备完毕。如果有任何稀有元素存在， 这个设备则一定会检测到。在其他方面，它仍然是很可靠的：90%的几率它会有准确的读数。在场地进行测试的第一天，设备响应了， 乔高兴地把石头放在他的车里。当你们两个返回营地， 在那里矿石能得到检验，乔向你开了价：他可以将这块矿石 以仅仅200美元卖给你。你心里知道那种大小的稀有元素 最少价值1000美元。但若是其他矿物，则一文不值。你应该做这笔交易吗？如果你想回答这个问题就暂停一下。倒计时：321直觉上，这似乎是个挺好的交易。因为检测器大多时候都工作正常。为什么不该相信它的读数呢？很抱歉，答案是不。原因如下：假设你开采的矿 正好有1000块矿石。难得素的稀有度为1%意味着，其中只有10块石头 含有那种珍贵的矿物。这10块石头都会 引起检测器响应。但那其他990块 不含稀有元素的石头呢？这些石头中的90%， 确切来说就是891块石头，什么反应都不会引起。但10%（99块）其他的石头， 都会引起检测器响应。无论含不含稀有元素。这个结果就是假正。为什么这个会有影响呢？因为它意味着 总共有109块石头触发了检测器。而乔的那块石头 可能是它们当中任意一个：可以是含有那种 矿物的10块石头，也可以是那 99块不含有的，也就是说含有稀有元素的石头 几率是10/109，大约9%。只有9%的几率获利1000， 而你要为此付200，这并不划算。为什么这个结果如此出乎意料？为什么乔的石头似乎 像一比划算的交易呢？答案在于“基本比率谬误”。当我们聚焦于检测器 有着相对较高的精度时，我们的直觉让我们忘记了去思考，稀有元素本来就是非常稀有的。但由于设备10%的错误率，仍然高于矿物总体的出现率，只要设备响应，仍有很大可能是假正，而不是真的发现了稀有元素。这个问题是条件概率的一个例子。答案既不在于发现 稀有元素的总体概率，也不在于收到误报的总体概率。在一切事情发生前， 先给我们的这种背景信息，就叫做无条件或者先验概率。但我们寻求的是：在我们知道 设备返回了一个正确的读数时，获得稀有元素的概率。这叫做条件或后验概率，是由一旦通过观察将 可能性降低所决定的。很多人困惑于假正悖论，因为我们更偏向于 将注意力集中在特定的信息，而不是更加一般的信息，特别是需要马上做决定的时候。不过大多数时候， 稳妥总比遗憾要好。假正会造成不良结果。在医疗测试中，假正比假负更加可靠，但是它们仍然能导致压力 或者不必要的治疗。在大规模监控下，误报会导致无辜的人 被逮捕、入狱或更糟。至于这种情况，你能肯定的一点是：狡猾的乔正试图欺骗你。

**P580 2018-05-07 When will the next ice age happen - Lorraine Lisiecki**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=580)

Twenty thousand years ago, the Earth was a frigid landscape where woolly mammoths roamed. Huge ice sheets, several thousand meters thick, encased parts of North America, Asia, and Europe. We commonly know it as the "Ice Age." But geologists call it the Last Glacial Maximum. That’s because it’s the most recent time that ice reached such a huge extent, and “ice age” is an informal term without a single agreed-upon definition. Over the last million years, there have actually been about 10 different glacial maxima. Throughout Earth’s history, climate has varied greatly. For hundreds of millions of years, the planet had no polar ice caps. Without this ice, the sea level was 70 meters higher. At the other extreme, about 700 million years ago, Earth became almost entirely covered in ice during an event known as “Snowball Earth.” So what causes these massive swings in the planet’s climate? One of the main drivers is atmospheric carbon dioxide, a greenhouse gas that traps heat. Natural processes, such as volcanism, chemical weathering of rocks, and the burial of organic matter, can cause huge changes in carbon dioxide when they continue for millions of years. Over the past million years, carbon dioxide has been relatively low, and repeated glacial maxima have been caused by cycles in Earth’s movement around the sun. As Earth rotates, it wobbles on its axis and its tilt changes, altering the amount of sunlight that strikes different parts of its surface. These wobbles, combined with the planet’s elliptical orbit, cause summer temperatures to vary depending on whether the summer solstice happens when Earth is closer or farther from the sun. Approximately every 100,000 years, these factors align to create dramatically colder conditions that last for millennia. Cool summers that aren’t warm enough to melt the preceding winter’s snow allow ice to accumulate year after year. These ice sheets produce additional cooling by reflecting more solar energy back into space. Simultaneously, cooler conditions transfer carbon dioxide from the atmosphere into the ocean, causing even more cooling and glacier expansion. About 20,000 years ago, these trends reversed when changes in Earth’s orbit increased summer sunshine over the giant ice sheets, and they began to melt. The sea level rose 130 meters and carbon dioxide was released from the ocean back into the atmosphere. By analyzing pollen and marine fossils, geologists can tell that temperatures peaked about 6,000 years ago, before another shift in Earth’s orbit caused renewed cooling. So what’s coming next? Based on the repeated natural cycle seen in the climate record, we’d normally expect the Earth to continue a trend of gradual cooling for the next few thousand years. However, this cooling abruptly reversed about 150 years ago. Why? Carbon dioxide levels in the atmosphere have been rising since the 19th century, when fossil fuel use increased. We know that from studying air bubbles trapped in Antarctic ice. This surge in carbon dioxide also coincides with a global temperature increase of nearly one degree Celsius. Ice cores and atmospheric monitoring stations show us that carbon dioxide levels are rising faster, and to higher levels, than at any point in the last 800,000 years. Computer models forecast another one to four degrees Celsius of warming by 2100, depending on how much additional fossil fuel we burn. What does that mean for the ice currently on Greenland and Antarctica? Past climate changes suggest that even a small warming shift can begin a process of ice melt that continues for thousands of years. By the end of this century, ice melt is expected to raise the sea level by 30 to 100 centimeters, enough to impact many coastal cities and island nations. If a four-degree Celsius warming persisted for several millennia, the sea level could rise by as much as 10 meters. By studying past climates, scientists learn more about what drives the shifts in ice that have shaped our planet for millions of years. Research suggests that by taking action now to reduce carbon dioxide emissions quickly, we still have the opportunity to curb ice loss and save our coastal communities.

**P580 2018-05-07 When will the next ice age happen - Lorraine Lisiecki**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=580)

翻译人员: Candace Hwang 校对人员: Cissy Yun两万年前，地球是猛犸象漫游的严寒地带。几千米厚的巨大冰盖，覆盖了北美、亚洲 和欧洲的部分地区，这就是我们所知的“冰河世纪”。但是地质学家称之为 “末次盛冰期”。是因为这是最近的冰层如此巨大的时期并且“冰河世纪”是非正式用语， 并没有单一的统一定义。在过去的一百万年里，实际上有大约十种 不同的“盛冰期”。纵观地球历史，气候变化很大。数亿年来，地球并没有两极冰盖。没有这些冰的时候， 海平面比现在高 70 米。另一个极端现象 大约发生在 7 亿年前，这被称作 “雪球地球” 的事件中，地球几乎完全被冰覆盖。所以，造成地球气候变化 如此之大的原因是什么？一个主要因素是大气中的二氧化碳，它是吸收热量的温室气体。自然进程，例如火山活动、岩石化学风化、以及被掩埋的有机物质，当这些进程持续上百万年， 能使二氧化碳发生巨变。在过去的一百万年里， 二氧化碳相对较低，而这些重复出现的“盛冰期”是由于地球绕太阳公转造成的。当地球旋转时，它沿着一条轴转动， 并且变化倾斜角度。使不同表面接收不同强度的阳光。这些转动与行星的椭圆轨道相结合，导致夏天温度变化取决于夏至发生在地球离太阳更近或更远的地方。大约每十万年，这些因素产生持续数千年的 寒冷环境。凉爽的夏天不够温暖， 无法融化前一冬的雪，使得冰年复一年的累积起来。这些冰盖通过将太阳热能反射回空中，使得周围更冷。同时，低温条件会将二氧化碳从大气转移到海洋中，使得温度更低与冰川扩张。大约在 2 万年前，当地球轨道的变化 造成大冰盖上夏日阳光增加时，这些趋势发生逆转， 并且它们开始融化。海平面上升了 130 米，二氧化碳从海洋中回到大气层。通过分析花粉和海洋生物化石，地质学家得出，在地球轨道的 另一次转变导致重新冷却之前，温度大约在 6000 年前 达到峰值。接下来会发生什么呢？根据气候记录中的重复自然循环，我们通常期望在接下来的几千年里，地球能保持逐渐降温的趋势。但此趋势在 150 年前突然逆转，为什么？自 19 世纪以来， 随着石燃料使用增加，二氧化碳含量开始升高。我们通过研究 南极冰层里的气泡而得知。二氧化碳的这种激增也与上升近 1 摄氏度的全球气温相吻合。冰核与大气监控站中显示，二氧化碳含量增长速度加快，所达含量高于过去八十万年间的任何值。计算机模型预测到 2100 年 将再升温 1 至 4 摄氏度，这取决于我们的化石能源燃烧量。这对格陵兰岛和南极目前的冰川来说 意味着什么？过去的气候变化表明， 即使是小的变暖转变也可能开始持续数千年的融冰过程。到本世纪末，冰川融化预计使海平面上升 30 到 100 厘米足以影响许多沿海城市和岛屿国家。如果持续数千年 4 摄氏度变暖，海平面可升高 10 米。基于过去的气候研究，科学家们对导致我们星球 塑造数百万年的冰的变化的原因有了更多了解。研究指出，现在就采取行动，迅速减少二氧化碳排放量，我们仍然有机会遏制冰川减少， 拯救我们的沿海地区。

**P581 2018-05-09 Why do we sweat - John Murnan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=581)

The finish line's in sight and you put on an extra burst of speed. As your legs pick up the pace, your breathing gets deeper, your heart pounds faster, and sweat pours over your skin. How does this substance suddenly materialize and what exactly is its purpose? There are a number of scenarios that can make us sweat: eating spicy foods, nervousness, and when we're sick. But exercise is probably the most familiar and common. In that case, sweating happens as a response to movement triggered deep inside your cells. As you increase your pace, your muscles work harder, increasing their demand for energy. A process called cellular respiration consumes glucose and oxygen to form ATP, the energy currency of the cell. Much of this process takes place in structures called mitochondria. The more you move, the harder mitochondria work to supply your body with energy. All this work comes at a cost, though. As the cells break down the ATP, they release heat. The heat stimulates temperature sensors throughout your body. Those receptors detect the excess heat being produced by your muscle cells and communicate that information to the hypothalamus, which regulates body temperature. The hypothalamus responds by sending signals out through the sympathetic nervous system to the sweat glands in your skin. These are distributed all over the body with especially high concentrations on the palms of your hands, the soles of your feet, and on your head. When a sweat gland first receives the signal, the fluid surrounding the cells in its coiled base contains high amounts of sodium and chloride. The cells pump these ions into a hollow tube that runs through the sweat gland. Then, because it's saltier inside the tube than outside, water moves into the tube by osmosis. As what's called the primary secretion builds up in the bottom of the tube, water pressure pushes it up into the long straight part of the duct. Before it seeps onto the skin, cells lining the tube will reclaim as much salt as possible so the process can continue. The water in sweat absorbs your body's heat energy and then evaporates off of you when it reaches the surface, which in turn lowers your temperature. This process, known as evaporative cooling, was an important adaptation for our ancestors. This cooling effect isn't only helpful during exercise. We sweat in many other scenarios, too. Eating particularly spicy food makes some people sweat profusely from their faces. That happens because spices trigger the same neural response in the brain that activates temperature receptors, which usually respond to increased heat. Sweating is also part of the fight or flight response stimulated by stressful scenarios, like asking someone on a date or interviewing for a job. This happens because adrenaline stimulates muscle activity and causes blood vessels to widen, two responses that increase heat and trigger the sweating response. And sweating also occurs when we get sick. When we're feverish, we sweat because infections stimulate the hypothalamus to increase muscle activity, which in turn releases more energy as heat. That increases your overall temperature, a protective mechanism that makes your body less habitable for infectious agents. Like with running, sweating helps your body vent that heat. When the fever's over or you've won your race, your temperature receptors sense the decrease in heat and the hypothalamus brings your sweating response to an end. In some cases, like after a run, the hypothalamus also signals to your body that you need to replenish the water that you've oozed out. So, when you're pushing yourself to reach that next goal, you can think of sweat as your body's very own calibrator, enabling you to go that extra mile.

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翻译人员: Lipeng Chen 校对人员: Vivian Hsia终点线近在眼前了， 你开始加速。你的腿逐渐变快， 呼吸也越来越深，你的心脏跳动得更快，你的汗如雨下。汗水是如何突然之间出现的？它又有什么作用呢？我们在很多情况下都会流汗：吃辣的东西，紧张，以及生病。但是运动可能是 其中最寻常的一种情况。在这种情况下，出汗是对于体内细胞运动的一种反应。当你的速度加快， 你身上的肌肉更努力的工作，需要的能量也就越多。一种名为细胞呼吸的过程消耗葡萄糖和氧气来合成ATP，也就是细胞的“能量货币”。这一过程大部分发生在线粒体中。你运动的越多，线粒体就越努力工作， 以支持你身体所需的能量。但是，这些工作都是有代价的。在细胞分解ATP时， 它们会同时散发热量。这些热量刺激你体内的热量感应器。感应器接收了你 肌肉细胞所产生的多余热量，并把这一信息传给负责调控体温的下丘脑。下丘脑对此作出反应，通过遍布人体的交感神经系统，向皮肤中的汗腺发出信号。这些汗腺遍布你的全身，密集分布于手掌，脚掌，和头部。当汗腺一开始接到信号时，在汗腺底部细胞周围的液体中含有大量的钠离子和氯离子。这些细胞将这些离子打进一个贯穿汗腺的小管。紧接着，由于管内比管外盐度更高，渗透作用使水分进入管中。随着这些主要分泌物 在小管的底部越积越多，压力使水上升到小管 长而直的部分中。在渗出皮肤之前，小管周围的细胞 会尽可能多的吸收盐分以确保这一过程继续进行。汗液中的水分能吸收你身体的热量在到达肌肤表层时蒸发， 带走热量，以此来降低你的体温。这一过程叫做蒸发冷却，是我们的祖先的 一种重要的适应性变化。这种冷却效应不光在运动中发挥作用。我们也在其他情况下出汗。吃辣的东西会让 一些人脸部大量出汗。这是因为香辛料同样 会刺激大脑的一些神经反应，这些反应会激活 感知热量增高的温度感应器。出汗也是“战斗/逃跑反应”的一部分，这种反应一般在焦虑的情况下会被激活， 例如邀请某人约会，或是工作面试。这是因为肾上腺素刺激肌肉运动，使血管变宽，这两者都会增加热量， 从而触发流汗反应。我们在生病时也会出汗。当我们发烧时，我们会出汗是因为炎症使下丘脑增加肌肉运动，并以散热的方式来释放热量。这会让你的体温整体上升，这是一种保护机制， 使得传染源在你体内不易生存。就像跑步时一样， 流汗帮你带走热量。当你退烧了或是赢了跑步比赛，热量感应器会感受到热量下降，下丘脑也随之终止流汗反应。在一些情况下，例如跑完步后，下丘脑也会向你的身体发送信号，提醒你补充流失的水分。所以，当你在尽力完成下一个目标时，你可以将汗水想成你身体的校准器，让你能够再多努力一点。

**P582 2018-05-10 Can you solve the wizard standoff riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=582)

You’ve been chosen as a champion to represent your wizarding house in a deadly duel against two rival magic schools. Your opponents are fearsome. From the Newt-niz school, a powerful sorcerer wields a wand that can turn people into fish, but his spell only works 70% of the time. And from the Leib-ton school, an even more powerful enchantress wields a wand that turns people to statues, and it works 90% of the time. Lots are drawn, and you’re chosen to cast the first spell in the duel. The Newt-niz magician will go second, and the Leib-ton enchantress third, after which you’ll repeat casting in that order until only one of you is left. The rules of magic duels are strict, and anyone who casts out of order immediately forfeits the duel. Also, to prevent draws, the rules stipulate that if everyone’s still standing at the end of the first round, you’ll all be turned into cats. Now, you must choose a wand. Your wizarding house presents you with three options: the Bannekar, which binds one target with vines and casts effectively 60% of the time, the Gaussian, which turns one target into a tree and works 80% of the time, and the incredibly rare Noether 9000, which banishes one target to a distant mountaintop and casts perfectly 100% of the time. Your opponents are masters of strategy, as well as sorcery, and you know they’ll make the choices that maximize their own chances of success. Which wand should you choose and what strategy should you employ to have the greatest chance of winning the duel? Pause the video now if you want to figure it out for yourself! Answer in: 3 Answer in: 2 Answer in: 1 You reach for the Noether 9000 first. After all, it makes sense to enter the duel with the most powerful wand. But before you pick it up, you consider what would happen. As the most dangerous wizard, you’d also be the target of the other two magicians, and you’d need to take care of the most dangerous of them first. But afterward, there’s a 70% chance you'd be struck down by the remaining wizard. That’s trouble. Maybe it’s better to take the Gaussian. It works 80% of the time, which means you wouldn’t be a target until the enchantress was incapacitated. But if you succeeded in transforming her, you’d probably be turned into a fish immediately after. If you transformed the sorcerer, the enchantress would almost certainly turn you to stone. It would really be better if you missed. And that’s when you have an idea: what if you took the Gaussian, then missed on purpose? Then, you would wait for the sorcerer to attack the enchantress, and you’d have an 80% chance of winning against the sorcerer. It’s a good idea, but there’s a problem; the sorcerer could also pass his turn and the enchantress, knowing that she couldn’t pass without becoming a cat, would cast her spell on one of you. And since you’re the most dangerous between you and the sorcerer, you’d be the target. And that’s when you see what you really need to do: take the weakest wand, the Bannekar, and miss on purpose. Now the sorcerer knows that he’ll be targeted by the enchantress and he’ll have to try to turn her into a fish to avoid being turned into stone. Seventy percent of the time he’d succeed and you’d have a 60% chance of winning the duel at the beginning of the next round. If he fails, chances are he’ll be turned to stone and you’d still have a 60% chance of winning the duel against the enchantress. There’s a slim 3% chance you’ll all be turned into cats, but when everything’s accounted for, you have better than even odds of winning with this strategy. And that’s the best you can do. Here’s what the probability of winning for the different strategies looks like. Who would’ve thought that the best way to take your shot would be to throw away your shot?

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翻译人员: Lipeng Chen你被选为勇士代表你的巫师学院，将在死亡决斗中， 迎战两个死对头魔法学校。你的对手都很可拍。来自Newt-niz学校的强力男巫可以用魔杖把人变成鱼，但是他的咒语只有七成成功率。来自Leib-ton学校的更厉害的女巫可以用魔杖把人变成雕像，而且她的咒语有九成成功率。抽签之后，你被选为 在决斗中第一个施放咒语的人。来自Newt-niz的魔法师第二个施放咒语，来自Leib-ton的女巫第三个施放咒语，你们会不断按顺序施放咒语 直到只剩下一个人。魔法决斗的规则很严格，任何不按顺序施放咒语的人 会立即丧失参赛权。以及，为了避免平局，规则规定：如果所有人在第一轮结束的时候都没有倒下，你们都会被变成猫。现在，你必须选择一个魔杖。巫师学院给你三个选择：Bannekar，能把目标用藤蔓缠住，有六成成功率，Gaussian，能把目标变成树，有八成成功率，以及极其稀有的Noether 9000，它可以把目标驱逐到遥远的山顶，而且有百分之百的成功率。你的队手既是策略大师又是魔法大师，你知道他们能做出使他们胜率最大化的选择。你会选择哪个魔杖？你又会选择什么样的策略才能有最大的胜率呢？如果你想自己想出答案那就暂停视频吧！答案在3秒后出现。答案在2秒后出现。答案在1秒后出现。你先尝试Noether 9000。毕竟，在决斗中用最强力的魔杖是有道理的。但是在你拿起魔杖之前，想想有可能发生什么。作为最危险的巫师，你同时也会成为其他两位魔法师的目标，你需要先解决他们中最危险的那个。但是，你还是有七成的概率 被剩下的那个巫师击倒。这很麻烦。也许拿Gaussian更好。它有八成的成功率，这意味着在女巫被击倒前， 你都不会成为首选目标。但是如果你成功把她变形，你就很有可能立刻被变成一条鱼。如果你把男巫变形，女巫几乎一定能把你变成石头。没有击中目标似乎是更好的。所以你就有了一个想法：如果你选择Gaussian， 而且故意没有击中目标？那么，你就会等到男巫攻击女巫，然后你有80%的机会击倒男巫。这是个好主意，但是有一个问题；男巫也可以跳过他的回合，那么对于女巫来说，因为会变成猫， 她不能跳过她的回合，她会攻击你们中的一个。因为你比男巫要危险，你会成为目标。这是你就知道你要做的是什么了：选择最弱的魔杖，Bannekar， 然后故意没有击中目标。现在男巫知道他一定会成为女巫的目标，在被女巫变成石头之前， 所以他不得不尝试把女巫先变成鱼。他有70%的成功率，然后你就在下一轮比赛开始的时候，有60%的概率赢得比赛。如果他失败了，他可能会被变成石头，而你还是有60%的成功率击败女巫。这只有微小的3%的可能性你们全部变成猫，但是考虑到所有的情况，这种策略有着超过一半的胜率。这是你能做到的最好了。这是各种不同策略的胜率。谁能想到最好的一击竟然是故意打偏呢?想要再来一个死亡决斗吗？试试这个吧。你和你的对手要从两个 各有五个苹果的碗中选择。在绿苹果的碗中，有两个是有毒的。在红苹果的碗中，有三个是有毒的。但是如果你选择了绿色的苹果， 你必须吃三个。但是如果你选择了红色的苹果， 你只用吃两个。问题来了：吃一个毒苹果不会有什么问题，但是两个会杀死你。你该选哪个碗？或者是根本没有区别？我们的赞助商brilliant.org会 帮助你提高在这类游戏的生存技巧。他们会给你如何分解问题， 清晰思考和总结的指导。在brilliant.org/teded磨练你的直觉。使用这个链接， 他们就会知道使我们推荐的。更好的是，前832位成为会员的 会享受年费八折优惠。如果你用链接注册账号， 网站就会发给你苹果谜题的答案。

**P583 2018-05-10 How to stay calm under pressure - Noa Kageyama and Pen-Pen Chen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=583)

Your favorite athlete closes in for a victorious win. The crowd holds its breath, and, at the crucial moment, she misses the shot. That competitor just experienced the phenomenon known as "choking," where despite months, even years, of practice, a person fails right when it matters most. Choking is common in sports, where performance often occurs under intense pressure and depends on key moments. And yet, performance anxiety also haunts public speakers, contestants in spelling bees, and even world-famous musicians. Most people intuitively blame it on their nerves, but why does being nervous undermine expert performance? There are two sets of theories, which both say that primarily, choking under pressure boils down to focus. First, there are the distraction theories. These suggest that performance suffers when the mind is preoccupied with worries, doubts, or fears, instead of focusing its attention on performing the task at hand. When relevant and irrelevant thoughts compete for the same attention, something has to give. The brain can only process so much information at once. Tasks that challenge working memory, the mental “scratch pad” we use to temporarily store phone numbers and grocery lists, are especially vulnerable to pressure. In a 2004 study, a group of university students were asked to perform math problems, some easy, others more complex and memory-intensive. Half the students completed both problem types with nothing at stake, while the others completed them when calm and under pressure. While everyone did well on the easy problems, those who were stressed performed worse on the more difficult, memory-intensive tasks. Explicit monitoring theories make up the second group of explanations for choking under pressure. They’re concerned with how pressure can cause people to overanalyze the task at hand. Here, the logic goes that once a skill becomes automatic, thinking about its precise mechanics interferes with your ability to do it. Tasks we do unconsciously seem to be most vulnerable to this kind of choking. A study on competitive golfers compared their performance when instructed to simply focus on putting as accurately as possible, versus when they were primed to be acutely aware of the mechanics of their putting stroke. Golfers usually perform this action subconsciously, so those who suddenly tuned in to the precise details of their own moves also became worse at making accurate shots. Choking may not be inevitable for everyone though. Research suggests that some are more susceptible than others, especially those who are self-conscious, anxious, and afraid of being judged negatively by others. So, how can we avoid choking when it really counts? First, it helps to practice under stressful conditions. In a study on expert dart players, researchers found that those who hadn’t practiced under stress performed worse when anxious, compared to those who had become accustomed to pressure. Secondly, many performers extol the virtues of a pre-performance routine, whether it’s taking a few deep breaths, repeating a cue word, or doing a rhythmic sequence of movements. Studies on golfing, bowling, and water polo find that short rituals can lead to more consistent and accurate performance under pressure. And thirdly, researchers have shown that having an external focus on the ultimate goal works better than an internal focus, where someone is tuned into the mechanics of what they’re doing. A study of experienced golfers revealed that those who hit chip shots while focused on the flight of the ball performed significantly better than those who focused on the motion of their arms. So, perhaps we can modify that age-old saying: practice, under pressure, with focus, and with that glorious end goal in sight, makes perfect.

**P583 2018-05-10 How to stay calm under pressure - Noa Kageyama and Pen-Pen Chen**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=583)

翻译人员: Riley WANG 校对人员: Monkey Luffy你最爱的运动员即将迎来制胜一击，观众们屏住呼吸，但在这重要时刻，她失误了。这位选手刚经历了“反胜为败”现象，纵使进行了经年累月的练习，人们仍会在关键时刻失败。“反胜为败”在运动界 是一种普遍现象，因为运动员的表现都在压力下进行，并且会受到比赛节点的影响。但这种焦虑也会影响演讲者，拼字游戏中的选手们，以及世界著名的音乐家。绝大多数人凭直觉 将其归咎于精神紧张，但为何紧张的情绪 会影响专业人士的表现呢？两组理论对此进行了解释。二者都认为压力下的“反胜为败” 归根结底是注意力问题。第一种理论是干扰理论。该理论认为当担忧、疑惑和恐惧 占据了人们的头脑，让人们无法集中注意力在手头的任务，其表现就会受到影响。当与任务相关和 无关的信息争夺注意力时，其中一方不得不做出让步。大脑能够同时处理的信息量有限。工作记忆是我们头脑中的“速写板”，我们用它短暂存储 电话号码和购物清单等。对于高度要求工作记忆的任务来说，压力对其影响尤为严重。在 2004 年的一项研究中，一组大学生被要求解答数学问题，一些题目简单，另一些 则非常困难，且需要大量记忆。一半学生在没有任何顾忌的 情况下解答全部题目，另一半学生分别在 冷静状态和压力状态下完成题目。尽管所有人在简单问题上表现良好，但对于更困难 且需要记忆的题目来说，经受压力的学生表现更差。第二套解释该现象的理论是外部控制理论。这一理论是关于压力如何使人们 过度分析当前的任务。这种说法的逻辑在于， 一旦某种技能成为下意识的熟练技能，思考其精确的原理机制 就会妨碍使用该技能。需要下意识完成的任务 最容易出现“反胜为败”。一项研究对比了高尔夫选手的表现，一组选手只需要关注准确挥杆，另一组则被要求时刻想着挥杆动作是否符合标准原理。高尔夫选手通常 依靠潜意识完成动作，因此在选手突然要 调整动作达到标准时，他们反而更难打出准确一击。虽然并非所有人 都会经历“反胜为败”，但研究表明， 部分人群更容易受到影响，尤其是那些自我意识较强的，容易焦虑的，害怕他人负面评价的人。既然“反胜为败”影响如此之大， 我们该如何避免它的出现呢？首先， 在压力环境下练习会有所帮助。在一项关于专业飞镖选手的研究中，研究者发现，从未在压力下练习过的选手，在焦虑时比习惯压力的选手表现更差。第二，许多运动员 推崇进行赛前例行动作，例如进行几次深呼吸，重复某个提示词，或是进行有节奏的一系列动作。在高尔夫、保龄球 和水球方面的研究发现，进行简短的仪式性动作可以使选手在压力下的 表现更为正常和准确。第三，研究者表示，将注意力集中在实现最终目标上，比关注在内部调整自己符合规范动作原理要更加有效。一项高尔夫研究表明， 在切削击球的经验丰富的选手中，那些关注球的飞行线路的选手，比关注自己手臂运动的 选手表现好得多。因此我们也许可以 修改那句古老谚语，练习，在压力下，保持专注，锁定目标的练习，才会熟能生巧。

**P584 2018-05-11 Are naked mole rats the strangest mammals - Thomas Park**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=584)

What mammal has the social life of an insect, the cold-bloodedness of a reptile, and the metabolism of a plant? Bald and buck-toothed, naked mole rats may not be pretty, but they’re extraordinary. With a lifespan of 30 years, their peculiar traits have evolved over millions of years to make them uniquely suited to survive harsh conditions, especially long periods without oxygen. In the deserts of East Africa, naked mole rats feed on root vegetables. They dig for the roots with teeth that can move independently, like chopsticks. But even with these special teeth, a single naked mole rat doesn’t stand a chance of finding enough food; the roots are large and nutritious, but scattered far and wide. A large workforce has a much better chance, so naked mole rats live in colonies. Similar to ants, bees, and termites, they build giant nests. Housing up to 300 mole rats, these colonies feature complex underground tunnel systems, nest chambers, and community bathrooms. Also like insects, naked mole rats have a rigid social structure. The dominant female, the queen, and two to three males that she chooses, are the only naked mole rats in the colony who have babies. All the other naked mole rats, male and female, are either soldiers, who defend the colony from possible invaders, or workers. Teams of workers are dispatched to hunt for roots, and their harvest feeds the whole colony. Living in a colony helps naked mole rats find enough food, but when so many animals live in the same underground space, oxygen quickly runs out. Mammals need a lot of oxygen; we use it to make the energy that fuels everything from maintaining our body temperatures to our heartbeats to voluntary movements. Without oxygen, we quickly die. In fact, no other mammal could survive the oxygen depletion experienced in a naked mole rat colony. Naked mole rats can thrive in low oxygen in part because they’ve abandoned one of the body functions that requires the most oxygen: thermoregulation. Most mammals are warm-blooded, meaning they have to keep their body temperature consistent. Naked mole rats don’t get enough oxygen to do this. Instead, they’re the only mammals whose body temperature fluctuates with their environment, making them cold-blooded, like reptiles. They also have a special type of hemoglobin, the molecule in the blood that transports oxygen. Their hemoglobin is much stickier for oxygen than ours and can pick oxygen up even when it’s scarce. In response to a real oxygen emergency, naked mole rats enter a state of suspended animation. They stop moving, slow their breathing, and dramatically lower their heart rate. This greatly reduces the amount of energy, and therefore oxygen, they need. At the same time, they begin to metabolize fructose, like a plant. Fructose is a sugar that can be used to make energy without burning oxygen. Usually, mammals metabolize a different sugar called glucose that makes more energy than fructose, but glucose only works when oxygen’s available. Human brain and heart cells have some cellular machinery to use fructose, but not nearly as much as naked mole rats. Naked mole rats are, in fact, the only mammals known to have this ability. While we can hope humans won’t ever need to exclusively live in underground tunnels, there are many situations where we would benefit from needing less oxygen. During heart attacks and other medical emergencies, people often die or sustain debilitating organ damage from oxygen deprivation. Could we replicate the naked mole rat’s use of the fructose pathway for human health? It took millions of years of evolution to bring the behavior of an insect, the temperature regulation of a reptile, and the energy production of a plant together in one little mammal, but maybe, with enough study, we can replicate just a few of their wild adaptations.

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翻译人员: Yuntao Li 校对人员: Lipeng Chen什么哺乳动物拥有着 昆虫一样的社群生活，爬行动物的冷血，以及植物一样的新陈代谢？光头龅牙的的裸鼹鼠 也许算不上漂亮，但他们确实不同寻常。在 30 年的生命周期中，它们特别的特征在长达百万年的时间中不断进化，使得他们以独特的方式 适应恶劣的环境，特别是长期缺氧的环境。生活在在东非的沙漠， 裸鼹鼠以植物根部为食。它们用像筷子一样，能够 单独移动的牙齿来挖掘根部。但是即使有着这样特殊的牙齿一只独居的裸鼹鼠没有 任何机会找到足够的食物；植物的根部又大又有营养， 但是分布的宽而远。唯有大量的劳动力才能有一个更好的机会。所以裸鼹鼠以群落生活。跟蚂蚁、蜜蜂以及白蚁相似， 他们建造巨大的巢穴。一个巢穴居住着 最多 300 只裸鼹鼠，这些群落以地下管道系统为显著特征，还有像大厅一样的巢穴，以及公共厕所。跟昆虫还有一个相似之处： 裸鼹鼠遵循严格的社会结构。雌性的支配者，也就是女王，以及两到三个她选择的雄性，是唯一担负生殖功能的群体。其他的裸鼹鼠，无论雄性还是雌性，要么是士兵，负责防御，要么是工人。工人团队被派往获取食物，它们的收获供给着整个群落。居住在这样的一个 能够找到充足食物的群落里，有个问题是大量的动物 同时居住在一个空间里，氧气很快就会被耗尽。哺乳动物需要大量的氧气；我们用氧气来生产能量， 供给所有的活动，从维持体温，到心跳，到自主运动。没有氧气，我们很快就会死。事实上，没有其他任何哺乳动物能够在 裸鼹鼠那种氧气短缺的情况下生存，裸鼹鼠能在低氧的环境下生长，部分原因是因为 它们放弃部分身体机能，需要大量氧气的温度调节。大部分哺乳动物都是温血的，意味着它们要保持体温恒定。裸鼹鼠并没有足够的氧气去做这个。它们是唯一的哺乳动物，体温随环境温度波动，使得它们像爬行动物一样冷血。他们同时有着一种特殊的血红蛋白，这种分子在血液中负责运输氧气。它们的血红蛋白比我们的更加粘，能够在氧气很稀薄的情况下 也能进行收集。如果真的遇到了紧急缺氧的情况，裸鼹鼠就会进入停滞运动状态。他们停止运动，减慢呼吸，以及极度降低它们的心率。这极大地缩减了需要的能量， 进而减少氧气需求。同时，他们开始消化果糖， 就像植物一样。果糖是一种不需要消耗氧气， 但也能产生能量的一种糖。通常，哺乳动物使用另一种 名叫葡萄糖的糖来产生能量，而不是果糖。但是葡萄糖只有在氧气 存在的情况下能够转化成能量。人的大脑和心细胞有着 一些细胞消耗果糖的机制，但是跟裸鼹鼠就差得很远了。裸鼹鼠实际上是唯一一个 有这种能力的哺乳动物。虽然我们希望人类永远不需要仅仅住在地下通道，但是还是有很多我们可以 从需要更少的氧气中获益情况。在心脏病突发以及 其他紧急医疗情况时，人们经常因为缺氧而死亡或是器官受损。我们能复制裸鼹鼠使用果糖的方法，使得人类的健康也能从中受益吗？裸鼹鼠花了几百万年的时间才将 昆虫的习性，爬行动物的体温调节，以及植物的能量生产方式集为一体。但是也许，通过充足的研究我们能复制它们的一些野性的适应。

**P585 2018-05-11 The journey to Pluto, the farthest world ever explored - Alan Stern**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=585)

On July 4, 2015, a NASA spacecraft called New Horizons was 5 billion kilometers away from Earth. It was only 10 days away from Pluto, after flying for 9.5 years, when it suddenly dropped out of contact. But let’s back up a little. As of 1989, mankind had successfully sent craft to every known planet in the solar system except one—Pluto. You may have heard that astronomers don’t consider Pluto or its brethren to be planets. However, most planetary scientists still do, which is why we're using that terminology here. There’s a limited amount we can learn about Pluto from Earth because it’s so far from us. Pluto, however, is a scientific goldmine. It’s located in a region called the Kuiper Belt, home to many small planets, hundreds of thousands of ancient icy objects, and trillions of comets. This mysterious region holds clues to the formation of our solar system, and it was long, tantalizingly beyond our reach. Until New Horizons. Its objectives: explore Pluto, collect as much scientific data as possible, transmit it back to Earth, then explore farther out in the Kuiper Belt. To achieve this, the New Horizons team outfitted their craft with seven state-of-the-art scientific instruments. Those included Ralph, a set of cameras powerful enough to capture features the size of city blocks in Manhattan from tens of thousands of kilometers away. And REX, designed to use radio waves to measure Pluto’s atmospheric pressure and temperature. All of the onboard equipment had to be built to be both reliable and lightweight because New Horizons had an additional challenge; it had to reach its target as fast as possible. Why? Around 2020, Pluto will reach a point in its orbit where its atmosphere could freeze. And due to the tilt of its axis, more and more of Pluto’s surface is shrouded in darkness every year. Pluto completes a full orbit once every 248 Earth years, so it would be a long wait for the next prime opportunity to visit. To see how New Horizons got to Pluto in time, let’s jump to its launch. Its three rocket stages accelerated New Horizons to such great speeds that it crossed the 400,000 kilometers to the moon in just nine hours. About a year later, the craft reached Jupiter and got what’s called a gravity assist. That’s where it flies close enough to the gas giant to receive a gravitational slingshot effect. New Horizons was then flying at around 50,000 kilometers per hour, as it would for the next eight years to cross the remaining gulf to Pluto. Going at such an astonishing speed meant that slowing down to get into orbit or land would’ve been impossible. That’s why New Horizons was on a flyby mission, where it would get just one chance to scream by Pluto and make its observations. The flyby would have to be fully automated, since at that distance, any signals to guide it from Earth would take 4.5 hours to reach it. So the team loaded the ship’s computer with a series of thousands of commands, called the core load, that would begin to execute when the craft was 6.5 days from Pluto. But when New Horizons was just ten days out, disaster almost struck. Ground control lost contact with the spacecraft. After two nerve-wracking hours, New Horizons came back online, but mission control discovered that its main computer had rebooted, losing the entire core load and other critical data. Without that, it would soon whizz by Pluto with virtually nothing to show for the mission. Alice Bowman, the mission’s Operations Manager, led a team for 72 sleepless hours to get the instructions loaded back into New Horizons in time. Without room for a single error, she and her team pulled it off, and New Horizons began taking and broadcasting breathtaking images. Those observations have revealed a delightfully varied world, with ground fogs, high altitude hazes, possible clouds, canyons, towering mountains, faults, craters, polar caps, glaciers, apparent dune fields, suspected ice volcanoes, evidence for past flowing liquids, and more. One of the most exciting discoveries is the 1000-kilometer-wide Sputnik Planitia glacier. Sputnik Planitia is mainly composed of slowly churning frozen nitrogen, and we’ve never seen anything like it in our solar system. The exploration of Pluto was a great success, but New Horizons isn’t done yet. On January 1, 2019, it’ll break its own record for furthest explored object when it visits a Kuiper Belt Object called 2014 MU69, which is orbiting the sun another billion kilometers farther away than Pluto. The world is holding its breath to see what it’ll find there.

**P585 2018-05-11 The journey to Pluto, the farthest world ever explored - Alan Stern**

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翻译人员: Yuntao Li 校对人员: Lipeng Chen在 2005 年 7 月 4 日，美国国家航空和宇宙航行局 (NASA) 的飞船新视野号正在距离地球 50 亿公里的地方。当它突然中断信号时候， 它已飞行了 9.5 年，离冥王星就只有 10 天的飞行时间。但是让我们先了解一下它的背景。到 1989 年为止，人类已经成功地将航天器送往 太阳系的所有已知行星，除了冥王星。你也有听说过天文学家 不认为冥王星是行星，或者是它是行星的小弟弟。但是，绝大部分行星科学家 还是认为冥王星是行星。这就是我们使用这个术语的原因。我们从地球上能了解 冥王星的知识很有限，因为它离我们太远了。然而，冥王星是科学的金矿。它处于名叫柯伊伯带的地区，是众多小行星的家，也是成百上千的古代冰体，以及数万亿彗星的家。这个神秘的地区拥有着 太阳系构成的线索，并且，它远远超出了 人类可以触及的范围，直到新视野号的出现。新视野号的目的就是：探索冥王星，收集越多数据越好，并传送回地球，然后探索柯伊伯带中更远的地方。为了达到这个目标， 新视野号研发团队让它全副武装，装有七个超高水准的科学仪器。这包括拉夫，一套足够强力的照相机，能够从一万公里以外，捕捉曼哈顿的城市街区。以及REX，被设计使用无线电波，用于测量冥王星的大气气压和温度。所有的船上仪器必须 被制造的既可靠又轻,因为新视野号还有一个附加的挑战；它必须越快抵达它的目标越好。为什么？大约在 2020 年，冥王星会抵达 其轨道上的一个点，在那个点它的大气层会凝结。而且因为它的轴的倾斜，冥王星越来越大的表面积 会被黑暗所笼罩。冥王星的公转时间相当于 248 个地球年。所以要等到下一个机会， 需要很长时间。为了看到新视野号是 如何及时抵达冥王星，让我们一起跳到它发射的时候。它的三个火箭阶段能够把新视野号 加速到足够的速度，以在九小时内抵达 400000 公里之外的月球。在一年以后，飞船抵达木星并得到我们说的重力协助。这就是它跟巨大气体行星 飞的足够近的地方，为了受到引力弹弓效应。新视野号以每小时 50000 千米的速度飞行，因此在未来的八年它会 穿过剩下的路程抵达冥王星。达到一个这样惊人的速度，就意味着减速进入轨道， 或者着陆，是不可能的。这就是为什么新视野号执行的是 飞近探测任务，意味着他只有一次机会观察冥王星。飞近探测任务是全自动的，因为在如此遥远的距离， 任何从地球来的信号，都要耗费 4.5 小时才能抵达。所以研发团队在飞船的电脑里 载满了几千套命令，叫做核心载入，这会在飞船距离冥王星 6.5 天 的时候开始执行。但是新视野号才刚刚发出十天，灾难几乎就毁灭了它。地面控制失去了与飞船的联系。在令人紧张的两个小时之后， 新视野号终于重新连线，但是主控中心发现 主电脑已经重启，所有的核心载入和 关键数据都已经失去。没有这些东西， 它很快就会直接掠过冥王星，但并不会完成任何任务。爱丽丝·伯曼，任务执行长，带领团队持续工作 72 小时无休， 终于把指令及时的加载回新视野号。没有一丝错误的空间， 她和她的团队圆满完成任务。而且新视野号开始拍摄并广播 令人激动的照片。这些观测展现了一个 变化多端的世界。有着地面雾气、高海拔烟雾、可能存在的云、大峡谷、高耸入云的山脉、断层、火山口、极地冰冠、冰川、明显的沙丘、疑似的冰火山、过去流动液体的证据和更多。最令人激动的一个发现之一是1000 千米宽的史波尼克高原冰川。史波尼克高原主要由 缓慢搅动的固氮组成，我们从来没有在太阳系中 见过类似的事物。对于冥王星的探索是个大成功，但是新视野号的使命仍未完成。在 2019 年 1 月 1 日，它会打破自己创造的最远飞行记录，当它到达柯伊伯带上的 2014 MU69 (星体编号)，这个星体相比冥王星距离太阳 又多出 10 亿千米。至于在那里会发现什么， 全世界都将为之屏息。

**P586 2018-05-18 Can you solve the penniless pilgrim riddle - Daniel Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=586)

After months of travel, you’ve arrived at Duonia, home to the famous temple that’s the destination of your pilgrimage. Entering from the northwest, you pass through the city gates and the welcome center, where you’re given a map and a brochure. The map reveals that the town consists of 16 blocks, formed by five streets that run west to east, intersecting five more that run north to south. You’re standing on the northernmost street facing east, with the two blocks containing the gate and the welcome center behind you. The temple’s only entrance lies at the very southeast corner. It’s not a long walk, but there’s a problem. As you learn from the brochure, Duonia imposes a unique tax on all visitors, which must be paid when they arrive at their destination within the city. The tax begins at zero, increases by two silver for every block you walk east, and doubles for every block you walk south. However, a recent reform to make the tax fairer halves your total bill for every block you walk north and subtracts two silver for every block you walk west. Just passing through the gate and the welcome center means you already owe four silver. As a pilgrim you carry no money and have no way of earning any. What’s more, the rules of your pilgrimage forbid you from walking over any stretch of ground more than once during your journey— though you can cross your own path. Can you figure out a way to reach the temple without owing any tax or walking the same block twice in any direction? Pause here if you want to figure it out for yourself. Answer in: 3 Answer in: 2 Answer in: 1 You look at the map to consider your options. Walking towards the temple always increases the tax, and walking away decreases it, so it seems like you can never reach it without owing silver. But what happens when you walk around a single block? If you start out owing four silver and go clockwise starting east, your tax bill becomes six, then 12, then 10, then five. If you looped again, you’d owe seven, 14, 12, and six. It seems that each clockwise loop leaves you owing one extra silver. What about a counterclockwise loop then? Starting owing four again and going south first, your bill changes to eight, 10, five, and three. Looping again you’d owe six, eight, four, and two. Each counterclockwise loop actually earns you one silver. That’s because any tax doubled, plus two, halved, and minus two, always ends up one smaller than it started. The key here is that while the different taxes for opposite directions may seem to balance each other out, the order in which they’re applied makes a huge difference. You start off owing four silver, so four counterclockwise loops would get you down to zero. Unfortunately, it’s not that simple, since you can’t walk the same block twice. But there’s another way to reduce your bill: walking one large counterclockwise loop through the city. From your starting position, walk three blocks south. You need to leave the southernmost street clear for the final stretch, so continuing counterclockwise means going east. Walk two blocks to the eastern wall and you owe a whopping 36 silver. But now you can start reducing your bill. Three blocks north and one block west cuts it to 2.5. You can’t go west from here —that would leave you with no way out. So you go one block south, and the remaining three blocks west, leaving you with a debt of -1 silver. And since doubling a negative number still gives you a negative number, walking the three blocks to the south wall means the city owes you eight. Fortunately, that’s exactly enough to get you through the final blocks to the temple. As you enter, you realize what you’ve learned from your pilgrimage: sometimes an indirect route is the best way to reach your destination.

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翻译人员: Riley WANG 校对人员: Monkey Luffy“流浪的人未必都迷茫......” ——J.R.R 托尔金 《魔戒同盟》经历了数个月的旅程之后 你来到了多纳。这里有一座著名的神殿， 也是你此次朝圣之旅的目的地。你从西北方向进入该区域，穿过城门和游客中心，在这里你得到了 一份地图和一个小册子。地图显示这个城镇 由 16 个方块区域构成，五条自西向东的大街， 与五条自北向南的大街彼此相交。你正位于最北边的街道，面向东边，在你身后是大门和 游客中心这两个街区。神殿的唯一入口位于城镇的东南角。去那里的路程并不长， 但有一个问题。你从手册中看到，多纳对所有到访者 都实行一种独特的征税制度，这项税额在游客到达 城市内某处目的地时收取。税额起初为零，每向东走一个街区 就增加两个银币，每向南走一个街区 就使当前税金翻倍。然而，最近的一项改革 使得缴税更加公平，每向北走一个街区会使税金减半，每向西走一个街区 就可以减掉两个银币。因为你已经走过了大门和游客中心，你目前已经欠下了 4 个银币。作为朝圣者， 你身无分文，也没有办法赚钱、此外，朝圣有规定，禁止重复已经走过的道路，但新的路线可以 与以前的路线相交。你能够想出不用交税、 不重复走过的路线，就能到达神殿的方法么？如果你想自己解题，请在此处暂停。答案倒计时：321你看着地图思考如何前进。朝着神殿走总会增加税金，背离神殿走则总会减少税金，似乎你永远也不能 零税金到达神殿。但如果你绕着单个街区 走一圈会发生什么呢？如果你开始欠下 4 个银币 并且以顺时针方向先向东走。要交的税金变成了 6 个银币，然后是 12 个银币，然后是 10 个银币，最后是 5 个银币。如果你再走一圈， 你所欠的银币就是 7，14，12，6。似乎每次顺时针行走 会让你多欠一个银币的税。那逆时针走会怎么样呢？仍然以 4 个银币的税金开始， 先向南走，税金变成了 8，然后是 10，5，最后是 3。再转一圈，你欠的税金变成 6，8，4，最后是 2。每次逆时针行走 都会减少一个银币的税金，这是因为任何数字先翻倍，再加 2，再减半，然后再减 2，都会比原来的数字小 1。关键在于， 税金额度在相反方向上的差异似乎会相互抵消，但调整方向的先后顺序 会产生很大不同。开始时你欠着 4 个银币，因此 4 次逆时针行走 就可以让你缴纳的税金为 0 。但这并没有如此简单， 因为你不能重复绕同一个街区两次。但还有一种方法 可以降低要缴纳的税金：在城市中走出一个大的逆时针圈。从起始点开始向南走三个街区。你需要留出最南边的街道 作为最后的路线，走逆时针路线意味着你要继续向东。向东走两个街区到达城墙， 此时税金达到了 36 个银币。但从现在开始 你的税金就要开始下降了。向北走三个街区再向西走一个街区 使得税金降至 2.5 。你不能再继续往西走， 不然就没有路可以走了。因此你继续向南走一个街区， 再向西走三个街区，此时的税金为 -1 个银币。由于负数翻倍仍然是负数，向南走三个街区 意味着城市欠你 8 个银币。幸运的是，这些金币的数量足够让你走到最后的神殿。当你进入神殿时，你意识到 自己从这次朝圣中领会了一个道理：有时候，绕路才是 到达目的地的最好办法。

**P587 2018-05-18 What is dust made of - Michael Marder**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=587)

Meet Dermatophagoides farinae. Crawling around on eight legs, this creature has no eyes to appreciate the kaleidoscope of colors around her. She relies on her extraordinary sense of smell to lead her to food and safe places to lay eggs. And she’s smaller than a pinhead. Dermatophagoides farinae is a dust mite. Less than a tenth the size of an ant, a dust mite’s whole world is contained in the dusty film under a bed or in a forgotten corner. This realm is right under our noses, but from our perspective, the tiny specks of brilliant color blend together into a nondescript grey. What are these colorful microscopic particles? What distinguishes the dust in your house from, say, sand on a beach is that it is a mixture of many different ingredients. It can contain grains of sand, dead skin cells, tiny hairs and threads, animal dander, pollen, manmade pollutants, minerals from outer space, and, of course, dust mites. Dust mites eat animal dander, human skin, and some fungi. We shed dead skin cells constantly, and wherever we live, they mix into the household dust. The same goes for our pets: their dander and hairs enter the mix, as do tiny pieces of thread and cotton fibers from our clothes. These components make every household’s dust a unique blend of bits from its particular inhabitants. Household dust also contains substances that blow in from the wider world. Depending on the local geology, finely ground quartz, coal, or volcanic ash might enter the air as atmospheric dust, along with pollen and fungal spores. Industrial activities also contribute cement powder, particles from car tires, and other chemicals to the airborne mix. The combination of these elements can be as unique as a fingerprint. In Spain, where the land is rich in carbonate materials, dust contains 20 times as much calcium as dust in Nigeria, where the geology is quite different. After a particularly violent storm, scientists identified dust from the Sahara Desert thousands of miles away in London, based on its specific composition. In the future, we may be able to pinpoint the origins of dust samples even more specifically, down to a particular neighborhood or even house - something that may be of great help for forensic specialists. In addition to markers of humans, animals, and landscapes, dust also contains particles from further afield. When a star explodes in a distant galaxy, super hot gases vaporize everything nearby. Then, the dust settles; minerals condense out of the gas. Floating out there between planets and galaxies, this extraterrestrial dust contains tiny pieces of extinguished stars and the building blocks of future celestial bodies. Every year, tens of thousands of tons of cosmic dust lands on Earth and mingles with terrestrial minerals. This blend of chemicals, minerals, and intergalactic particles settles out of the air onto surfaces in our homes, mixing with the detritus of each house’s occupants. Stars explode, mountains erode, and buildings, plants, and animals are all slowly but surely pulverized into fine grey powder. We’re all destined to become dust, but it’s also possible that we came from it. Interstellar dust has been found to carry organic compounds through space. It’s possible that billions of years ago, some of these cosmic particles were the seed of life on our little blue planet.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=587)

翻译人员: Xinran Yu 校对人员: Carol Wang见识一下美洲尘螨，它用八只脚四处爬行，这种生物是没有眼睛的， 无法欣赏其周边环境的色彩斑斓。它依靠超凡的嗅觉，去找食物以及产卵的安全地方。它比针头还小。美洲尘螨是一种尘螨，体型不到一只蚂蚁的十分之一，尘螨的生活的世界就在 一张床下或者一个被遗忘角落的薄薄灰尘之中。尘螨的王国就在我们眼皮底下， 但在我们看来，这些色彩艳丽的微粒 集中在一起却是单调的灰色。这些色彩斑斓的微小粒子是什么？房间里的灰尘与海滩的沙 的区别在于，灰尘中包含了许多不同物质。它包含沙粒、死亡的皮肤细胞、微小毛发和线头、动物毛屑、花粉、人造污染物、来自外界的矿物质，当然，还有尘螨。尘螨会吃动物毛屑、人类皮肤，以及一些霉菌。我们经常会有 死亡的皮肤细胞脱落，不论我们住在哪里，它们都会 和家中的灰尘混合在一起。我们的宠物也是这样：它们的皮屑和毛发都会混和进去，我们衣物上的小线头 以及棉纤维也会混和进去。这些成分会让每户人家的灰尘都成为了来自住户独特的混合灰尘。家中的灰尘也包含了 从外界吹进来的物质。根据当地的地质情况而异，微细的石英粉、煤，或火山灰都可能会以大气灰尘的形式 进入空气当中，并伴随着花粉以及菌类孢子。工业活动也产生水泥粉末、来自汽车轮胎的微粒，以及其他化学物质， 这些都会混合在空气中。这些元素的组合就像 指纹一样独一无二。在西班牙，土地富含碳酸盐物质，那里灰尘中的钙含量 是地质情况截然不同的尼日利亚的二十倍。在一场特别的强烈暴风之后，科学家在伦敦依靠独特成分辨识出了数千里之外的撒哈拉沙漠尘土。在未来，我们有可能更明确地 定位出灰尘样本是属于哪个社区， 甚至哪间房子——这可能会对法医很有帮助。灰尘所含的粒子， 除了来自人类、动物和环境之外，还可能来自更远的地方。当一颗恒星在遥远的星系爆炸时，高温气体会蒸发附近的所有物质。接着，尘土会沉积下来； 气体凝结成矿物质。这些在行星和星系之间漂 浮的外星尘埃包含了已经消失的恒星的微小碎片，以及形成未来天体的基石。每年，数万吨的宇宙尘土降落在地球上， 与陆地矿物质混合在一起。这种化学物质，矿物， 以及银河间粒子的混合物会从空气中沉积下来， 落在房屋表面，与房屋中的居住者 产生的碎屑混合。星星会爆炸，山脉会被侵蚀，建筑物、植物，及动物都会无可避免地 慢慢地变成灰色粉末。我们都注定要化为尘土，但我们也有可能 是来自于尘土。我们已经发现，星际尘土 会带着有机复合物穿过太空。有可能在数十亿年前，某些宇宙粒子正是我们在这蓝色小星球上的生命种子。

**P588 2018-05-22 How one scientist averted a national health crisis - Andrea Tone**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=588)

In the fall of 1960, Frances Oldham Kelsey was one of the Food and Drug Administration’s newest recruits. Before the year was out, she would begin a fight that would save thousands of lives, though no one knew it at the time. Although she was new to the FDA, Kelsey was no novice as a scientist. After graduating from high school at age 15, she enrolled at McGill University in Montreal and earned both undergraduate and master’s degrees in pharmacology. From there, she applied for a research post at the University of Chicago’s pharmacology department. Her acceptance letter was addressed to Mr. Oldham. Kelsey later joked that had her name been Elizabeth or Mary Jane, her career might have ended there. Fortunately, it didn’t. She earned her doctorate in pharmacology and accepted Chicago’s invitation to stay as faculty, where she undertook pioneering research on drugs and fetal safety. In 1950, she earned an MD, her fourth and final degree. By the time she joined the FDA, Frances Kelsey was one of the most educated, experienced scientists around. Yet, as the newest member of the team, Kelsey was assigned what everyone thought would be an easy review: an application from the US drug company Merrell to sell a drug called thalidomide. Thalidomide was a sedative developed in Germany that was already being widely used in dozens of countries to treat insomnia and workplace stress. Thalidomide’s anti-nausea properties also made it a popular remedy for pregnant women with morning sickness. Reviewing Merrell’s application, Kelsey found its data on thalidomide’s absorption and toxicity inadequate. Today, the FDA classifies drugs based on their safety for a fetus. But in 1960, many experts believed that the placental barrier shielded a fetus from harm. Kelsey's earlier animal-based research demonstrated the opposite: drugs could pass from mother to fetus through the placenta. Like other drug companies at this time, Merrell had not tested its drug on pregnant animals. Kelsey later said Merrell’s evidence for thalidomide’s safety seemed “more like testimonials than the results of well-designed studies.” Kelsey rejected Merrell’s application and asked them to submit a second backed by better evidence. Her FDA colleagues supported this decision. Merrell had expected a quick, affirmative reply so it could launch thalidomide for the holiday season, when sedative sales soar. Instead of supplying Kelsey with the data she requested they first tried to convince her to approve the drug over a series of calls and visits. When these failed to sway her, Merrell executives complained that stubborn and nit-picking Kelsey was the problem, not thalidomide. The FDA backed Kelsey, forcing Merrell to file another application, and another, and another. As Kelsey reviewed and rejected each new application, news of thalidomide’s adverse side effects began to surface. Doctors reported cases of nerve damage in early 1961, and by fall, they’d unmasked a more horrible truth. Thalidomide, widely used by pregnant women, caused severe birth defects. Thousands of babies died in utero, and tens of thousands more were born with extra appendages, shorter limbs, or no limbs at all. In November 1961, thalidomide was pulled from the German market. Nonetheless, Merrell continued trying to get it approved in the US for several months before withdrawing their sixth and final application. While Kelsey wasn’t the only scientist to identify the risks of thalidomide, she sounded the alarm that kept it off the multi-billion-dollar American drug market. As public awareness of the thalidomide tragedy grew, the quiet scientist became a media sensation. Headlines in newspapers and magazines heralded her heroism while a smiling President John F. Kennedy presented her an award on the White House lawn. After the thalidomide scare, Congress passed laws that expanded the FDA’s authority and toughened requirements for new drug applications. Kelsey was tapped to head the agency’s drug investigation branch. Working at the FDA in different capacities into her 90s, Kelsey was able to witness the changes her actions helped inspire. Her visibility may have dimmed since, but her legacy endures. Privileging facts over opinions, and patience over shortcuts, she made evidence-based medicine the foundation of reforms that continue to protect people today.

**P588 2018-05-22 How one scientist averted a national health crisis - Andrea Tone**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=588)

翻译人员: Riley WANG 校对人员: Lipeng Chen1960年秋天，Frances Oldham Kelsey 刚刚加入 美国食品药品监督管理局 (FDA)。在这年年末，她即将开始一场拯救数千生命的斗争，但在当时却无人知晓。虽然凯尔西刚刚进入FDA， 但她并非新人科学家。15岁从高中毕业之后，她在加拿大蒙特利尔的麦吉尔大学就读，在此获得了药理学的学士和硕士学位。此后，她向芝加哥大学的药理学系申请了研究员一职。她的录取信发给了 Oldham 先生。Kelsey 后来开玩笑说 如果她的名字是 Elizabeth 或 Mary Jane，她的职业生涯可能会就此结束。幸运的是，这并未发生。她获得了药理学博士学位，并接受了芝加哥大学的邀请成为教员，她在药物和胎儿安全方面进行了开创性的实验。1950年，她获得了医学博士学位， 这是她获得的第四个也是最后一个学位。她加入FDA时，Frances Kelsey 是其中受教育程度最高、 经验最丰富的科学家之一。但作为团队最新的一员，分派给 Kelsey 的是公认的简单工作：审查美国梅里尔制药公司的提起的申请，这项申请请求批准名为沙利度胺的药品上市。沙利度胺是德国开发的镇静剂，已经在数十个国家广泛使用，用来治疗失眠和职场压力。沙利度胺具有抑制恶心的特性，使得它也广泛用于缓解孕妇晨吐。在审核梅里尔的材料时，Kelsey 发现，关于沙利度胺 药品吸收和毒性的数据并不充分。如今，FDA按照对胎儿的安全程度 进行药品分级。但在1969年时，许多专家认为胎盘屏障可以保护胎儿免受药物伤害。Kelsey 进行的早期动物测试推翻了这一结论：药物可以通过胎盘由母体传递给胎儿。如同当时其他的制药公司，梅里尔并未在孕期动物身上进行测试。Kelsey 后来表示 梅里尔给出的沙利度胺安全性的证据“更像是引用证词而不是精确研究得出的结果。”Kelsey 否决了梅里尔的申请，并要求公司再次提交更有效的证据。这个决定也得到了FDA同事的支持。梅里尔原本期待快速通过批准，以便在假期前发售沙利度胺药品，因为镇静药物销量在假期时往往大增。梅里尔公司并未提供 Kelsey 要求的数据，而是先通过不断打电话和上门会面，试图说服 Kelsey 批准药物上市。当这些都无法动摇 Kelsey 时，梅里尔的高层主管怨声载道，认为沙利度胺没有问题，顽固不堪、吹毛求疵的 Kelsey 才是最大的问题。FDA支持 Kelsey，迫使梅里尔公司重新提交申请，再一次提交，又一次提交。这些申请都经过 Kelsey 的审核及回绝，此时有关沙利度胺副作用 的新闻也开始出现。1961年初，有医生发表神经损伤的病例，秋天时，医生揭露出一个更可怕的事实。广泛作为孕妇用药的沙利度胺 导致了严重的婴儿出生缺陷。数千名婴儿在子宫中死去，上万名婴儿出生时伴有多余附器，更短的四肢，甚至完全没有四肢。1961年11月，沙利度胺在德国市场下架。尽管如此，梅里尔仍进行了数月的尝试，共提交了六次申请， 希望药品在美国通过审批。虽然发现沙利度胺具有风险的 不止 Kelsey 一人，却是她敲响了警钟，阻止该药品进入 规模达到数十亿的美国药品市场。随着公众对沙利度胺惨案的意识提高，默默无闻的科学家成为了媒体聚焦点。报纸杂志头条宣传 Kelsey 的英雄事迹，约翰·肯尼迪总统在白宫的草坪颁发给 Kelsey 一枚奖章。沙利度胺恐慌之后，议会通过法案提高FDA的权力，加强了新药申请的要求。Kelsey 被任命领导药品审查部分的工作。她在FDA不同职位工作直到90岁高龄，Kelsey 见证了 她的行为促进了改变。虽然之后人们对她的关注度不如以往， 但她的事迹仍在流传。事实高于观点，耐心胜于捷径，她将以证据为基础的药品作为改革的基础，而这仍继续保护着如今的我们。

**P589 2018-05-23 The Irish myth of the Giant's Causeway - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=589)

On the coast of Northern Ireland, a vast plateau of basalt slabs and columns called the Giant’s Causeway stretches into the ocean. The scientific explanation for this is that it’s the result of molten lava contracting and fracturing as it cooled in the wake of a volcanic eruption. But an ancient Irish myth has a different accounting. According to legend, the giant Finn MacCool lived happily on the North Antrim coast with his wife Oonagh. Their only disturbance came from the taunts and threats of the giant Benandonner, or the red man, who lived across the sea in Scotland. The two roared insults and hurled rocks at each other in dramatic shows of strength. Once, Finn tore up a great clump of land and heaved it at his rival, but it fell short of reaching land. Instead, the clump became the Isle of Man, and the crater left from the disturbed earth filled with water to become Lough Neagh. The giants’ tough talk continued, until one day Benandonner challenged Finn to a fight, face to face. And so the Irish giant tossed enough boulders into the sea to create a bridge of stepping stones to the Scottish coast. Finn marched across in a fit of rage. When Scotland loomed before him, he made out the figure of Benandonner from afar. Finn was a substantial size, but at the sight of his colossal enemy thundering towards him, his courage faltered. With one look at Benandonner’s thick neck and crushing fists, Finn turned and ran. Back home, with Benandonner fast approaching, Finn trembled as he described his enemy’s bulk to Oonagh. They knew that if he faced Benandonner head on, he’d be crushed. And so Oonagh hatched a cunning plan - they needed to create an illusion of size, to suggest Finn was a mountain of a man whilst keeping him out of sight. As Benandonner neared the end of the bridge, Oonagh stuffed her husband in a huge cradle. Disguised as an enormous baby, Finn lay quiet as Benandonnner pounded on the door. The house shook as he stepped inside. Oonagh told the enraged visitor that her husband wasn’t home, but welcomed him to sit and eat while he waited. When Benandonner tore into the cakes placed before him, he cried out in pain for he’d shattered his teeth on the metal Oonagh had concealed inside. She told him that this was Finn’s favorite bread, sowing a seed of doubt in Benandonner’s mind that he was any match for his rival. When Finn let out a squawk, Benandonner’s attention was drawn to the gigantic baby in the corner. So hefty was the infant swaddled under piles of blankets, Benandonner shuddered at the thought of what the father would look like. He decided he’d rather not find out. As he fled, Benandonner tore up the rocks connecting the shores, breaking up the causeway. What remains are two identical rock formations: one on the North Antrim coast of Ireland and one at Fingal’s Cave in Scotland, right across the sea.

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翻译人员: Sally Yang 校对人员: Lipeng Chen在北爱尔兰的海岸，有一大片玄武岩石板和石柱绵延入海，其名为巨人堤道。科学表明，这是在火山喷发之后，灼热的熔岩反复冷却收缩并爆裂所形成的景观。但是，一个古爱尔兰传说 却对其有着不同的诠释。传说是这样讲的：爱尔兰巨人芬·麦库尔与他的妻子乌娜 幸福地生活在北安特里姆的海岸上。唯一的烦恼来自 巨人贝南德纳的嘲讽和挑衅。贝南德纳别名红色巨人， 他住在海的彼岸的苏格兰。两个人互相嘲讽， 为了展现自己的实力甚至向对方投掷石块。有一次，芬挖起了一块巨石掷向了对手，但巨石落在了海里。于是，那块巨石变成了如今的马恩岛，而石块原先所在的地方留下的坑 渐渐装满了水，变成了内伊湖。两个巨人之间的争吵还在继续。直到一日，贝南德纳 要求芬和他面对面单挑。于是芬不断地将一块块石头丢到海里，搭起了一座通往苏格兰海岸的石桥。芬愤怒地跨过了大海。当他总算抵达苏格兰时，他看到了在远处的贝南德纳的身影。芬自己也身高马大，但当他看到比他还魁梧高大的 贝南德纳向他走来时，他的勇气一下子没了。芬看了一眼贝南德纳粗壮的脖子 和坚不可摧的双拳，转头就跑。他跑回了家，贝南德纳紧追在后。芬一边颤抖着， 一边向乌娜形容了敌人的个头。他们明白若他正面迎上贝南德纳，他是赢不了的。于是乌娜想出了一个狡猾的计策——他们必须诱导敌人的思维，在芬不在场的情况下， 让他以为芬是一个不可战胜的人。随着贝南德尔走下石桥，乌纳将丈夫塞进了 一个巨大的婴儿摇篮里。芬假装自己是一个巨大的婴儿，在贝南德尔敲门时一语不发。当贝南德尔进门时，房子都抖了起来。乌娜告诉愤怒的来访者她的丈夫不在家，但欢迎他坐下来吃点东西， 一起等芬回来。贝南德尔对着面前的蛋糕一阵狼吞虎咽，却痛得叫出声来。乌娜提前将金属藏在了蛋糕里， 导致他的牙齿都碎裂了。她告诉贝南德尔这是芬最喜欢的面包，使得贝南德尔开始怀疑自己是否真的敌得过对方。芬一声尖叫，使得贝南德尔注意到了 角落里巨大的婴孩。裹在一层层被子里的婴儿显得那么魁梧，贝南德尔甚至无法想象 其父亲的体型将有多么恐怖。他决定自己还是不知道为妙。贝南德尔逃之夭夭， 途中他故意拆断了堤道。剩下的便是两个完全相同的岩石构成：一个在爱尔兰北安特里姆的海岸上，另一个则在海的彼岸， 苏格兰的芬格洞穴里。

**P590 2018-05-24 What causes insomnia - Dan Kwartler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=590)

What keeps you up at night? Pondering deep questions? Excitement about a big trip? Or is it stress about unfinished work, an upcoming test, or a dreaded family gathering? For many people, this stress is temporary, as its cause is quickly resolved. But what if the very thing keeping you awake was stress about losing sleep? This seemingly unsolvable loop is at the heart of insomnia, the world’s most common sleep disorder. Almost anything can cause the occasional restless night - a snoring partner, physical pain, or emotional distress. And extreme sleep deprivation like jetlag can throw off your biological clock, wreaking havoc on your sleep schedule. But in most cases, sleep deprivation is short-term. Eventually, exhaustion catches up with all of us. However, some long-term conditions like respiratory disorders, gastrointestinal problems, and many others can overpower fatigue. And as sleepless nights pile up, the bedroom can start to carry associations of restless nights wracked with anxiety. Come bedtime, insomniacs are stressed. So stressed their brains hijack the stress response system, flooding the body with fight-flight-or-freeze chemicals. Cortisol and adrenocorticotropic hormones course through the bloodstream, increasing heart rate and blood pressure, and jolting the body into hyperarousal. In this condition, the brain is hunting for potential threats, making it impossible to ignore any slight discomfort or nighttime noise. And when insomniacs finally do fall asleep, the quality of their rest is compromised. Our brain’s primary source of energy is cerebral glucose, and in healthy sleep, our metabolism slows to conserve this glucose for waking hours. But PET studies show the adrenaline that prevents sleep for insomniacs also speeds up their metabolisms. While they sleep, their bodies are working overtime, burning through the brain’s supply of energy-giving glucose. This symptom of poor sleep leaves insomniacs waking in a state of exhaustion, confusion, and stress, which starts the process all over again. When these cycles of stress and restlessness last several months, they’re diagnosed as chronic insomnia. And while insomnia rarely leads to death, its chemical mechanisms are similar to anxiety attacks found in those experiencing depression and anxiety. So suffering from any one of these conditions increases your risk of experiencing the other two. Fortunately, there are ways to break the cycle of sleeplessness. Managing the stress that leads to hyperarousal is one of our best-understood treatments for insomnia, and good sleep practices can help rebuild your relationship with bedtime. Make sure your bedroom is dark and comfortably cool to minimize “threats” during hyperarousal. Only use your bed for sleeping, and if you’re restless, leave the room and tire yourself out with relaxing activities like reading, meditating, or journaling. Regulate your metabolism by setting consistent resting and waking times to help orient your body’s biological clock. This clock, or circadian rhythm, is also sensitive to light, so avoid bright lights at night to help tell your body that it’s time for sleep. In addition to these practices, some doctors prescribe medication to aid sleep, but there aren’t reliable medications that help in all cases. And over-the-counter sleeping pills can be highly addictive, leading to withdrawal that worsens symptoms. But before seeking any treatment, make sure your sleeplessness is actually due to insomnia. Approximately 8% of patients diagnosed with chronic insomnia are actually suffering from a less common genetic problem called delayed sleep phase disorder, or DSPD. People with DSPD have a circadian rhythm significantly longer than 24 hours, putting their sleeping habits out of sync with traditional sleeping hours. So while they have difficulty falling asleep at a typical bedtime, it’s not due to increased stress. And given the opportunity, they can sleep comfortably on their own delayed schedule. Our sleeping and waking cycle is a delicate balance, and one that’s vital to maintain for our physical and mental wellbeing. For all these reasons, it’s worth putting in some time and effort to sustain a stable bedtime routine, but try not to lose any sleep over it.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=590)

翻译人员: Lan (Theresa) Peng 校对人员: Fern Miao是什么导致你晚上睡不着？思考某些深刻的问题？为旅行感到兴奋？或者是因为各种压力， 来自未完成的工作的、即将来临的考试的、或是来自可怕的家庭聚会的压力？对很多人来说， 这种压力是暂时的， 因为压力来源很快便会消失。但是， 如果那个导致你失眠的原因 正是害怕失眠的压力呢？这个看似无法解决的死循环是 失眠的核心，世界上最常见的睡眠问题。几乎任何事情都可以造成 一个不眠之夜：一个打呼噜的同伴，身体上的疼痛，或者情绪上的困扰。还有，像极端剥夺睡眠时差, 还可以打乱你的生物钟，破坏你的睡眠时间表。但是在大多数的情况下， 睡眠剥夺是暂时的。最终，疲劳会打败任何人。可是一些长期的症状， 比如呼吸系统疾病，肠胃问题，还有很多其他原因， 都给予疲劳打败我们的机会。随着不眠之夜越来越多，卧室开始与那些未眠夜关联起来，被焦虑所充斥。每到睡觉时间， 失眠患者便会感到压力。由于压力太大，患者的大脑开始干涉 人体压力反应系统的运作，在人体产生大量抗击-逃避-或静止的 化学物质。皮质醇和促肾上腺皮质激素 在血液中流动，提高心率和血压，以及刺激身体进入过度清醒的状态。在这样的情况下，大脑搜索潜在的威胁，让大脑无法忽视任何不适或者噪音，当失眠患者最终睡着了，他们的睡眠质量已受到影响。我们大脑最主要的能量来源是脑葡萄糖，在健康的睡眠中，我们的新陈代谢放缓， 以保存脑葡萄糖供我们清醒时使用。但是，PET (正电子发射断层扫描) 研究显示， 防止失眠患者睡眠的肾上腺素同样也加速他们的新陈代谢。当他们睡觉时， 他们的身体还在加班，消耗脑葡萄糖的能量。睡眠不好的症状使得失眠患者在疲惫，困惑和充满压力的状态下 醒过来，这个过程一晚又一晚的重复。当压力和疲劳的循环持续几个月后，他们会被诊断为慢性失眠症。虽然失眠症很少导致死亡，但它的化学机制与焦虑发作时产生的抑郁和焦虑的化学机制很相似。所以患上这些症状中的任何一种，会提高你患上另外两种症状的风险。幸好，是有方法可以打破失眠的循环。管理导致高度觉醒的压力，是我们知道已知的 治疗失眠的方法之一，而且好的睡眠习惯可以重建 你的睡眠时间。确保你的卧室足够黑暗和凉爽，让高度觉醒中的“危险”达到最小。你的床只用来睡觉，如果你睡不着，离开卧室，做一些放松的活动 让自己疲劳，比如阅读，冥想，或者写日记。通过设置一致的休息和清醒时间 调节你的新陈代谢，帮助适应你身体的生物钟。这生物钟，或者生理节奏，对灯光也很敏感，所以在晚上要避免亮光，有助告诉你的身体 现在是睡觉时间。除了这些方法外，一些医生会开有助睡眠的处方药物，但是没有可靠的药物能够 解决所有的问题。而且非处方药很容易让人上瘾，导致依赖药物 使得症状更糟糕。但是在寻求任何治疗方法前，确保你的失眠 是由失眠症造成的。大约8%被诊断为慢性失眠的病人，实际上患有不常见的遗传问题，被称为延迟睡眠期障碍， 或者DSPD。患有延迟睡眠期障碍的病人， 他们的昼夜规律明显长于正常的24小时，导致了他们的睡眠习惯与 传统的睡眠时间上的不一致。所以他们在通常的睡觉时间很难入睡，这不是因为压力的增加。如果给予他们适合自己的睡眠时间表，他们可以非常舒服地睡觉。我们的睡眠和清醒的周期 是一个微妙的平衡，这个平衡对于维护我们 身心健康非常重要。因为所有的这些原因，值得付出一些时间和努力，来维持一个稳定的睡眠习惯，并努力减少失眠。

**P591 2018-05-25 Can you solve the giant cat army riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=591)

The villainous Dr. Schrödinger has developed a growth ray and intends to create an army of giant cats to terrorize the city. Your team of secret agents has tracked him to his underground lab. You burst in to find… that it’s a trap! Dr. Schrödinger has slipped into the next room to activate his device and disabled the control panel on the way out. Fortunately, your teammates are masters of spy-craft. Agent Delta has hacked into the control panel and managed to reactivate some of its functionality. Meanwhile, Agent Epsilon has searched through surveillance to find the code for the door: 2, 10, 14. All you have to do is enter those numbers and you’ll be free. But there’s a problem. The control panel has only three buttons: one which adds 5 to the display number, one which adds 7, and one which takes the square root. You need to make the display output the numbers 2, 10, and 14, in that order. It’s okay if it outputs different numbers in between, but there’s no way to reset the display, so once you get to 2, you’ll have to continue on to 10 and 14 from there. Not only that, Agent Delta explains that there are other traps built into the panel. If it ever shows the same number more than once, a number greater than 60, or a non-whole number, the room will explode. Right now, the display reads zero, and time is running out. There’s only one way to solve the puzzle, with a few small variations. How will you input the code to escape from Dr. Schrödinger’s lair and save the day? Pause the video now if you want to figure it out for yourself! Answer in: 3 2 1. You look over your options. Adding 5 or 7 increases the number, and the square root button will make it smaller. But there are only a few options where you can use that button: 4 9 16 25, 36, and 49. You’d love to make 4 or 16. Then you could hit the square root button once or twice to get 2. But you can’t make either with just the 5 and 7 buttons. What will you do? You look at the other possible options for numbers you could take the square root of. Nine you can’t reach. Twenty-five and 49 would take you back to 5 or 7, and you can already get to each of those. Thirty-six is your only option. You add 5, 7, 5, 7, 5, 7, and then hit the square root button. Why that series of 5s and 7s? It’s somewhat arbitrary, but you know that you want to avoid 10, 14, and perfect squares, since you’ll need them later. This gets you to 6. Does that help? Looking at your options, you see that 16 is now in your sights. You add 5 twice more to reach it. Then hit square root twice. That gets you to 2. You’re on your way! Now to 10. You can’t get straight there through addition alone, so you’re going to have to reach another square. Taking the square root of 9 or 25 would get you to a good place, but it turns out that 25 is unreachable from 2. So you add 7 to get to 9, then take the square root again. That gets you to 3. Adding 7 again makes 10. Finally, you need to reach 14. Thinking backwards, you imagine where you could be before 14: 7 or 9. But 9 won’t work because you’ve already used 9. However, you could get to 7 by reaching 49 first. You add your way towards it, being careful not to hit any of the numbers you’ve hit so far. You thread your way carefully, adding five 5s and two 7s. Then, square root to 7, and add 7 more. The door opens, and you’re out of the trap. Thanks to your problem-solving skills, your team gets Schrödinger’s cats out of the box in the nick of time. As for Schrödinger, you can be certain of one thing: he’ll be spending quite some time in a box of his own.

**P591 2018-05-25 Can you solve the giant cat army riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=591)

翻译人员: Riley WANG 校对人员: Monkey Luffy邪恶博士薛定谔 发明了一种生长射线，他意图制造一支巨猫军队，造成市民恐慌。你所在的秘密特工小队跟踪薛定谔博士 来到他的地下实验室。你们经过深入调查， 却发现这是个陷阱！薛定谔博士已经到隔壁房间 激活了他的装置，他破坏了撤出路线的控制板。幸运的是， 你的团队成员都是间谍大师。德尔塔特工黑入了控制面板，成功激活了部分功能。与此同时，艾普西龙特工 查看了监控录像，发现了开门的密码：2 ，10 ，和 14 。你只需要输入这些数字 就可以获得自由。但还有一个问题。控制面板只有三个按键，一个是给显示屏上的数字加 5 ，另一个是加 7 ，最后一个则是开平方。你需要让显示器按顺序出现2 ，10 ，14 这三个数字。在两个目标数字之间 可以出现其他数字，但是无法重置输入过程，因此，一旦你得到了 2，你需要在此基础上继续输入 直到得到 10 和 14 。德尔塔特工说规则不仅如此，控制面板中还设置了其他陷阱。如果重复出现了同样的数字，或是数字大于 60，再或者出现了非整数，这个房间就都会爆炸。现在，显示屏上的数字是 0 而时间所剩无几。这道题目的解答方法 只有一种且变化很少。为了逃离薛定谔博士的实验室 并拯救城市，你将如何输入密码？如果你想自己解题，请在此暂停。离答案揭晓还有：3 秒，2 秒，1 秒。你思考着对策。加 5 或加 7 会让数字增加，而平方根会让数字变小。但使用平方根的机会很少，只有 4，9，16，25，36，49。你希望能得到 4 或是 16 。然后开一次或两次根号 就可以得到 2。但这两个数字都没办法 用加 5 和加 7 获得。这该如何是好?你尝试想出其他的对策 得出可以开方的数字。9 是无法得出的。25 和 49 会让 你得到 5 和 7 ，但你本来就可以得到这两个数字。36 成了你唯一的选择。你先加 5，再加 7，再加 5，再加 7，再加 5，再加 7，然后敲下开平方的按键。为什么以这个顺序加 5 和加 7 呢？看上去是随机的，但是你需要避开 10，14 和完全平方数，毕竟你之后还要用到它们。这下你得到了 6。这有用么？再思考一下，你发现 16 这个数字变得唾手可得。通过两次加 5 就可以得到。然后开平方两次。就得到了 2。进展不错！下一个目标数字是 10。你无法通过加法直接得到这个数字，因此你还是要 先得到某个完全平方数。对 9 和 25 开根号 会带来不错的结果，但是无法从 2 得到 25 。所以你在 2 的基础上 加 7 得到 9，然后开根号。这就得到了 3。再加 7 得到 10。最后的目标数字是 14。通过逆向思考，设想在 14 之前 可以得到的数字有哪些？7 或是 9。但是不能选 9， 因为 9 已经出现过一次。但是你可以通过 对 49 开根号得到 7。你通过加法试图得到 49，要小心不重复之前出现过的数字。你小心翼翼，加上 5 个 5 和 2 个 7。然后开根号得到 7， 再加 7。门开了，你们成功脱困。由于你出色的问题解决能力，你的小队在最后一刻 抓到了薛定谔的猫。至于薛定谔，你可以确定的是，他要在自己的盒子里 待上好一段时间了。

**P592 2018-05-29 Why is it so hard to cure ALS - Fernando G. Vieira**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=592)

In 1963, a 21-year-old physicist named Stephen Hawking was diagnosed with a rare neuromuscular disorder called amyotrophic lateral sclerosis, or ALS. Gradually, he lost the ability to walk, use his hands, move his face, and even swallow. But throughout it all, he retained his incredible intellect, and in the more than 50 years that followed, Hawking became one of history’s most accomplished and famous physicists. However, his condition went uncured and he passed away in 2018 at the age of 76. Decades after his diagnosis, ALS still ranks as one of the most complex, mysterious, and devastating diseases to affect humankind. Also called motor neuron disease and Lou Gehrig’s Disease, ALS affects about two out of every 100,000 people worldwide. When a person has ALS, their motor neurons, the cells responsible for all voluntary muscle control in the body, lose function and die. No one knows exactly why or how these cells die and that’s part of what makes ALS so hard to treat. In about 90% of cases, the disease arises suddenly, with no apparent cause. The remaining 10% of cases are hereditary, where a mother or father with ALS passes on a mutated gene to their child. The symptoms typically first appear after age 40. But in some rare cases, like Hawking’s, ALS starts earlier in life. Hawking’s case was also a medical marvel because of how long he lived with ALS. After diagnosis, most people with the disease live between 2 to 5 years before ALS leads to respiratory problems that usually cause death. What wasn’t unusual in Hawking’s case was that his ability to learn, think, and perceive with his senses remained intact. Most people with ALS do not experience impaired cognition. With so much at stake for the 120,000 people who are diagnosed with ALS annually, curing the disease has become one of our most important scientific and medical challenges. Despite the many unknowns, we do have some insight into how ALS impacts the neuromuscular system. ALS affects two types of nerve cells called the upper and lower motor neurons. In a healthy body, the upper motor neurons, which sit in the brain’s cortex, transmit messages from the brain to the lower motor neurons, situated in the spinal cord. Those neurons then transmit the message into muscle fibers, which contract or relax in response, resulting in motion. Every voluntary move we make occurs because of messages transmitted along this pathway. But when motor neurons degenerate in ALS, their ability to transfer messages is disrupted, and that vital signaling system is thrown into chaos. Without their regular cues, the muscles waste away. Precisely what makes the motor neurons degenerate is the prevailing mystery of ALS. In hereditary cases, parents pass genetic mutations on to their children. Even then, ALS involves multiple genes with multiple possible impacts on motor neurons, making the precise triggers hard to pinpoint. When ALS arises sporadically, the list of possible causes grows: toxins, viruses, lifestyle, or other environmental factors may all play roles. And because there are so many elements involved, there’s currently no single test that can determine whether someone has ALS. Nevertheless, our hypotheses on the causes are developing. One prevailing idea is that certain proteins inside the motor neurons aren’t folding correctly, and are instead forming clumps. The misfolded proteins and clumps may spread from cell to cell. This could be clogging up normal cellular processes, like energy and protein production, which keep cells alive. We’ve also learned that along with motor neurons and muscle fibers, ALS could involve other cell types. ALS patients typically have inflammation in their brains and spinal cords. Defective immune cells may also play a role in killing motor neurons. And ALS seems to change the behavior of specific cells that provide support for neurons. These factors highlight the disease’s complexity, but they may also give us a fuller understanding of how it works, opening up new avenues for treatment. And while that may be gradual, we’re making progress all the time. We’re currently developing new drugs, new stem cell therapies to repair damaged cells, and new gene therapies to slow the advancement of the disease. With our growing arsenal of knowledge, we look forward to discoveries that can change the future for people living with ALS.

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翻译人员: Riley WANG 校对人员: Lipeng Chen生活中没有什么是需要畏惧的， 只是需要了解。现在我们去了解更多，就会畏惧更少。 ——玛丽·居里1963年，21岁的物理学家斯蒂芬·霍金被诊断出一种罕见的神经肌肉失调症，称为肌萎缩侧索硬化，也称为ALS。霍金逐渐不能行走，无法使用双手，不能做出面部动作，甚至不能吞咽。但尽管如此，他仍保留了惊人的才智。在接下来的50多年中，霍金成为了历史上最著名、 最有成就的物理学家之一。然而他的疾病依然未得到治愈，霍金于2018年去世，享年76岁。自霍金被诊断后的数十年来，ALS仍然是最复杂、最难以理解、对人类伤害最大的疾病之一。这种疾病也被称为运动神经元病、卢伽雷病，世界上每10万人中便有2人患有ALS。患上ALS时，负责控制身体全部随意肌的细胞，即运动神经元，会失去功能，然后死亡。没有人知道这些细胞死亡的确切原因及方式，这也是ALS难以治愈的原因之一。在90%的病例中，ALS突然发作并且没有明显的病因。余下10%的病例则是通过遗传获得，患者的父亲或母亲患有ALS 并将突变基因传给孩子。ALS的症状通常在40岁时初次出现。但个别病例，例如霍金，ALS的发病更早。霍金在患有ALS的情况下生活了很长一段时间， 这也是一项医学奇迹。大部分患者在诊断后只有2-5年的寿命，因最终ALS会使呼吸困难进而导致死亡。霍金身上不寻常的一点在于，他的学习能力、思考能力以及通过感官认知的能力都毫发无伤。大多数患有ALS的患者不会出现认知受损。患上ALS要面临如此多的风险，而每年都有12万人次被诊断出患有该疾病，治愈这种疾病已成为最为重要的科学及医疗难题之一。尽管仍有大量未知，我们对ALS如何影响神经肌肉系统已有所了解。ALS会影响两种类型的神经细胞，上运动神经元和下运动神经元。在健康的身体中，位于大脑皮层的上神经元细胞将大脑发出的信号 传递给下运动神经元，下运动神经元位于脊髓中。这些神经元再将信息传递给肌肉纤维，使其做出收缩或放松的反应，完成动作。我们做出的每个自发性动作，都是由于信息沿神经通路传导。但患上ALS时运动神经元退化，其传输信息的能力中断，重要的信号系统陷入混乱。没有了规律的信号指令，肌肉很快萎缩。ALS最大的谜团在于运动神经元退化的确切原因。在遗传患病的病例中， 父母将基因突变传递给孩子。此时仍有多个基因与ALS相关，对运动神经元造成的可能影响也有多个，因此，精准锁定疾病的诱发因素十分困难。当ALS症状偶有发生， 可能致病的因素会越来越多，毒素、病毒、生活方式、其他环境因素等， 它们都可能会产生一定影响。由于涉及到如此多的因素，目前没有单一的测试 能够确定患者是否患上了ALS。尽管如此，我们对于患病原因的推想仍在发展。一个主流观点认为在运动神经元中，某种特定蛋白没有正确折叠，反而聚集成块。错误折叠的蛋白质和块状结构 可能会扩散到其他细胞，这可能会堵塞正常的细胞进程，例如能量和蛋白质的产生过程， 这一过程能保持细胞充满活力。我们也已经知道， 除了运动神经元和肌肉纤维，ALS也涉及到其他细胞类型。ALS患者的大脑和脊髓通常都有炎症。有缺陷的免疫细胞可能 也会消灭运动神经元细胞。ALS似乎能够改变某种特定细胞的行为，这种细胞为神经元提供支持。这些因素表明了ALS疾病的复杂性，但是它们也让我们更全面地了解发病机制，为治疗打开了新的大门。虽然进程也许缓慢，但我们一直在取得进步。我们现在正在开发新药，新的干细胞疗法用来修复受损细胞，以及新的基因疗法用以减缓疾病发展速度。在不断积累知识储备的同时，我们期待能够有新的发现，来改变ALS患者的未来。

**P593 2018-05-30 Are there universal expressions of emotion - Sophie Zadeh**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=593)

The 40 or so muscles in the human face can be activated in different combinations to create thousands of expressions. But do these expressions look the same and communicate the same meaning around the world, regardless of culture? Is one person’s smile another’s grimace? Charles Darwin theorized that emotional expression was a common human feature. But he was in the minority. Until the mid-20th century, many researchers believed that the specific ways we show emotion were learned behaviors that varied across cultures. Personality theorist Silvan Tomkins was one of the few to insist otherwise. Tomkins claimed that certain affects— emotional states and their associated facial expressions— were universal. In the 1960s, psychologist Paul Ekman set about testing this theory by examining hundreds of hours of film footage of remote tribes isolated from the modern world. Ekman found the native peoples’ expressions to be not only familiar, but occurring in precisely the situations he would expect. Conversely, he ran tests with tribes who had no prior exposure to Western culture. They were able to correctly match photos of different facial expressions with stories designed to trigger particular feelings. Over the next few decades, further research has corroborated Darwin’s idea that some of our most important emotional expressions are in fact universal. The degrees of expression appropriate to a given situation can, however, vary greatly across cultures. For instance, researchers have studied facial expression in people who are born blind, hypothesizing that if expressions are universal, they would be displayed in the same way as sighted people. In one study, both blind and sighted athletes displayed the same expressions of emotion when winning or losing their matches. Further evidence can be found in our evolutionary relatives. Comparisons of facial expression between humans and non-human mammals have found similarities in the structure and movement of facial muscles. Chimpanzee laughter looks different from ours, but uses some of the same muscle movements. Back in the 60s, Ekman identified six core expressions. Anger is accompanied by lowered eyebrows drawn together, tense and narrowed eyes, and tight lips; disgust, by the lips pulled up and the nose crinkling. In fear, the upper white of the eyes are revealed as the eyebrows raise and the mouth stretches open, while surprise looks similar, but with rounded eyebrows and relaxed lips. Sadness is indicated by the inner corners of the eyebrows being drawn inwards and upwards, drooping eyes, and a downturned mouth. And of course there’s happiness: lips drawn up and back, and raised cheeks causing wrinkling around the eyes. More recently, researchers have proposed additional entries such as contempt, shame, and disapproval, but opinions vary on how distinct boundaries between these categories can be drawn. So if Ekman and other researchers are correct, what makes certain expressions universal? And why are they expressed in these particular ways? Scientists have a lot of theories rooted in our evolutionary history. One is that certain expressions are important for survival. Fear and surprise could signal to others an immediate danger. Studies of humans and some other primates have found that we pay more attention to faces that signal threats over neutral faces, particularly when we’re already on high alert. Expressions also could help improve group fitness by communicating our internal states to those around us. Sadness, for example, signals to the group that something’s wrong. There’s some evidence that expressions might be even more directly linked to our physiology. The fear expression, for instance, could directly improve survival in potentially dangerous situations by letting our eyes absorb more light and our lungs take in more air, preparing us to fight or flee. There’s still much research to be done in understanding emotional expression, particularly as we learn more about the inner workings of the brain. But if you ever find yourself among strangers in a strange land, a friendly smile could go a long way.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=593)

翻译人员: Chloe Ma 校对人员: Jenny Yang人类面部有超过40块肌肉人们通过触发不同的肌肉群， 去做出数以万计的表情。但在不同的文化中，这些相同的表情，在世界范围内传达的意思都相同吗？一个人做笑脸 会不会也是在做鬼脸呢？查尔斯·达尔文的理论是 情绪表达是人类的共同特点。那时他的理论受众并不广。直到二十世纪中期，许多研究人员相信 我们展示情绪的具体方式是习得性行为， 并存在文化差异。人格理论家西尔万·汤姆金斯 是为数不多支持这一理论的人。汤姆金斯声称一定的影响---情绪状态和与之相关的面部表情是普遍适用的。在19世纪60年代， 心理学家保罗·埃克曼测试了这个理论。通过检查前往与世隔绝的部落拍摄的成百上千小时的录像片段，埃克曼发现原住民的表情 不只熟悉，而且准确出现在他期待的情形下。反过来，他测试了一些 完全隔绝于西方文明的部落。随着触发 特定情绪的故事设定，他们能正确选出与之匹配的 不同面部表情的照片。之后的几十年中，后续研究确实了达尔文的想法即一些重要的情绪表达方式 事实上是具有普遍性的。然而特定情况下的表情在各种文化中表现很不一样举个例子，研究者在学习 面部的表情在那些天生就失明的人身上假设情绪是通用的，他们会和不失明的人 做出一样的动作。在一项研究中，盲和不盲的运动员做出了一样的表情 当他们赢或输了比赛。更多的证据可以在进化论中找到。对比人类和非人类的 哺乳动物的表情找到了面部肌肉相似的 构造和动态。猩猩笑起来看上去和我们不同，但是使用的是同样的肌肉。在上世纪60年代， 埃克曼定义了6种核心表情。愤怒伴随着紧缩在一起的眉毛狭窄而紧绷的眼睛以及紧绷的嘴唇讨厌，表现在嘴唇嘟起 和鼻子皱在一起。恐惧，上眼白露出，眉毛高挑嘴巴张着，惊讶看起来很相似，只不过眉毛是比较圆润的， 嘴唇放松。悲伤表现在眉头的部分不断的上下浮动，下垂的眼睛，嘴巴缩小。当然了还有愉快：嘴唇上扬，鼓起的脸颊使眼角的鱼尾纹露出。最近不久， 研究者发现了额外的一些像是鄙视耻辱以及不赞成但是在关于如何定义这些表情的观点 各不相同。如果埃克曼和其他研究人员 是正确的，是什么使特定的表情普遍呢为什么它们都表现在 某一种特殊方式呢？科学家们有许多基于 进化史的理论。一是 一种表情对于生存很重要，恐惧和惊讶是 即将到来的危险的信号。人类和其他灵长类动物的研究发现我们会更加注意 有威胁的信号。相比于自然的面部表情，特别是当我们已经敲响了警钟。表情也可以帮助改善合群性与在我们身边的这些人 进行内部交流。悲伤，打个比方，对于群体来说 是事情不对劲的信号。这里有一些证据，关于表情可能对我们的生理 有更加直接的联系。恐惧的表情，作为例子可以直接增加 在潜在危险情况中存活的几率让我们的眼睛接收更多光让我们的肺吸入更多的空气， 让我们准备好战斗或逃离。关于表情的学习和研究 依然有很长的路要走，特别是当我们更加了解 大脑内部的运行方法。如果你发现自己身处陌生的小岛 还有一群陌生的人。一个友好的微笑总会是有用的。

**P594 2018-05-30 Would you live on the moon - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=594)

You roll out of bed and leap eight meters across your underground habitat. The greywater from your sink drains into a small greenhouse where your vegetables grow. After suiting up, you head through a transport chute to inspect the generator. Outside, it’s pitch black - just as it’s been for the last 12 days. This isn’t some post-apocalyptic scenario; it’s just another day of life on the moon. And with the European Space Agency’s idea to establish a functioning "moon camp" by the 2020s, that day may be closer than we think. Of course, living on the moon won’t be easy. The camp envisioned is not so much a village as an inhabited research base similar to those in places like Antarctica. But there are far greater obstacles to living on the moon than just cold weather. The biggest is cosmic radiation. Unlike the Earth, the moon has no atmosphere and no magnetic field. A person on its surface can receive over 400 times the maximum safe dosage of heavy ion radiation, enough to be fatal within ten hours, even in a spacesuit. The first step would likely involve robots and 3D printers constructing covered habitats from lunar soil, or building shelters inside caves formed by lava tubes from the moon’s volcanic past. But what would the inhabitants live on? Supplies would need to be transported from Earth at first. Growing plants requires greenhouse soil and air rich in carbon dioxide, a gas that’s rare on the moon, but could be synthesized from recycled materials. A water treatment plant could be supplied by ice mined from the polar regions using a specialized drill that can bore two meters beneath the lunar surface. Friendly bacteria and viruses necessary to the human microbiome and immune system would also have to be imported or synthesized on site. And lunar inhabitants would have to exercise for hours a day to maintain bone and muscle mass. That’s because the moon’s gravity is just one-sixth that of the Earth, and the everyday strain of working against gravity is part of what keeps our bodies healthy. It might seem strange to go to all this trouble to build a base on a dead rock we’ve already visited. But NASA’s Apollo missions only explored small portions of the moon. We’ve made many discoveries since then, such as ice near the poles and particles of solar wind gases that date back billions of years. They collectively show that the moon has much more to teach us about the history of our solar system. A radio telescope on its far side could observe the cosmos, shielded from the Earth’s electromagnetic interference. And the lunar surface is rich in minerals, like silicon, aluminum, and magnesium, creating great economic potential for mining. But the biggest benefit of the moon camp may not lie on the moon but beyond it. With the nearest possibly habitable world light-years away, and the International Space Station to be retired in about a decade, a moon base would be our first foothold towards becoming an interplanetary species. And proposals such as the Deep Space Gateway envision launching future missions from lunar orbit. The smaller gravitational pull would require less fuel to overcome, allowing for larger ships and more cargo. Meanwhile, the base on the surface could serve as a testing ground for future space operations, a refueling station, and a supply depot all in one. With Europe, Russia, China, and the US expressing interest in the project, the moon camp may come to involve the space agencies of all major nations, as well as private companies. Within a few decades, the moon may be bustling with mining operations, research stations, and tourist routes alongside a construction yard under an orbiting space port. We may have already visited the moon, but now we’re closer than ever to making it part of humanity’s home.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=594)

翻译人员: Laura Chen 校对人员: Monkey Luffy你翻下床，跳跃八米， 横穿你的地下栖息地。水池里的洗涤水 流入一间小温室，在这里，你的蔬菜正在生长。着完装后，你通过一道运输滑槽去检查发动器。窗外依然是漆黑的， 在过去的十二天每一天都是这样的。这不是世界末日后的废墟， 而是月球生活的普通一天。如果你考虑到欧洲航天局的2020年代”月亮营地“计划，其实这一天的实现 也许比我们想象中的要快。当然， 在月球上生活不是什么容易的事想象中的月球营比起小镇更像是在南极洲的可居住的研究基地。但是在月亮居住的难度远大于 在寒冷的地方居住。最大的问题是宇宙辐射。不像地球， 月亮没有大气层，也没有磁场。人类在月亮表面 会受到超过 400 倍的重离子辐射安全值的影响，尽管在航天服里， 这个量足够在十个小时内致命。建造月亮居住地的第一步 可能要依靠机器人和3D打印器， 它们可以用月亮的土建造居住地，或者在洞里建造居住地，这些洞是熔岩洞， 是从以前的月亮火山形成的。但居民要以什么为食呢？一开始得从地球运送补给品。若要种植物，则需要温室土壤 以及富含二氧化碳的空气。在月球上二氧化碳是很稀有的，但可以用回收材料来合成。水可以由极地冰矿供给。这要用到专门的钻头， 钻入月球表面下 2 米才能得到水。人类微生物群系和免疫系统 所需要的良性细菌和病毒也得要从地球进口， 或是在当地合成。此外，月球居民必须每天运动数小时来维持骨头和肌肉的质量。那是因为月球的引力 只有地球的六分之一，每天花力气来对抗引力，是维持身体健康所必要的。你可能会觉得奇怪， 为什么要大费周章在我们已经造访过的 没有生命的岩石上建立一个基地。其实美国太空总署的阿波罗任务 只探索了月球的小部分。从那以后， 我们又有许多的新发现，比如在两极附近的冰， 以及太阳风气体的粒子，这些粒子有着数十亿年的历史。这告诉我们，太阳系的历史 还有许多秘密隐藏在月球里，等着被我们探测。架设在月球远端的无线电波望远镜 能够观察到宇宙，因为月球的屏障， 望远镜不会被地球的电磁波干扰。而且月球表面的矿物质丰富， 比如说硅、铝，以及镁等等，使得月球在采矿业上 有很大的经济潜力。但月球营地最大的收益可能 不在月球上，而在月球外。其他有可能的宜居星球， 最近的也在数光年之外，但是国际太空站大约还有 十年左右就要退休了，月球基地也许会是我们成为星际物种的第一个立足点。“深空闸道” 这类的提案，立志运用月球轨道发射火箭。因为月球相对较小的引力， 火箭不需要浪废过多燃料来克服，所以我们可以发射更大， 运量更多的飞船。同时，在月亮表面的基地 也能够当作试验场，供未来太空行动、航天加油站以及供应仓库三合一使用。目前欧洲、俄国、中国，以及美国 都对这个计划感兴趣，月球营地有可能会成为所有主要国家以及私人公司的 太空办事处。在几十年内，月球可能就会变得很忙碌， 充斥着采矿活动、研究站以及旅游路线，还有在正在建造的太空港口。我们已经拜访过月球了，但现在，是我们史上最接近 将月球变成“家”的时候。

**P595 2018-05-31 Can you solve the Mondrian squares riddle - Gordon Hamilton**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=595)

Dutch artist Piet Mondrian’s abstract, rectangular paintings inspired mathematicians to create a two-fold challenge. First, we must completely cover a square canvas with non-overlapping rectangles. All must be unique, so if we use a 1x4, we can’t use a 4x1 in another spot, but a 2x2 rectangle would be fine. Let’s try that. Say we have a canvas measuring 4x4. We can’t chop it directly in half, since that would give us identical rectangles of 2x4. But the next closest option - 3x4 and 1x4 - works. That was easy, but we’re not done yet. Now take the area of the largest rectangle, and subtract the area of the smallest. The result is our score, and the goal is to get as low a score as possible. Here, the largest area is 12 and the smallest is 4, giving us a score of 8. Since we didn’t try to go for a low score that time, we can probably do better. Let’s keep our 1x4 while breaking the 3x4 into a 3x3 and a 3x1. Now our score is 9 minus 3, or 6. Still not optimal, but better. With such a small canvas, there are only a few options. But let’s see what happens when the canvas gets bigger. Try out an 8x8; what’s the lowest score you can get? Pause here if you want to figure it out yourself. Answer in: 3 Answer in: 2 Answer in: 1 To get our bearings, we can start as before: dividing the canvas roughly in two. That gives us a 5x8 rectangle with area 40 and a 3x8 with area 24, for a score of 16. That’s pretty bad. Dividing that 5x8 into a 5x5 and a 5x3 leaves us with a score of 10. Better, but still not great. We could just keep dividing the biggest rectangle. But that would leave us with increasingly tiny rectangles, which would increase the range between the largest and smallest. What we really want is for all our rectangles to fall within a small range of area values. And since the total area of the canvas is 64, the areas need to add up to that. Let’s make a list of possible rectangles and areas. To improve on our previous score, we can try to pick a range of values spanning 9 or less and adding up to 64. You’ll notice that some values are left out because rectangles like 1x13 or 2x9 won’t fit on the canvas. You might also realize that if you use one of the rectangles with an odd area like 5, 9, or 15, you need to use another odd-value rectangle to get an even sum. With all that in mind, let’s see what works. Starting with area 20 or more puts us over the limit too quickly. But we can get to 64 using rectangles in the 14-18 range, leaving out 15. Unfortunately, there’s no way to make them fit. Using the 2x7 leaves a gap that can only be filled by a rectangle with a width of 1. Going lower, the next range that works is 8 to 14, leaving out the 3x3 square. This time, the pieces fit. That’s a score of 6. Can we do even better? No. We can get the same score by throwing out the 2x7 and 1x8 and replacing them with a 3x3, 1x7, and 1x6. But if we go any lower down the list, the numbers become so small that we’d need a wider range of sizes to cover the canvas, which would increase the score. There’s no trick or formula here – just a bit of intuition. It's more art than science. And for larger grids, expert mathematicians aren’t sure whether they’ve found the lowest possible scores. So how would you divide a 4x4, 10x10, or 32x32 canvas? Give it a try and post your results in the comments.

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翻译人员: Lipeng Chen荷兰艺术家 Piet Mondrian 的 抽象长方形绘画启发数学家们创造了一个双重挑战。首先，我们必须用互不重叠的 长方形完整地覆盖一个正方形画布。所有的长方形必须是独特的，若我们用了1x4的 长方形，就不能在其他地方再用4x1的长方形，但是用2x2的正方形就可以。让我们试一下。假设我们有一个4x4的画布。我们不能直接把它劈成两半，因为这会给我们两个一样的2x4的长方形。但是下一种可行的方式就是一个3x4和一个1x4。这很简单，但是我们还有没结束。现在我们看看其中最大的长方形面积，然后与最小的长方形面积相减。结果就是我们的分数，目标是得分越低越好。对这个来说，最大的面积是12，最小的面积是4，我们的分数就是8。因为我们没有尝试去找到最低的分数，我们可能可以做得更好。让我们留下1x4的长方形，并且把3x4的分成3x3的和3x1。现在我们的分数是9减3，6分。还不是最小值，但是比之前好了。对于这么小的画布，我们的选择不是很多。但是让我们来看看当画布变大时会发生什么。试一试8x8的，你能得到最低的分数是多少呢？如果你想自己试一下的话就在这里暂停。答案在3秒后出现。答案在2秒后出现。答案在1秒后出现。为了理解我们的想法， 我们可以从之前开始：把画布先粗略的分成两半。这给我们一个5x8的长方形， 有着40的面积，和一个3x8的长方形， 有着24的面积，这样我们就有16分。这是个糟糕的分数。把5x8的再分成5x5和5x3， 我们就能得到10分。好一点了， 但是还不是最好的。我们可以继续分割最大的长方形。但是这样就给我们留下越来越小的长方形，这会增加最大的和最小的长方形的面积差。我们真正想要的是让我们所有的长方形 都处于一个很接近的范围。因为画布的总面积是64，所以所有长方形的面积需要加起来是64。让我们把可能的长方形和面积列出来。为了提高之前的分数，让我们尝试去挑选一个在9或以下的值，然后加在一起等于64。你会发现有些数字是要被舍弃的，因为像1x13和2x9的长方形并不能嵌入画布。你也有可能注意到如果你用了像是5，9或15这样奇数面积的长方形，你需要用另外一个奇数面积的 长方形让它们的和为偶数。知道了这些，让我们来看看怎样能成功。从大于20的面积开始一下子 就把我们限制住了。但我们可以用14-18范围内的长方形去得到64，除去15。但是不幸的是，实际上没有方法 能把这些长方形放进画布，使用2x7的长方形会留下一个缺口，只能被宽度为1的长方形填补，如果尝试更低的范围， 下一个区间就是8-14，除去3x3的正方形，这次，这些长方形能放到画布中去，这个得分是6，我们能做的更好吗？不能。通过移除2x7和1x8的长方形， 我们能得到同样的分数，用3x3，1x7和1x6的长方形替代。但是如果我们把范围继续下移，那些数字就太小了，所以我们就需要 一个更大的范围来填满画布，这样就会提高分数。这个问题没有什么巧妙地公式， 全凭一点直觉。这不只是科学，更像艺术。并且对于更大的方块，数学家们不能确定他们是否发现了可能的最低分。你会怎么分割4x4，10x10，或是32x32的画布呢？试一下，并在评论里发表你的结果吧。

**P596 2018-06-04 Did the Amazons really exist - Adrienne Mayor**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=596)

Since the time of Homer, ancient stories told of fierce warriors dwelling beyond the Mediterranean world, striking fear into the mightiest empires of antiquity. Their exploits were recounted by many epic poets. They fought in the legendary Trojan War and their grand army invaded Athens. Jason and the Argonauts passed by their shores, barely avoiding their deadly arrows. These formidable fighters faced off against the greatest champions of myth: Heracles, Theseus, and Achilles. And every single one of these warriors was a woman. The war-loving Amazons, "the equals of men" in courage and skill, were familiar to everyone in ancient Greece. Amazon battle scenes decorated the Parthenon on the Athenian Acropolis; paintings and statues of Amazons adorned temples and public spaces. Little girls played with Amazon dolls, and Amazons were a favorite subject on Greek vase paintings. In Greek art and literature, they were depicted as daring and desirable, but also terrifying and deadly, and doomed to die at the hands of Greek heroes. Were Amazons merely figures of myth, or something more? It was long assumed that they were imaginary, like the cyclops and centaurs. But curiously enough, stories from ancient Egypt, Persia, the Middle East, Central Asia, India, and China also featured Amazon-like warrior women. And Amazons were described in ancient historical accounts, not just myths. Writers like Herodotus, Plato, and Strabo never doubted their existence. So who were the real women warriors known as Amazons? Ancient historians located the Amazon homeland in Scythia, the vast territory stretching from the Black Sea across the steppes of Central Asia. This immense region was populated by nomadic tribes whose lives centered on horses, archery, and warfare. Their culture flourished for about 1,000 years beginning around 800 BC. Feared by Greeks, Persians, and the Chinese, the Scythians left no written records. But we can find clues in how their neighbors described them, as well as in archaeology. Scythians' ancestors were the first to ride horses and they invented the recurve bow. And, because a female mounted archer could be as fast and as deadly as a male, all children were trained to ride and shoot. Women hunted and fought alongside men, using the same weapons. The harsh landscape and their nomadic lifestyle created its own form of equality. This amazed the ancient Greeks, whose women led restricted indoor lives. The earliest stories of the Scythians, and Amazons, may have been exaggerated rumors. But as the Greeks began to trade around the Black Sea and further east, their portrayals became more realistic. Early depictions of Amazons showed them with Greek weapons and armor. But in later representations, they wielded bows and battle-axes, rode horses, and wore pointed caps and patterned trousers characteristic of steppe nomads. Until recently, no one was sure how strong the links were between Scythians and the Amazons of Greek myth. But recent archaeological discoveries have provided ample evidence. More than 1,000 ancient Scythian kurgans, or burial mounds, have been excavated, containing skeletons and weapons. Archaeologists had previously assumed that weapons could only belong to male warriors. But modern DNA analysis so far has revealed that about 300 skeletons buried with weapons belong to females ranging in age from 10 to 45, and more are being found every year. The women's skeletons show battle injuries: ribs slashed by swords, skulls bashed by battle-axes, and arrows embedded in bones. In classical art and writings, the fearsome Amazons were always portrayed as brave and heroic. In male-dominated classical Greece, however, the very idea of strong women who gloried in freedom and war aroused mixed feelings. And yet, the Greeks were also drawn to egalitarian ideals. Is it possible that the mythic realm of thrilling Amazon tales was a way to imagine women and men as equal companions?

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翻译人员: Chien Yet Chong 校对人员: Ran Lan由荷马时代开始，就有古老的传说叙述一群 居住在地中海以外的彪悍勇士，他们所向无敌， 足以令古代强大的帝国惶恐不安。他们的战绩已被诗人们重述万遍。他们曾参与著名的特洛伊战争， 他们庞大的军队也侵略过雅典。伊阿宋和阿耳戈英雄们 经过他们的海岸线，还差点被他们致命的箭击伤。这群令人惊悚的战士曾跟 神话里伟大的英雄对战：赫拉克勒斯、忒修斯以及阿喀琉斯。这群勇士每一位成员都是女的。好战的亚马逊人， 无论在勇气或战术方面都不让须眉，他们的名气是古希腊众所周知的。亚马逊人的战斗场面装饰着 帕特农神殿和雅典卫城；亚马逊人的画和雕像 点缀着庙宇和公共场所。小女孩们玩着亚马逊玩偶，他们也是古希腊瓶画首选的主题。古希腊艺术和文学把亚马逊人描述成英勇强悍和富有魅力，但与此同时凛然生畏和致命非凡，并且注定死于古希腊英雄的手中。亚马逊人只是神话中的人物 抑或真有其人呢？很长一段时间，人们都认为他们 都是虚构的，跟单眼巨人和半人马无异。不过令人惊奇的是， 来自古埃及、波斯、中东、中亚、印度和中国的典故中都有跟亚马逊人类似的女战士。此外，亚马逊人不只在神话中出现， 也呈现于古代的历史记载中。古代作者，如希罗多德、柏拉图 和斯特拉波，都不曾怀疑过他们的存在。那么，称为亚马逊人的女勇士 的真实身份是什么呢？古代的历史学家都认为 亚马逊人的故乡位于斯基提亚，这块广袤的地区位于黑海和中亚草原之间。游牧民族居住在这块宽广的土地上，他们的生活围绕马匹、箭术、和战争为重心。他们的文化始于公元前800年， 并持续繁荣昌盛长达一千年。斯基提亚人令希腊人，波斯人和中国人 闻风丧胆，但他们并没留下任何文字记录。 虽然如此，我们仍然可以通过邻国的记载和 考古学来一窥他们。斯基提亚人的祖先是 第一群懂得驾驭马群的人类，他们也发明了反曲弓。因为女弓骑兵可以有男人 一样的速度和杀伤力，所有孩童都接受 骑马和射击训练。女人使用的兵器跟男的一样， 并且和男人并肩作战。严酷的环境和他们的游牧生活习惯造就了这种独特的男女平等。这种社会现象令古希腊人十分惊奇， 因为他们的女人都过着三步不出门的生活。最早期跟斯基提亚人和亚马逊人的故事很大可能都是被夸大的传闻。不过当古希腊人开始在黑海周围以及 远东地区通商时，有关他们的描述更加真实了。早期有关亚马逊人的图画都显示他们 使用古希腊人的武器和铠甲。但是后期的图画显示他们手持弓箭和战斧，骑着骏马，以及头戴尖顶帽 和身穿花纹裤子，也就是草原游牧民族的典型服装。直到近期，没有人可以确定 斯基提亚人跟古希腊神话里的亚马逊人有多大的关联。但是近期的考古发现已提供了 足够的证据。超过一千个古斯基提亚古冢已被挖掘出来，里面埋有骨骸和兵器。以前，考古学家认为那些兵器只属于男性战士。但是现代脱氧核糖核酸检验显示超过三百副跟兵器一起 下葬的骨骸都属于女性， 年龄介于10至45岁。每年有更多类似的骨骸被发现。这些女性骨骸带着战伤：有的肋骨被剑砍伤，有的头颅骨被战斧击碎，也有的骨头中还嵌着箭。在古典艺术和文学中，令人畏惧的亚马逊人通常都被 描绘成英勇的战士。不过，在男权至上的古希腊社会里，想象在在自由和战争中闪耀的强大女性 会引发矛盾的情绪。虽然如此，希腊人仍然深爱 平均主义的理想。有没有可能，扣人心弦的亚马逊人的神秘国度其实是想象着男女平等相处的一种方法？

**P597 2018-06-04 How much of what you see is a hallucination - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=597)

An elderly woman named Rosalie was sitting in her nursing home when her room suddenly burst to life with twirling fabrics. Through the elaborate drapings, she could make out animals, children, and costumed characters. Rosalie was alarmed, not by the intrusion, but because she knew this entourage was an extremely detailed hallucination. Her cognitive function was excellent, and she had not taken any medications that might cause hallucinations. Strangest of all, had a real-life crowd of circus performers burst into her room, she wouldn’t have been able to see them: she was completely blind. Rosalie had developed a condition known as Charles Bonnet Syndrome, in which patients with either impaired vision or total blindness suddenly hallucinate whole scenes in vivid color. These hallucinations appear suddenly, and can last for mere minutes or recur for years. We still don’t fully understand what causes them to come and go, or why certain patients develop them when others don’t. We do know from fMRI studies that these hallucinations activate the same brain areas as sight, areas that are not activated by imagination. Many other hallucinations, including smells, sights, and sounds, also involve the same brain areas as real sensory experiences. Because of this, the cerebral cortex is thought to play a part in hallucinations. This thin layer of grey matter covers the entire cerebrum, with different areas processing information from each of our senses. But even in people with completely unimpaired senses, the brain constructs the world we perceive from incomplete information. For example, our eyes have blind spots where the optic nerve blocks part of the retina. When the visual cortex processes light into coherent images, it fills in these blind spots with information from the surrounding area. Occasionally, we might notice a glitch, but most of the time we’re none the wiser. When the visual cortex is deprived of input from the eyes, even temporarily, the brain still tries to create a coherent picture, but the limits of its abilities become a lot more obvious. The full-blown hallucinations of Charles Bonnet Syndrome are one example. Because Charles Bonnet Syndrome only occurs in people who had normal vision and then lost their sight, not those who were born blind, scientists think the brain uses remembered images to compensate for the lack of new visual input. And the same is true for other senses. People with hearing loss often hallucinate music or voices, sometimes as elaborate as the cacophony of an entire marching band. In addition to sensory deprivation, recreational and therapeutic drugs, conditions like epilepsy and narcolepsy, and psychiatric disorders like schizophrenia, are a few of the many known causes of hallucinations, and we’re still finding new ones. Some of the most notorious hallucinations are associated with drugs like LSD and psilocybin. Their hallmark effects include the sensation that dry objects are wet and that surfaces are breathing. At higher doses, the visual world can appear to melt, dissolve into swirls, or burst into fractal-like patterns. Evidence suggests these drugs also act on the cerebral cortex. But while visual impairment typically only causes visual hallucinations, and hearing loss auditory ones, substances like LSD cause perceptual disturbances across all the senses. That’s likely because they activate receptors in a broad range of brain areas, including the cortical regions for all the senses. LSD and psilocybin both function like serotonin in the brain, binding directly to one type of serotonin receptor in particular. While serotonin’s role in the brain is complex and poorly understood, it likely plays an important part in integrating information from the eyes, nose, ears, and other sensory organs. So one theory is that LSD and psilocybin cause hallucinations by disrupting the signaling involved in sensory integration. Hallucinations associated with schizophrenia may share a similar mechanism with those caused by LSD and psilocybin. Patients with schizophrenia often have elevated levels of serotonin in the brain. And antipsychotic drugs relieve symptoms of schizophrenia by blocking the same serotonin receptors LSD and psilocybin bind to. And, in some cases, these drugs can even relieve the hallucinations of patients with Charles Bonnet Syndrome. We’re still a long way from understanding all the different causes and interconnected mechanisms of hallucinations. But it’s clear that hallucinatory experiences are much more closely tied to ordinary perception than we once thought. And by studying hallucinations, we stand to learn a great deal about how our brains construct the world we see, hear, smell, and touch. As we learn more, we’ll likely come to appreciate just how subjective and individual each person’s island universe of perception really is.

**P597 2018-06-04 How much of what you see is a hallucination - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=597)

翻译人员: Riley WANG 校对人员: Lipeng Chen罗萨莉婆婆正坐在养老院的的屋子里，突然，她的房间充满旋转的图形。通过精巧的折叠，她能够制作出动物、儿童、和一些穿着戏服的角色。罗萨莉婆婆感到十分震惊， 并非这些东西突然出现，而是因为她清楚这些都是 细节极其丰富的幻觉。她的认知功能一切正常，也并未服用能够引起幻觉的药物。最奇怪的在于，若在现实中 有这样一群马戏团演员冲进她的房间，她也无法看到他们，因为她彻底失去了视觉。罗萨莉患有邦纳症候群。 (Charles Bonnet Syndrome)患者通常视觉受损或是完全丧失视觉，眼前却突然出现色彩缤纷的各种幻觉。这些幻觉的出现很突然，只会持续几分钟或是在几年内反复发作。我们仍然不清楚幻觉出现和消失的原因，也尚不明确 为何只有部分患者出现幻觉。通过功能性磁共振成像，我们发现这些幻觉会激活 负责视觉的大脑区域，而想象力并不会激发该区域。许多其他的幻觉，包括气味、视觉、和声音，都与负责真实感官的大脑区域相同。正因为此，大脑皮层被认为与幻觉相关。这层薄薄的灰质覆盖整个大脑，不同的区域负责处理 来自各个感官的信息。但即便对于感官完全正常的人来说，大脑也是通过不完整的信息 来构建我们所感知的世界。例如，我们的眼睛有盲点，此处的光学神经会阻挡部分视网膜。当视觉中枢处理连续图像的光线时，它会用周边区域的信息来填充盲点。有时候，我们或许能发现小错， 但绝大多数情况下我们都不够机敏。当视觉中枢不能从眼睛获得信息， 即便只持续短暂的时间，大脑仍会试图创造出连续的影像。但这种能力的缺陷则更为明显。邦纳症候群中 全面爆发的幻觉就是一个例子。由于这种病症只发生在后天失明的人身上，先天失明的人并不会患上该疾病，科学家认为大脑使用了记忆中的图像，来弥补新视觉信息的缺失。对其他感官来说也是同理。失聪的人们经常幻听到音乐或说话声，有时声音能够具体到 像是整个军乐队在演奏。除了感官功能缺失、服用消遣及治疗性药物之外，癫痫和发作性睡病等疾病，以及精神分裂症等精神失调都是已知的能够导致幻觉的原因。而我们仍在探索其他原因。一些众人皆知的幻觉与LSD和赛洛西宾等致幻剂有很大关系。它们的典型影响包括让我们 以为干燥物体是湿润的，物体表面仿佛在呼吸。剂量加高之后，眼睛看到的世界 则像是融化一般，一切溶解形成漩涡，或是变成分形样式。证据表明这些药物也会影响大脑皮层。虽然通常视觉受损只会引发视觉上的幻觉，听力缺失只会导致幻听，但LSD这类物质 会干扰所有感官的觉知功能。这很可能是因为 它激发了大脑大片区域的感受器，包括脑皮质区域的所有感官。LSD和赛洛西宾 与大脑中的血清素功能相似，可以与一种特定的 血清素受体直接结合。虽然血清素在大脑中的功能非常复杂， 且我们对其知之甚少，它可能是在整合信息方面发挥重要作用，这些信息来自于眼睛、鼻子、耳朵、以及其他感受器官。有一种理论认为LSD和赛洛西宾会通过扰乱感觉统合时的信号 由此导致幻觉。与精神分裂症相关的幻觉与由LSD和赛洛西宾造成的幻觉可能 拥有相同的发病机制。患有精神分裂症的病人大脑通常拥有较高的血清素的水平。治疗精神疾病的药物通过 阻断与LSD和赛洛西宾结合的同种血清素受体来减轻精神分裂症的症状。在某些病例中，这些药物甚至能够减轻邦纳综合征病人的幻觉。在了解幻觉的全部病因 以及相互联系的机制上，我们仍有很长的路要走。但现已明确的是幻觉体验与普通感知的关系 比我们想象的更近。通过研究幻觉，我们能够更多地了解我们的大脑如何通过所看、所听、所闻、所触来构建世界。随着我们不断研究，我们将能够欣赏每个人的感觉世界是多么的主观和独特。

**P598 2018-06-06 The psychology of post-traumatic stress disorder - Joelle Rabow Malet**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=598)

Many of us will experience some kind of trauma during our lifetime. Sometimes, we escape with no long-term effects. But for millions of us, those experiences linger, causing symptoms like flashbacks, nightmares, and negative thoughts that interfere with everyday life. This phenomenon, called post-traumatic stress disorder, or PTSD, isn’t a personal failing; rather, it’s a treatable malfunction of certain biological mechanisms that allow us to cope with dangerous experiences. To understand PTSD, we first need to understand how the brain processes a wide range of ordeals, including the death of a loved one, domestic violence, injury or illness, abuse, rape, war, car accidents, and natural disasters. These events can bring on feelings of danger and helplessness, which activate the brain’s alarm system, known as the “fight-flight-freeze” response. When this alarm sounds, the hypothalamic, pituitary, and adrenal systems, known as the HPA axis, work together to send signals to the autonomic nervous system. That’s the network that communicates with adrenal glands and internal organs to help regulate functions like heart rate, digestion, and respiration. These signals start a chemical cascade that floods the body with several different stress hormones, causing physiological changes that prepare the body to defend itself. Our heart rate speeds up, breathing quickens, and muscles tense. Even after a crisis is over, escalated levels of stress hormones may last for days, contributing to jittery feelings, nightmares, and other symptoms. For most people, these experiences disappear within a few days to two weeks as their hormone levels stabilize. But a small percentage of those who experience trauma have persistent problems —sometimes vanishing temporarily only to resurface months later. We don’t completely understand what’s happening in the brain, but one theory is that the stress hormone cortisol may be continuously activating the “fight-flight-freeze” response while reducing overall brain functioning, leading to a number of negative symptoms. These symptoms often fall into four categories: intrusive thoughts, like dreams and flashbacks, avoiding reminders of the trauma, negative thoughts and feelings, like fear, anger, and guilt, and “reactive” symptoms like irritability and difficulty sleeping. Not everyone has all these symptoms, or experiences them to the same extent and intensity. When problems last more than a month, PTSD is often diagnosed. Genetics, on-going overwhelming stress, and many risk factors like preexisting mental illnesses or lack of emotional support, likely play a role in determining who will experience PTSD. But the underlying cause is still a medical mystery. A major challenge of coping with PTSD is sensitivity to triggers, physical and emotional stimuli that the brain associates with the original trauma. These can be everyday sensations that aren’t inherently dangerous but prompt powerful physical and emotional reactions. For example, the smell of a campfire could evoke the memory of being trapped in a burning house. For someone with PTSD, that memory activates the same neurochemical cascade as the original event. That then stirs up the same feelings of panic and helplessness as if they’re experiencing the trauma all over again. Trying to avoid these triggers, which are sometimes unpredictable, can lead to isolation. That can leave people feeling invalidated, ignored, or misunderstood, like a pause button has been pushed on their lives while the rest of the world continues around them. But, there are options. If you think you might be suffering from PTSD, the first step is an evaluation with a mental health professional who can direct you towards the many resources available. Psychotherapy can be very effective for PTSD, helping patients better understand their triggers. And certain medications can make symptoms more manageable, as can self- care practices, like mindfulness and regular exercise. What if you notice signs of PTSD in a friend or family member? Social support, acceptance, and empathy are key to helping and recovery. Let them know you believe their account of what they’re experiencing, and that you don’t blame them for their reactions. If they’re open to it, encourage them to seek evaluation and treatment. PTSD has been called “the hidden wound” because it comes without outward physical signs. But even if it’s an invisible disorder, it doesn’t have to be a silent one.

**P598 2018-06-06 The psychology of post-traumatic stress disorder - Joelle Rabow Malet**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=598)

翻译人员: Yuntao Li 校对人员: Lipeng Chen很多人都会在生命中经历某种创伤。有时，我们能毫发无伤地从中脱离，但是，成千上万的人会难以脱身，并伴有许多后遗症， 像是往事突然重现，噩梦，以及困扰我们每天生活的负面情绪。这种现象就是创伤后应激障碍，或者PTSD，这个不是个人的失败；这其实是可以治愈的生理机制失调，这种生理机制一般来说 帮助我们应对危险的经历。想要了解PTSD，我们首先要了解脑部 是如何处理一系列的严酷考验，包括爱人之死、家庭暴力、受伤或是疾病、虐待、强奸、战争、车祸、以及自然灾害。这些事件都能带来危险和无助的感觉，使得激活脑部的警觉系统，这就是大家知道的 “战斗，逃跑或冻结”反应。当这个警报响起时，下丘脑，脑垂体和肾上腺系统，也就是 “下丘脑-垂体-肾上腺轴”，通过协同工作将信号 送达副交感神经系统。就是沟通肾上腺和体内器官的网络，来帮助调节身体机能，像是心率、消化、以及呼吸。这些信号引发了化学物质的联动反应，伴随着几种不同的压力荷尔蒙 流向身体，导致生理变化， 使得身体进入防御准备状态。我们的心跳加速，呼吸加快，肌肉紧绷。甚至在危机结束之后，压力荷尔蒙在数日之内仍然持续保持一个高值，导致神经过敏的感觉、噩梦、以及其它症状。对于多数人，这些体验会在几天到两周内消失，他们荷尔蒙水平慢慢趋于稳定。但是一小部分经历心理创伤的人就有着难以摆脱的问题——有时症状短暂消失，却在几个月后又重新发作。我们不完全知道我们的脑子里发生了什么，但是有一个理论是压力荷尔蒙皮质醇也许会持续激活 “战斗，逃跑或冻结”反应，于此同时，大脑的功能被降低， 导致很多负面反应。这些症状通常被分为四类：侵入式想法，像是做梦或者闪回，逃避对于心理创伤的回忆，负面想法和感觉，像是恐惧，愤怒和负罪感，以及“反应的”症状，像是易怒以及难以入睡。不是每个人都有这些症状，或者有着相同程度或强度。当这些问题持续长达一个月， 创伤后压力综合征就经常可以被确诊了。基因，正在经历的过度紧张，以及很多风险因素像是已经存在的心理疾病，或是缺少感情上的支持，都在引发创伤后压力综合征种扮演着角色。但是直接原因一直是一个谜团。解决创伤后压力综合征最大的挑战是它的敏感性，当患者面临生理和心理的刺激时，大脑就把这些刺激与之前的创伤联系在一起。这些刺激其实可以是日常并不危险的的感觉，但是激起短暂而有力的生理和情绪反应。比如，闻到篝火的气味时可以唤起曾经被困在燃烧中的房子的经历。对于创伤后压力综合征患者来说，这个记忆激活了相同的神经化学反应，就跟一开始受到的创伤一样。然后，就激起了相同的慌张和无助感，就像再次经历这次创伤一样。尝试去躲避这些有时难以预测的事件，会导致与世隔绝。会让患者觉得无助、被忽视、被误解，就像是患者的人生被按了暂停键，而周围的一切却在持续地运转。但是，还有别的选择。如果你认为你正在遭受创伤后压力综合征的折磨，你第一件要做的事是接受心理健康专家的评估，他们能够给你很多资源。心理治疗对于创伤后压力综合征是十分有效的，帮助患者理解是什么引起他们的症状。有一些药物也可以使得症状更容易被控制，自我保健也能有所帮助， 像是保持专注和锻炼身体。如果你意识到了你的家人或朋友 可能患有创伤后压力综合征该怎么办呢？社交支持，接受和同情 都很有可能帮助他们的恢复。让他们知道你重视他们的经历，以及你并不会责怪他们的行为。如果他们对这个话题很开放，那就鼓励他们去接受评估和治疗。创伤后压力综合征也被叫做 “隐藏的伤口”，因为它不会有明显的生理症状。但是，虽然它是难以被看到的疾病， 并不意味着它是该被忽视的一个。

**P599 2018-06-15 Why don’t poisonous animals poison themselves - Rebecca D. Tarvin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=599)

One fine day, when Charles Darwin was still a student at Cambridge, the budding naturalist tore some old bark off a tree and found two rare beetles underneath. He’d just taken one beetle in each hand when he spotted a third beetle. Stashing one of the insects in his mouth for safekeeping, he reached for the new specimen – when a sudden spray of hot, bitter fluid scalded his tongue. Darwin’s assailant was the bombardier beetle. It’s one of thousands of animal species, like frogs, jellyfish, salamanders, and snakes, that use toxic chemicals to defend themselves – in this case, by spewing poisonous liquid from glands in its abdomen. But why doesn’t this caustic substance, ejected at 100 degrees Celsius, hurt the beetle itself? In fact, how do any toxic animals survive their own secretions? The answer is that they use one of two basic strategies: securely storing these compounds or evolving resistance to them. Bombardier beetles use the first approach. They store ingredients for their poison in two separate chambers. When they’re threatened, the valve between the chambers opens and the substances combine in a violent chemical reaction that sends a corrosive spray shooting out of the glands, passing through a hardened chamber that protects the beetle’s internal tissues. Similarly, jellyfish package their venom safely in harpoon-like structures called nematocysts. And venomous snakes store their flesh-eating, blood-clotting compounds in specialized compartments that only have one exit: through the fangs and into their prey or predator. Snakes also employ the second strategy: built-in biochemical resistance. Rattlesnakes and other types of vipers manufacture special proteins that bind and inactivate venom components in the blood. Meanwhile, poison dart frogs have also evolved resistance to their own toxins, but through a different mechanism. These tiny animals defend themselves using hundreds of bitter-tasting compounds called alkaloids that they accumulate from consuming small arthropods like mites and ants. One of their most potent alkaloids is the chemical epibatidine, which binds to the same receptors in the brain as nicotine but is at least ten times stronger. An amount barely heavier than a grain of sugar would kill you. So what prevents poison frogs from poisoning themselves? Think of the molecular target of a neurotoxic alkaloid as a lock, and the alkaloid itself as the key. When the toxic key slides into the lock, it sets off a cascade of chemical and electrical signals that can cause paralysis, unconsciousness, and eventually death. But if you change the shape of the lock, the key can’t fit. For poison dart frogs and many other animals with neurotoxic defenses, a few genetic changes alter the structure of the alkaloid-binding site just enough to keep the neurotoxin from exerting its adverse effects. Poisonous and venomous animals aren’t the only ones that can develop this resistance: their predators and prey can, too. The garter snake, which dines on neurotoxic salamanders, has evolved resistance to salamander toxins through some of the same genetic changes as the salamanders themselves. That means that only the most toxic salamanders can avoid being eaten— and only the most resistant snakes will survive the meal. The result is that the genes providing the highest resistance and toxicity will be passed on in greatest quantities to the next generations. As toxicity ramps up, resistance does too, in an evolutionary arms race that plays out over millions of years. This pattern appears over and over again. Grasshopper mice resist painful venom from scorpion prey through genetic changes in their nervous systems. Horned lizards readily consume harvester ants, resisting their envenomed sting with specialized blood plasma. And sea slugs eat jellyfish nematocysts, prevent their activation with compounds in their mucus, and repurpose them for their own defenses. The bombardier beetle is no exception: the toads that swallow them can tolerate the caustic spray that Darwin found so distasteful. Most of the beetles are spit up hours later, amazingly alive and well. But how do the toads survive the experience? That is still a mystery.

**P599 2018-06-15 Why don’t poisonous animals poison themselves - Rebecca D. Tarvin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=599)

翻译人员: Riley WANG 校对人员: Zhenlan Yao在晴朗的某天，查尔斯 · 达尔文此时 仍是一名剑桥大学的学生，这位崭露头角的博物学家 从某棵树上剥下一些树皮，并在树皮下发现了两只稀有的甲虫。他双手各抓一只， 此时，他发现了第三只甲虫。于是他把其中一只甲虫 放在嘴里暂时保存，便伸手去抓第三只——就在此时，他的舌头突然 感受到一股滚烫苦涩的液体。袭击达尔文的正是放屁虫，和放屁虫一样，上千种其他物种例如蛙类，水母，蝾螈，毒蛇，都会通过有毒物质来保卫自己。在达尔文这个例子中， 放屁虫通过腹部腺体喷出有毒液体。但是为何这种 100 摄氏度的腐蚀性物质并不会伤害放屁虫自己呢？事实上，有毒动物如何能够 不受自己分泌的毒素伤害呢？有以下两种方法可以让它们免于中毒：小心地将这些有毒物质存储起来，或者是进化出不受毒害的体质。放屁虫使用的是第一种方法。它们将生成毒液的物质 分别存储在两个腔室里。当感受到威胁时， 两个腔室之间的阀门便会打开，两种物质进行剧烈的化学反应，生成一种具有腐蚀性的物质， 并且从腺体喷射而出，而硬化的腔室 可以保护甲虫的内部组织。水母也采取类似的做法，它将毒液存在 鱼叉状的“刺囊”细胞中。毒蛇的毒液能腐蚀肌体，使血液凝结，这些毒液存储在特定部位， 并且只有一个出口，那就是通过獠牙 注入到猎物或天敌体内。蛇类也会使用第二种方法： 利用自身的生化抵抗力。响尾蛇以及其他种类的蝰蛇 能产生特殊蛋白质，这种蛋白质能够结合 血液中的有毒化合物，使其失活。箭毒蛙也进化出了对自身毒素的免疫性，但是其机制有所不同。这些小生物使用上百种生物碱， 一种苦味化合物，来保护自己。它们通过捕食螨虫、蚂蚁等节肢动物 获得这些生物碱。其中一种最强大的生物碱是地棘蛙素，它能够像尼古丁一样 附着在大脑中的感受器上，但效果要比尼古丁强上十倍。约 0.065 克的量就足以杀死一个人。那么是什么让毒蛙自身免受毒害？试着把神经毒素生物碱 要攻击的分子目标想象成一把锁，生物碱则是钥匙。当有毒的钥匙插入锁中，它会释放大量化学物质和电信号，这能够导致神经瘫痪，失去意识，最终死亡。但如果你改变锁的形状， 钥匙就失去了功能。对于箭毒蛙和其他能够 抵御神经毒素的动物来说，小的基因突变就能够 改变生物碱结合的结构，这就足以保证神经毒素 不会对自己产生不利影响。并非只有有毒动物 才能够建立起这种抗性：它们的天敌和猎物同样也能。束带蛇捕食带有神经毒素的蝾螈，它已经进化出了 能够抵抗蝾螈毒素的特性，这是通过进行与蝾螈相同的 基因改变而实现的。这意味着 只有最为剧毒的蝾螈能不被吃掉，只有最能抵抗毒素的蛇才能活下来。这样的结果就是 基因提供了最强的抗性和毒性，而这些会最大程度地传递给后代。随着毒素不断升级，抗性也不断增强。在物种进化的军备竞赛中， 这场战争上演了数百万年。这种模式不断重复出现。食蝗鼠通过改变神经系统的基因来抵御蝎子蜇伤时的毒液。角蜥蜴能够用自身的特殊血浆抵御住农田蚁有毒的叮咬。海蛞蝓能够吃掉水母的刺囊，使粘液中的化合物不被激活，并将其重新利用，保护自己。放屁虫也不例外：吞食掉它们的蟾蜍能够忍受令达尔文反感的腐蚀性液体。大多数甲虫都会 在数个小时后被蟾蜍吐出来，奇迹般地毫发无伤。但蟾蜍如何能不受放屁虫毒液的影响？这仍然是一个谜。

**P600 2018-06-18 The science of hearing - Douglas L. Oliver**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=600)

You hear the gentle lap of waves, the distant cawing of a seagull. But then an annoying whine interrupts the peace, getting closer, and closer, and closer. Until...whack! You dispatch the offending mosquito, and calm is restored. How did you detect that noise from afar and target its maker with such precision? The ability to recognize sounds and identify their location is possible thanks to the auditory system. That’s comprised of two main parts: the ear and the brain. The ear’s task is to convert sound energy into neural signals; the brain’s is to receive and process the information those signals contain. To understand how that works, we can follow a sound on its journey into the ear. The source of a sound creates vibrations that travel as waves of pressure through particles in air, liquids, or solids. But our inner ear, called the cochlea, is actually filled with saltwater-like fluids. So, the first problem to solve is how to convert those sound waves, wherever they’re coming from, into waves in the fluid. The solution is the eardrum, or tympanic membrane, and the tiny bones of the middle ear. Those convert the large movements of the eardrum into pressure waves in the fluid of the cochlea. When sound enters the ear canal, it hits the eardrum and makes it vibrate like the head of a drum. The vibrating eardrum jerks a bone called the hammer, which hits the anvil and moves the third bone called the stapes. Its motion pushes the fluid within the long chambers of the cochlea. Once there, the sound vibrations have finally been converted into vibrations of a fluid, and they travel like a wave from one end of the cochlea to the other. A surface called the basilar membrane runs the length of the cochlea. It’s lined with hair cells that have specialized components called stereocilia, which move with the vibrations of the cochlear fluid and the basilar membrane. This movement triggers a signal that travels through the hair cell, into the auditory nerve, then onward to the brain, which interprets it as a specific sound. When a sound makes the basilar membrane vibrate, not every hair cell moves - only selected ones, depending on the frequency of the sound. This comes down to some fine engineering. At one end, the basilar membrane is stiff, vibrating only in response to short wavelength, high-frequency sounds. The other is more flexible, vibrating only in the presence of longer wavelength, low-frequency sounds. So, the noises made by the seagull and mosquito vibrate different locations on the basilar membrane, like playing different keys on a piano. But that’s not all that’s going on. The brain still has another important task to fulfill: identifying where a sound is coming from. For that, it compares the sounds coming into the two ears to locate the source in space. A sound from directly in front of you will reach both your ears at the same time. You’ll also hear it at the same intensity in each ear. However, a low-frequency sound coming from one side will reach the near ear microseconds before the far one. And high-frequency sounds will sound more intense to the near ear because they’re blocked from the far ear by your head. These strands of information reach special parts of the brainstem that analyze time and intensity differences between your ears. They send the results of their analysis up to the auditory cortex. Now, the brain has all the information it needs: the patterns of activity that tell us what the sound is, and information about where it is in space. Not everyone has normal hearing. Hearing loss is the third most common chronic disease in the world. Exposure to loud noises and some drugs can kill hair cells, preventing signals from traveling from the ear to the brain. Diseases like osteosclerosis freeze the tiny bones in the ear so they no longer vibrate. And with tinnitus, the brain does strange things to make us think there’s a sound when there isn’t one. But when it does work, our hearing is an incredible, elegant system. Our ears enclose a fine-tuned piece of biological machinery that converts the cacophony of vibrations in the air around us into precisely tuned electrical impulses that distinguish claps, taps, sighs, and flies.

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翻译人员: Riley WANG 校对人员: Xiaoyu Ye你听到海浪温柔的拍打声，听到远处海鸥的叫声，但一阵嗡嗡声扰乱了平静，令人恼火。声音越来越近，越来越近。然后，啪的一声！你拍死了烦人的蚊子， 世界终于重回安静。你是如何听到远处的声音， 并如此准确地锁定声音来源的呢？我们之所以能够 识别声音并判断出其所在位置很大程度是因为听觉系统。它由大脑和耳朵这两部分构成。耳朵的任务是将声音转换成为神经信号；大脑则是接受并处理这些信号中的信息。为了更好地理解它的工作原理，我们跟随声音进行一场耳朵之旅。声源会产生振动，这会以压力波的形式 通过空气中的微粒传播，或是在液体和固体中传播。但我们的内耳，也叫耳蜗，实际上充满了盐水一样的液体。因此，第一个要解决的问题是如何将这些四面八方传来的声波转化成液体的波动。答案在于鼓膜。以及中耳处一些微小的骨头。它们将鼓膜较大的震动转化成耳蜗液体的压力波。当声音进入耳道，它首先使鼓膜震动， 就像敲打一面鼓。震动的鼓膜使 一块叫做锤骨的骨头发生震动。锤骨击打砧骨， 并继续震动第三块骨头镫骨。这些动作推动耳蜗狭长腔室中的液体流动。至此，声音的震动终于转化成为液体的震动。之后他们如波浪般从耳蜗的一头传至另一头。一种叫做基底膜的膜状结构遍布耳蜗。基底膜上覆盖拥有特殊结构的毛细胞，称为纤毛。它会随耳蜗液体和基底膜而震动，这种动作会沿毛细胞触发信号，信号会进入听觉神经，之后进入大脑， 由大脑解析识别出特定的声音。声音让基底膜震动时，并非所有毛细胞都会随之震动，依据声音的频率不同， 只有特定的毛细胞会摆动。这与一些精密工程学相关。基底膜一段较为坚硬，只会对波长短、频率高的声音 做出震动反应。另一端则更为灵活，只对波长长、频率低的声音 做出反应。因此海鸥和蚊子的声音其实会引起基底膜不同区域的震动，就像是在钢琴上弹不同的琴键。但这并不是全部过程。大脑仍然有另一个重要的任务：它需要识别声音来自何处。为此，大脑会比照进入两个耳朵的声音，以此在空间中定位声源。直接来自你面前的声音 会同时到达双耳，每个耳朵听到的声音强度也相同。但是来自其他方向的低频声音会以微秒之差先进入靠近声源一侧的耳朵。靠近声源的耳朵 会感受到高频声音更大的强度，因为头部会阻挡 声音到达另一边的耳朵。这部分滞后的信息 会到达脑干的特殊位置，以此分析双耳信号的时间和强度差异。它们将分析结果 传输至大脑皮层的听觉中枢。现在，大脑拥有了全部所需的信息：可以断定是哪种声音的活动模式，以及声音在空间中的位置信息。并非所有人都拥有正常听力。失聪是世界上第三大最普遍的慢性疾病。接触巨大噪音和一些药物会杀死毛细胞，从而阻止信号从耳朵传送至大脑。骨硬化等疾病会使耳朵中的小骨硬化，使其无法震动。至于耳鸣，大脑会做出奇怪的反应，使我们听到并不存在的声音。但是当听觉系统正常工作时，它是一个精妙无比的系统。我们的耳朵包含了 精密协调的生物构造，将周边空气中的刺耳震动转化成为精确校准的电脉冲，使我们能够分辨掌声， 敲打声，叹息和苍蝇的嗡嗡声。

**P601 2018-06-19 What is the coldest thing in the world - Lina Marieth Hoyos**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=601)

The coldest materials in the world aren’t in Antarctica. They’re not at the top of Mount Everest or buried in a glacier. They’re in physics labs: clouds of gases held just fractions of a degree above absolute zero. That’s 395 million times colder than your refrigerator, 100 million times colder than liquid nitrogen, and 4 million times colder than outer space. Temperatures this low give scientists a window into the inner workings of matter, and allow engineers to build incredibly sensitive instruments that tell us more about everything from our exact position on the planet to what’s happening in the farthest reaches of the universe. How do we create such extreme temperatures? In short, by slowing down moving particles. When we’re talking about temperature, what we’re really talking about is motion. The atoms that make up solids, liquids, and gases are moving all the time. When atoms are moving more rapidly, we perceive that matter as hot. When they’re moving more slowly, we perceive it as cold. To make a hot object or gas cold in everyday life, we place it in a colder environment, like a refrigerator. Some of the atomic motion in the hot object is transferred to the surroundings, and it cools down. But there’s a limit to this: even outer space is too warm to create ultra-low temperatures. So instead, scientists figured out a way to slow the atoms down directly – with a laser beam. Under most circumstances, the energy in a laser beam heats things up. But used in a very precise way, the beam’s momentum can stall moving atoms, cooling them down. That’s what happens in a device called a magneto-optical trap. Atoms are injected into a vacuum chamber, and a magnetic field draws them towards the center. A laser beam aimed at the middle of the chamber is tuned to just the right frequency that an atom moving towards it will absorb a photon of the laser beam and slow down. The slow down effect comes from the transfer of momentum between the atom and the photon. A total of six beams, in a perpendicular arrangement, ensure that atoms traveling in all directions will be intercepted. At the center, where the beams intersect, the atoms move sluggishly, as if trapped in a thick liquid — an effect the researchers who invented it described as “optical molasses.” A magneto-optical trap like this can cool atoms down to just a few microkelvins — about -273 degrees Celsius. This technique was developed in the 1980s, and the scientists who'd contributed to it won the Nobel Prize in Physics in 1997 for the discovery. Since then, laser cooling has been improved to reach even lower temperatures. But why would you want to cool atoms down that much? First of all, cold atoms can make very good detectors. With so little energy, they’re incredibly sensitive to fluctuations in the environment. So they’re used in devices that find underground oil and mineral deposits, and they also make highly accurate atomic clocks, like the ones used in global positioning satellites. Secondly, cold atoms hold enormous potential for probing the frontiers of physics. Their extreme sensitivity makes them candidates to be used to detect gravitational waves in future space-based detectors. They’re also useful for the study of atomic and subatomic phenomena, which requires measuring incredibly tiny fluctuations in the energy of atoms. Those are drowned out at normal temperatures, when atoms speed around at hundreds of meters per second. Laser cooling can slow atoms to just a few centimeters per second— enough for the motion caused by atomic quantum effects to become obvious. Ultracold atoms have already allowed scientists to study phenomena like Bose-Einstein condensation, in which atoms are cooled almost to absolute zero and become a rare new state of matter. So as researchers continue in their quest to understand the laws of physics and unravel the mysteries of the universe, they’ll do so with the help of the very coldest atoms in it.

**P601 2018-06-19 What is the coldest thing in the world - Lina Marieth Hoyos**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=601)

翻译人员: Lipeng Chen 校对人员: lei li史上最寒冷的物体并非在南极。它们既不在珠穆朗玛峰上，也不藏在冰川之下。它们存在于实验室中：这些一团团的气体的温度 只比绝对零度高零点几度。这个温度比你家里的冰箱 还要冷39.5亿倍，比液态氮冷10亿倍，以及比外太空冷4百万倍。如此低的温度让科学家有机会 一窥物质的内部运作，也让工程师能够 制造敏感度极高的仪器。这些仪器可丰富我们的知识，比如如更精确地确定我们在地球的位置或了解宇宙远方所发生的事。我们如何才能创造出这种极端的温度呢？简单来说，只要降低运动粒子的速度。当我们谈及温度的时候， 我们实际上是在讨论运动。组成固体、液体、以及气体的粒子，一直处于运动之中。当原子运动快时， 我们感受到物质是热的。当原子运动慢时， 我们则觉得是冷的。日常生活中为了让热的固体或气体降温，我们将其放在更冷的环境中，比如冰箱里。热物体中的原子运动 被部分的传递到周围环境里，然后它就冷下来了。但是这有一个限制：即使是外太空也太温暖了， 无法创造出极端低的温度。所以相反，科学家们找到了一个 直接降低原子速度的方法——用激光束。在大多数情况下，激光束中的能量会加热物体。但是如果被用以特定的方式，激光束的动量可以阻止运动的原子， 从而降低温度。这就是在一种名叫磁场-光学陷阱的 仪器中发生的事情。原子被注入真空的盒子中，然后磁场会将它们向中间吸引。一束激光束正对盒子的中央，它的频率被调的正好可以让向其运动的原子吸收 一个激光束光子，进而减速。减速效果来自原子和光子之间的动量转换。六束激光，以垂直的布局保证向各个方向运动的原子都会被拦截。在光束交汇的中央，原子运动的格外缓慢， 就像陷入了粘稠的液体——该效果被发现它的研究人员 称作“光学糖浆”。像这样的磁场-光学陷阱可以将原子冷却到零点几开尔文——大概-273摄氏度。这项技术于上世纪八十年代被发展出来，对此有贡献的科学家们在1997年因为他们的发现 赢得了诺贝尔物理学奖。自此，激光冷却进一步完善， 可以达到更低的温度。但是为什么要把原子 冷却到如此之低的温度呢？首先，极寒原子可以成为很好的检测物质。拥有很少的能力，它们对周围的波动异常敏感。所以它们被用在寻找 地下石油和矿藏的装置之中，它们也能制造高精度原子钟，例如全球定位卫星中的原子钟。其次，极寒原子蕴藏着 探索物理学前沿的巨大潜力。它们极端的敏感性使他们可以在未来的空间探测仪中 被用来探测引力波。它们对原子和次原子现象的研究也有帮助，这种研究需要测度原子能量的 极其微小的波动。原子在常温中被射出，此时原子速度大概在每秒几百米。激光冷却可以使原子降速到每秒几厘米——对观测由原子量子效果 造成的运动够用了。极寒原子已经帮助科学家研究了诸如玻色–爱因斯坦凝聚等现象，在该凝聚中原子被降温到接近绝对零度，然后成为一种少见的物质新状态。所以随着研究人员 继续试图理解物理学定律并解开宇宙谜题的同时，他们会需要极寒原子的帮助。

**P602 2018-06-25 Why does your voice change as you get older - Shaylin A. Schundler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=602)

In the mid-16th century, Italians were captivated by a type of male singer whose incredible range contained notes previously thought impossible for adult men. However, this gift came at a high price. To prevent their voices from breaking, these singers had been castrated before puberty, halting the hormonal processes that would deepen their voices. Known as castrati, their light, angelic voices were renowned throughout Europe, until the cruel procedure that created them was outlawed in the 1800s. Though stunting vocal growth can produce an extraordinary musical range, naturally developing voices are already capable of incredible variety. And as we age, our bodies undergo two major changes which explore that range. So how exactly does our voice box work, and what causes these shifts in speech? The specific sound of a speaking voice is the result of many anatomical variables, but it’s mostly determined by the age and health of our vocal cords and the size of our larynxes. The larynx is a complex system of muscle and cartilage that supports and moves the vocal cords, or, as they’re more accurately known, the vocal folds. Strung between the thyroid and arytenoid cartilages, these two muscles form an elastic curtain that opens and shuts across the trachea, the tube that carries air through the throat. The folds are apart when we’re breathing, but when we speak, they slam shut. Our lungs push air against the closed folds, blowing them open and vibrating the tissue to produce sound. Unlike the deliberate focus required for playing an external instrument, we effortlessly change notes as we speak. By pushing air faster or slower, we change the frequency and amplitude of these vibrations, which respectively translate to the pitch and volume of our voices. Rapid and small vibrations create high-pitched, quiet tones, while slow, large vibrations produce deep, bellowing rumbles. Finally, by moving the laryngeal muscles between the cartilages, we can stretch and contract those folds to intuitively play our internal instruments. This process is the same from your first words to your last, but as you age, your larynx ages too. During puberty, the first major shift starts, as your voice begins to deepen. This happens when your larynx grows in size, elongating the vocal folds and opening up more room for them to vibrate. These longer folds have slower, larger vibrations, which result in a lower baseline pitch. This growth is especially dramatic in many males, whose high testosterone levels lead first to voice cracks, and then to deeper, more booming voices, and laryngeal protrusions called Adam’s apples. Another vocal development during puberty occurs when the homogenous tissue covering the folds specializes into three distinct functional layers: a central muscle, a layer of stiff collagen wrapped in stretchy elastin fibers, and an outer layer of mucus membrane. These layers add nuance and depth to the voice, giving it a distinct timbre that sets it apart from its pre-pubescent tones. After puberty, most people’s voices remain more or less the same for about 50 years. But we all use our voices differently, and eventually we experience the symptoms associated with aging larynxes, known as presbyphonia. First, the collagen in our folds stiffens and the surrounding elastin fibers atrophy and decay. This decreased flexibility increases the pitch of older voices. But for people who have experienced the hormonal effects of menopause, the higher pitch is countered and outweighed by swollen vocal folds. The folds' increased mass slows their vibrations, resulting in deeper voices. All these symptoms are further complicated by having fewer healthy laryngeal nerve endings, which reduces precise muscle control and causes breathy or rough voices. Ultimately, these anatomical changes are just a few of the factors that can affect your voice. But when kept in good condition, your voice box is a finely tuned instrument, capable of operatic arias, moody monologues, and stirring speeches.

**P602 2018-06-25 Why does your voice change as you get older - Shaylin A. Schundler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=602)

翻译人员: Wee Loon Ng 校对人员: Lipeng Chen十六世纪中期，当时的意大利人被一种男歌手所吸引着，他们难以置信的音域包括了之前成年男性以为 不可能达到的音级。可是，这份天赋是有着沉重的代价的。为了避免嗓子倒仓，这些歌手在青春期之前 就先自阉，以便阻止荷尔蒙 促使声音变得更低沉。名为阉伶，他们轻盈而又 天使般的声音享誉全欧洲，直到制造他们那残忍的手术 在十九世纪被制止。迟缓声带发育确实可以 导致非一般的音域，可是表自然形成的声音 也同样可以。随着我们成长，我们的身体 会经过两次影响音域的重大的改变。那我们的声门到底是怎么运作的， 而是什么导致发音的变化？我们说话是所发出的声音 是许多不同生理因素所产生的结果，但是最大的影响来自声带的 年龄和健康状况以及喉头的大小。我们的喉头是由许多肌肉 和软骨织所形成的复杂系统，它负责支撑和移动声线，或更正确的说，应该是声带。悬系在甲状腺与杓状软骨之间，这两块肌肉形成一片有弹性的帘子， 横盖着经过喉咙输送空气的气管。当我们呼吸的时候，声带是分开的，当我们说话的时候，它们会紧闭。我们的肺会把之前吸入的空气 推向闭着的声带，把它们吹开并震动肌肉组织 从而产生声音。与专心致志地 弹奏着乐器相反，我们在说话的时候会 毫不费吹灰之力的转换音符。以不同的速度将空气推出，我们可以改变震动的 频率与幅度，从而改变说话 的声量与频率。快捷而细小的震动 带来高频率而平静的声调，缓慢而巨大的震动 则带来低沉的阵吼。然后，通过把喉头肌肉 移动到软骨之间，我们可以伸长或缩短声带来下意识地吹奏着 体内的乐器。这道程序从我们会说第一个字 到我们的最后一个字都一样，但随着你老去，你的喉头也会老化。青春期的时候， 随着你的声音变得低沉，第一个重大的转移开始，当你的喉头成长而变大的时候，你的声带就会被拉长 而开启更多的空间可以震动。这些被拉长的声带 有着比较慢长而巨大的震动，所以会有比较低的音调。喉头的成长在许多男性中 特别的明显，他们的高量男性荷尔蒙 首先导致破音，然后是更低，更宏亮的声音，再者是喉头突出， 形成喉结。发育期的另外一个声带发展是当掩盖着声带单一性组织专门化地形成三层 功能不同的组织：一个中枢肌肉，一层被弹性纤维包裹 的软骨组织，和外层的粘膜。这些不同层次的细胞 使得声音具有深度和细微差别，而赋予它与发育前 不同的独特音色。发育期后，大多数人 在接下来的50年，会有着几乎不变的嗓音。但我们每个人用嗓子的方法各不同，而结果是我们会体验俗称老年语音 的喉咙老化所带来的各种症状。首先，喉咙内的软组织将硬化而周围的弹性纤维也将 萎缩而衰化。所失去的灵活性将提高 声音的频率。但是若同时经历更年期， 荷尔蒙的变化将会导致声带肿胀 而相抵过之前的变化。肿胀所产生的多余的组织 则会减缓震动而使到声音变得低沉。种种的症状又会因为喉部神经细胞减少 而复杂化，使得肌肉控制失去准确性 而发出比较粗，或类似喘息的声音。到最后，这些生理上的变化 只是影响声音的部分因素罢了。你的声门在细心保存的情况下 是个精细的工具，能够唱出歌剧中的情感，念出悲伤的独白，发表感人的演说。

**P603 2018-06-26 History vs. Augustus - Peta Greenfield & Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=603)

His reign marked the beginning of one of history’s greatest empires and the end of one of its first republics. Was Rome’s first emperor a visionary leader who guaranteed his civilization’s place in history or a tyrant who destroyed its core values? Find out in History versus Augustus. Order, order. The defendant today is Gaius Octavius? Gaius Julius Caesar/Augustus... Do we have the wrong guy? No, your Honor. Gaius Octavius, born in 63 BCE, was the grand-nephew of Julius Caesar. He became Gaius Julius Caesar upon being named his great-uncle’s adoptive son and heir. And he gained the title Augustus in 27 BCE when the Senate granted him additional honors. You mean when he established sole authority and became emperor of Rome. Is that bad? Didn’t every place have some king or emperor back then? Actually, your Honor, the Roman people had overthrown their kings centuries before to establish a republic, a government meant to serve the people, not the privilege of a ruling family. And it was Octavius who destroyed this tradition. Octavius was a model public servant. At 16, he was elected to the College of Pontiffs that supervised religious worship. He fought for Rome in Hispania alongside his great-uncle Caesar and took up the responsibility of avenging Caesar’s death when the corrupt oligarchs in the Senate betrayed and murdered him. Caesar had been a power-hungry tyrant who tried to make himself a king while consorting with his Egyptian queen Cleopatra. After his death, Octavius joined his general Mark Antony in starting a civil war that tore Rome apart, then stabbed his ally in the back to increase his own power. Antony was a fool. He waged a disastrous campaign in Parthia and plotted to turn Roman territories into personal kingdoms for himself and Cleopatra. Isn’t that what Caesar had been accused of? Well... So Octavius destroyed Antony for trying to become a king and then became one himself? That’s right. You can see the megalomania even in his adopted title – "The Illustrious One." That was a religious honorific. And Augustus didn’t seek power for his own sake. As winner of the civil war and commander of the most troops, it was his duty to restore law and order to Rome so that other factions didn’t continue fighting. He didn’t restore the law - he made it subordinate to him! Not true. Augustus worked to restore the Senate’s prestige, improved food security for the lower classes, and relinquished control of the army when he resigned his consul post. Mere optics. He used his military influence and personal wealth to stack the Senate in his favor, while retaining the powers of a tribune and the right to celebrate military triumphs. He kept control of provinces with the most legions. And if that wasn’t enough, he assumed the consul position twice more to promote his grandchildren. He was clearly trying to establish a dynasty. But what did he do with all that power? Glad you asked, your Honor. Augustus’s accomplishments were almost too many to name. He established consistent taxation for all provinces, ending private exploitation by local tax officials. He personally financed a network of roads and employed couriers so news and troops could travel easily throughout the realm. And it was under Augustus that many of Rome’s famous public buildings were constructed. The writers of the time were nearly unanimous in praising his rule. Did the writers have any other choice? Augustus exiled plenty of people on vague charges, including Ovid, one of Rome’s greatest poets. And you forgot to mention the intrusive laws regarding citizens’ personal lives – punishing adultery, restricting marriage between social classes, even penalties for remaining unmarried. He was trying to improve the citizenry and instill discipline. And he succeeded. His legacy speaks for itself: 40 years of internal stability, a professional army that expanded Rome’s frontiers in all directions, and a government still remembered as a model of civic virtue. His legacy was an empire that would go on to wage endless conquest until it collapsed, and a tradition of military autocracy. Any time a dictator in a general’s uniform commits atrocities while claiming to act on behalf of "the people," we have Augustus Caesar to thank. So you’re saying Augustus was a good emperor, and you’re saying there’s no such thing? We’re used to celebrating historical leaders for their achievements and victories. But to ask whether an individual should have such power in the first place is to put history itself on trial.

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翻译人员: Clare Wong 校对人员: Homer Li他的统治标志着史上其中一个 最伟大的帝国的掘起，以及史上第一个共和国的终結。罗马的第一个皇帝，到底是个名留青史具远见的领袖，还是摧毁了帝国核心价值的暴君 ?请在《历史审判下的奥古斯都》中找出答案。肃静，肃静。今天的被告是盖乌斯·屋大维吗?尤利乌斯·凯撒/奥古斯都……我们抓错了人吗？没有，法官阁下。盖乌斯·屋大维，生于公元前63年， 是尤利乌斯·凯撒的甥孙。他其后继承了尤利乌斯·凯撒的名字亦成为他这叔公的养子及继承人。公元前27年， 元老院赐予他额外的荣耀，他获得了奥古斯都这个称号。你的意思是他独掌政权 并成为罗马皇帝。这是件坏事吗?以前不是每个地方都有些皇帝吗？事实上，法官阁下，罗马人在几个世纪前 推翻了他们的国王而建立一个共和国，它的政府应该为人民服务， 不是为权贵服务。而屋大维破坏了这个传统。屋大维是个模范公仆。16岁时，他被选中到监督宗教崇拜的大祭司团。他和他的凯撒叔公 在西班牙并肩为罗马而战。当元老院中腐败的寡头统治集团 背叛并且杀了凯撒后，屋大维肩负起为凯撒报仇的责任。凯撒是位渴望权力的暴君。 他尝试令自己成为皇帝的同时，还埃及的克丽奥佩脱拉女皇厮混。他死后，屋大维和他的将领马克·安东尼发起了分裂罗马的内战。然后屋大维在背后暗算自己的盟友 来增强自己的权力。安东尼是个蠢材。他在安息帝国发动了 一场灾难性的战役，并且密谋把罗马的疆土变成他和克丽奥佩脱拉的私人王国。这不正是凯撒的罪名吗?嗯...就是说，屋大维因安东尼 想做皇帝而把他杀害，然后自己成为皇帝?没错。从他的头衔——“显赫者” 可以看出他狂妄自大。那是个宗教尊称。奥古斯都不是为了自己才寻求权力。作为内战中的胜利者 和绝大部分部队的指挥官，恢复罗马的法令是他的责任，如此其他党派便不会继续斗争。他没有恢复法令，他使法令臣服于他。不是。奥古斯都在恢复元老院的威信,提升下级阶层的食品安全，并辞去将领职位时 撤除对军队的控制下了功夫。这只是表面。他利用自己的军事影响力 和个人财富，拉拢元老院投向他的一方，并保留护民官的权力以及兴祝军事胜利的权利。他继续掌控着拥有最多军团的行省。如果这还不够，他两次恢复自己执政官的职务， 来提拔他的孙子们。他明显地试图建立一个皇朝。但他用这些权力都做了些什么呢?幸好你问了，法官阁下。奥古斯都的成就太多，无法说清。他统一所有行省的税制，结束了地方税吏中饱私囊的局面。他自资建立道路网并聘请很多信使，使得资讯和军队在王国中容易穿行。很多罗马着名的公共建筑，都是在奥古斯都时期兴建的。当时的作家几乎一致赞扬他的管治。当时的作家有其他选择吗?奥古斯都以含糊的指控 流放了很多人，其中包括奥维德， 罗马其中一个最伟大的诗人。你忘记提及那些 干预百姓私生活的法令——惩治通奸，限制社会各阶层间的通婚，甚至处罚不婚者。他尝试提升公民素质 和灌输纪律。而他成功了。他的遗产说明了一切——四十年的内部稳定 ，一支全方面扩张罗马边境的专业军队和一个仍被记得为 公民道德模范的政府。他的遗产是一个会发动无尽战争直至自我毁灭的帝国和一个军事独裁的传统。任何时候，当一个独裁者 穿着将领的制服施行暴行，同时宣称是代表“人民”执行，那都是奥古斯都·凯撒的功劳。所以你是说奥古斯都是个好皇帝，而你说没有这回事?我们习惯因他们的成就和胜利，颂扬历史上的领袖。若我们问一个跟本问题—— 一个人应否有如此权力?那就相等于将历史送上审判台。

**P604 2018-06-26 How exactly does binary code work - José Américo N L F de Freitas**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=604)

Imagine trying to use words to describe every scene in a film, every note in your favorite song, or every street in your town. Now imagine trying to do it using only the numbers 1 and 0. Every time you use the Internet to watch a movie, listen to music, or check directions, that’s exactly what your device is doing, using the language of binary code. Computers use binary because it's a reliable way of storing data. For example, a computer's main memory is made of transistors that switch between either high or low voltage levels, such as 5 volts and 0 volts. Voltages sometimes oscillate, but since there are only two options, a value of 1 volt would still be read as "low." That reading is done by the computer’s processor, which uses the transistors’ states to control other computer devices according to software instructions. The genius of this system is that a given binary sequence doesn't have a pre-determined meaning on its own. Instead, each type of data is encoded in binary according to a separate set of rules. Let’s take numbers. In normal decimal notation, each digit is multiplied by 10 raised to the value of its position, starting from zero on the right. So 84 in decimal form is 4x10⁰ + 8x10¹. Binary number notation works similarly, but with each position based on 2 raised to some power. So 84 would be written as follows: Meanwhile, letters are interpreted based on standard rules like UTF-8, which assigns each character to a specific group of 8-digit binary strings. In this case, 01010100 corresponds to the letter T. So, how can you know whether a given instance of this sequence is supposed to mean T or 84? Well, you can’t from seeing the string alone – just as you can’t tell what the sound "da" means from hearing it in isolation. You need context to tell whether you're hearing Russian, Spanish, or English. And you need similar context to tell whether you’re looking at binary numbers or binary text. Binary code is also used for far more complex types of data. Each frame of this video, for instance, is made of hundreds of thousands of pixels. In color images, every pixel is represented by three binary sequences that correspond to the primary colors. Each sequence encodes a number that determines the intensity of that particular color. Then, a video driver program transmits this information to the millions of liquid crystals in your screen to make all the different hues you see now. The sound in this video is also stored in binary, with the help of a technique called pulse code modulation. Continuous sound waves are digitized by taking "snapshots" of their amplitudes every few milliseconds. These are recorded as numbers in the form of binary strings, with as many as 44,000 for every second of sound. When they’re read by your computer’s audio software, the numbers determine how quickly the coils in your speakers should vibrate to create sounds of different frequencies. All of this requires billions and billions of bits. But that amount can be reduced through clever compression formats. For example, if a picture has 30 adjacent pixels of green space, they can be recorded as "30 green" instead of coding each pixel separately - a process known as run-length encoding. These compressed formats are themselves written in binary code. So is binary the end-all-be-all of computing? Not necessarily. There’s been research into ternary computers, with circuits in three possible states, and even quantum computers, whose circuits can be in multiple states simultaneously. But so far, none of these has provided as much physical stability for data storage and transmission. So for now, everything you see, hear, and read through your screen comes to you as the result of a simple "true" or "false" choice, made billions of times over.

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翻译人员: Robin W 校对人员: Carol Wang想象一下，用词语来描绘 电影中的每一处场景，你最爱的歌曲的每一个音符，或者你镇上的每一条街道，现在想一下试着只用数字 1 和 0 来表达这些。每次你使用因特网观赏电影、听音乐、或者查找方位，你的设备就是这样工作的：使用二进制编码语言。电脑使用二进制，因为它 能可靠地存储数据。举例来说，电脑的主存储器 由晶体管构成，晶体管在高压与低压之间转换，例如 5 伏和 0 伏。电压有时会振动，但由于 只有高压和低压之分，1 伏仍然被认为是低压。这些数值由电脑处理器读取，根据软件指令，通过 晶体管的状态来控制其他电脑设备。这套系统的妙处是： 给定的二进制序列本身没有既定含义。相反的，每种数据 根据一套单独的规则，进行二进制编码。让我们以数字为例，在通常的十进制计数法中，每个数位上的数字 乘以 10 的指数次幂，指数从右向左，由 0 开始增长，因此 84 的十进制形式 是 4x10⁰ + 8x10¹。二进制计数法的原理也很相似，但每个数位上的数值 与 2 的指数次幂相乘，因此 84 的二进制形式如图所示。同时，字母 根据标准规则，如 UTF-8，用一组特定的 8 位 二进制串进行编码。在这种情况下， 01010100 指的是字母 T。那么，你怎么知道 这个给定的二进制序列指的是 T 还是 84 呢？事实上，单看这一串数字 的确无法判断，就像单纯听到“DA”的声音， 你不能判断它的意思一样。你需要根据语境，判断听到的 是俄语、西班牙语、还是英语。你同样需要语境来判断你看到的是二进制 数字还是二进制文字。二进制编码也被用在 复杂得多的数据类型中，例如，这个视频的每一帧，都是由无数的像素组成的。在彩色图片中，每个像素由 3 个二进制序列表示，分别对应红、绿、蓝三原色。每个序列编码成一个数字，决定了特定颜色的强度。之后，一个视频驱动程序将此信息传递给你屏幕上数百万的液晶，形成了你现在看到的不同的色调。这个视频的声音也通过 二进制的形式储存，通过脉冲编码调制技术实现。持续的声波被数字化，通过对其振幅进行 几毫秒一次的快照，这些声音以二进制串的 数字形式记录下来，每秒的声音包含 多达 44000 个数字。当它们被你电脑上 的音频软件读取时，这些数字决定了 扬声器里线圈的振动速度，以转换成不同频率的声音。所有这些需要数十亿、 数百亿的二进制位。但是通过巧妙的压缩格式， 这个数值能够显著减少。例如，如果一个图片有 30 个 相邻的绿格像素，它们会被记录成“30绿”， 而不是把每一个像素分别编码，这个过程叫做“行程编码“，这些压缩格式本身 也被编成了二进制码。那么二进制就是 计算的最终目标了吗？不一定。三进制计算机已有相关研究，将三种可能的状态形成循环。甚至有量子计算机，可以同时进行多重状态的循环。但是到目前为止， 这些研究中没有一种在信息存储和传输方面 具有足够的物理稳定性。因此现在，你在屏幕上看到的、听到的、和读到的一切，都是简单的“是” “非”选择运行了数十亿次的结果。

**P605 2018-06-26 The myth of Hercules - 12 labors in 8-bits - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=605)

Hercules, son of Zeus and champion of humankind, gazed in horror as he realized he had just committed the most unspeakable crime imaginable. The goddess Hera, who hated Hercules for being born of her husband’s adultery, had stricken him with a temporary curse of madness. And his own family were the casualties. Consumed by grief, Hercules sought out the Oracle of Delphi, who told him the path to atonement lay with his cousin, King Eurystheus of Tiryns, a favorite of Hera’s. Eurystheus hoped to humiliate Hercules with ten impossible tasks that pitted him against invincible monsters and unfathomable forces. Instead, the king set the stage for an epic series of adventures that would come to be known as the Labors of Hercules. The first labor was to slay the Nemean Lion, who kidnapped women and devoured warriors. Its golden fur was impervious to arrows, but Hercules cornered the lion in its dark cave, stunned it with a club, and strangled it with his bare hands. He found no tool sharp enough to skin the beast, until the goddess Athena suggested using one of its own claws. Hercules returned to Tiryns wearing the lion’s hide, frightening King Eurystheus so much that he hid in a wine jar. From then on, Hercules was ordered to present his trophies at a safe distance. The second target was the Lernaean Hydra, a giant serpent with many heads. Hercules fought fiercely, but every time he cut one head off, two more grew in its place. The battle was hopeless until his nephew Iolaus thought to cauterize the necks with fire, keeping the heads from regrowing. The dead serpent’s remains became the Hydra constellation. Instead of slaying a beast, Hercules next had to catch one, alive. The Ceryneian Hind was a female deer so fast it could outrun an arrow. Hercules tracked it for a year, finally trapping it in the northern land of Hyperborea. The animal turned out to be sacred to Artemis, goddess of the hunt, and Hercules swore to return it. When Eurystheus saw the hind, he demanded to keep it instead, but as soon as Hercules let go, the animal ran to its mistress. Thus, Hercules completed his task without breaking his promise. The fourth mission was to capture the Erymanthian boar, which had ravaged many fields. Advised by the wise centaur Chiron, Hercules trapped it by chasing it into thick snow. For the fifth task, there were no animals, just their leftovers. The stables where King Augeas kept his hundreds of divine cattle had not been maintained in ages. Hercules promised to clean them in one day if he could keep one-tenth of the livestock. Augeas expected the hero to fail. Instead, Hercules dug massive trenches, rerouting two nearby rivers to flow through the stables until they were spotless. Next came three more beastly foes, each requiring a clever strategy to defeat. The carnivorous Stymphalian birds nested in an impenetrable swamp, but Hercules used Athena’s special rattle to frighten them into the air, at which point he shot them down. No mortal could stand before the Cretan bull’s mad rampage, but a chokehold from behind did the trick. And the mad King Diomedes, who had trained his horses to devour his guests, got a taste of his own medicine when Hercules wrestled him into his own stables. The ensuing feast calmed the beasts enough for Hercules to bind their mouths. But the ninth labor involved someone more dangerous than any beast, Hippolyta, Queen of the Amazons. Hercules was to retrieve the belt given to her by her father Ares, the god of war. He sailed to the Amazon land of Themyscira prepared for battle, but the queen was so impressed with the hero and his exploits that she gave the belt willingly. For his tenth labor, Hercules had to steal a herd of magical red cattle from Geryon, a giant with three heads and three bodies. On his way, Hercules was so annoyed by the Libyan desert heat that he shot an arrow at the Sun. The sun god Helios admired the hero’s strength and lent his chariot for the journey to the island of Erytheia. There, Hercules fought off Geryon’s herdsman and his two-headed dog, before killing the giant himself. That should have been the end. But Eurystheus announced that two labors hadn’t counted: the Hydra, because Iolaus had helped Hercules kill it, and the stables, because he’d accepted payment. And so, the hero set about his eleventh task, obtaining golden apples from the garden of the Hesperides nymphs. Hercules began by catching the Old Man of the Sea and holding the shape-shifting water-god until he revealed the garden’s location. Once there, the hero found the titan Atlas holding up the heavens. Hercules offered to take his place if Atlas would retrieve the apples. Atlas eagerly complied, but Hercules then tricked him into trading places again, escaping with apples in hand. The twelfth and final task was to bring back Cerberus, the three-headed hound guarding the underworld. Helped by Hermes and Athena, Hercules descended and met Hades himself. The lord of the dead allowed Hercules to take the beast if he could do it without weapons, which he achieved by grabbing all three of its heads at once. When he presented the hound to a horrified Eurystheus, the king finally declared the hero’s service complete. After 12 years of toil, Hercules had redeemed the tragic deaths of his family and earned a place in the divine pantheon. But his victory held an even deeper importance. In overcoming the chaotic and monstrous forces of the world, the hero swept away what remained of the Titans’ primordial order, reshaping it into one where humanity could thrive. Through his labors, Hercules tamed the world’s madness by atoning for his own.

**P605 2018-06-26 The myth of Hercules - 12 labors in 8-bits - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=605)

翻译人员: Riley WANG 校对人员: Liu Qi宙斯之子，人类王者赫拉克勒斯惊恐地瞪大了双眼，意识到自己刚刚犯下了 难以想象的可怕罪行。女神赫拉因痛恨赫拉克勒斯， 她丈夫的私生子，施法让他陷入短暂的癫狂状态，赫拉克勒斯的家人因此受害。赫拉克勒斯怀着悲痛 寻求德尔菲的神谕，被指点了一条救赎之路——即找到他的表兄，也是赫拉的宠信， 梯林斯的国王欧律斯透斯。欧律斯透斯计划用十项 不可能完成的任务羞辱赫拉克勒斯，这些任务包含难以战胜的怪兽，和深不可测的力量。国王此举反而成就了 一系列史诗探险，后来被称为赫拉克勒斯的伟业。第一项任务是杀死涅墨亚的狮子，这头狮子掳掠妇女，吞食战士，连弓箭都无法穿透它的金色皮毛，但赫拉克勒斯将狮子 围困到黑暗的洞穴，用棍棒将其打晕，并徒手掐死了狮子。他找不到可以剥狮子皮的锋利工具，直到雅典娜建议他用狮爪剥下狮皮。赫拉克勒斯穿着这张兽皮返回梯林斯，吓得国王欧律斯透斯 躲到了红酒桶中。从那以后，赫拉克勒斯被要求只能站在安全的距离展示他的战利品。第二个目标是水蛇海德拉， 一条长着多个脑袋的巨蟒。赫拉克勒斯与之激烈地搏斗，但每当他砍掉一个蛇头， 原来的地方会重新长出两个头。战胜的希望渺茫，这时，赫拉克勒斯的侄子伊奥劳斯 提议用火来烧断蛇颈，阻止蛇头重新长出来。死掉的毒蛇尸体化为了长蛇座。接下来的任务不是去杀猛兽， 而是要活捉牝鹿，刻律涅牝鹿是一种雌性鹿， 速度极快，可以躲过弓箭。赫拉克勒斯追踪了它一整年，最终在亥帕波尼亚北部困住了它。这只牝鹿竟是狩猎女神 阿尔忒弥斯的坐骑，赫拉克勒斯发誓一定会还回来。但欧律斯透斯一看到牝鹿， 便要求将其留为己用，但是赫拉克勒斯刚一松手， 牝鹿便跑向了它的女主人。因此赫拉克勒斯既完成了任务， 也没有食言。第四项任务是 抓住厄律曼托斯的野猪，这头野猪践踏了许多田地。赫拉克勒斯按照半人马喀戎的建议，将野猪赶到积雪深厚的地方抓住了它。第五项任务不是动物， 而是动物的排泄物。国王奥吉亚斯的牛棚里 养着上百头神牛，数年来未曾打理，赫拉克勒斯承诺在一天之内 将牛棚清洗完毕，条件是分给他十分之一的牛群。奥吉亚斯认定赫拉克勒斯会失败。但是，赫拉克勒斯挖了 一条巨大的沟渠，将两条附近的河流引经牛棚，直到将牛棚彻底冲洗干净。接下来要面对的是 三个更加残忍的对手，每一个都需要智谋来取胜。斯廷法利斯怪鸟 巢居在深不可测的沼泽，赫拉克勒斯在雅典娜的帮助下 用特殊的声响惊飞鸟群，之后瞄准飞起的鸟将其击落。没有哪个凡人能挑战 疯狂肆虐的克里特公牛，但他从牛的背后 套住牛脖子制服了它。接下来是疯王狄俄墨得斯，他训练食人马吃掉来宾，但最终却自食苦果。赫拉克勒斯把他扔到了马厩中，食人马匹安静下来大快朵颐， 赫拉克勒斯借此机会绑住马嘴。第九项任务涉及到 比任何野兽都更可怕的人，亚马逊女王希波吕忒。赫拉克勒斯前去取回 女王之父战神阿瑞斯赠给她的腰带。他航行到特弥斯奇拉的 亚马逊准备战斗时，女王被赫拉克勒斯的英雄事迹打动，自愿交出了腰带。到了第十项考验，赫拉克勒斯需要从革律翁那里 偷回一群赤色疯牛，革律翁是拥有三个身体和 三个头的巨人。路途中，赫拉克勒斯被 利比亚沙漠的酷热折磨的心烦，于是便向太阳射了一箭。太阳神赫利俄斯欣赏这位英雄的力量，把四马金车借给了他前往厄律忒亚岛。赫拉克勒斯先与放牧人，还有双头猎狗搏斗， 最后杀死了巨人革律翁。任务本应到此为止。但欧律斯透斯宣布其中两项不算数：一项是毒蛇海德拉， 因为伊奥劳斯帮助了赫拉克勒斯，另一项是清洗牛棚， 因为他接受了赏赐。于是这位英雄踏上旅程 完成第十一项任务——从赫斯帕里得斯仙女的花园中 摘取金苹果。赫拉克勒斯先是抓住了海神，让这位能够改变水形态的神 说出花园的地点。到达那里后，他发现 阿特拉斯巨人背负青天。他提议若阿特拉斯能够拿到金苹果， 他愿代替阿特拉斯的扛着青天。阿特拉斯欣然同意，但赫拉克勒斯 之后又用计让他重新扛起青天，赫拉克勒斯拿着苹果逃跑了。第十二项，也是最终一项任务是 把刻耳柏洛斯带回来。这是一只守卫底地底世界的三头猎犬，在赫尔墨斯和雅典娜的帮助下， 赫拉克勒斯见到了冥王哈德斯。冥王允许赫拉克勒斯带走猎犬，前提是他不能使用武器，赫拉克勒斯同时抓住 猎犬的三个脑袋，制服了它。当他将猎犬呈现给欧律斯透斯国王时， 国王大为震惊，并最终宣布赫拉克勒斯的任务 全部完成。经过了12年的辛劳，赫拉克勒斯从家族惨死的悲剧中 得到了救赎，并在万神庙中赢得了一席之地。他的胜利还具有更深层次的意义，在面对世界上混乱可怕的力量时，这位英雄打破了神族的原始秩序，创造了让人类繁衍的秩序。通过这些任务，赫拉克勒斯为自己赎了罪， 也训诫了世界上其他暴行。

**P606 2018-06-27 A day in the life of an ancient Egyptian doctor - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=606)

It’s another sweltering morning in Memphis, Egypt. As the sunlight brightens the Nile, Peseshet checks her supplies. Honey, garlic, cumin, acacia leaves, cedar oil. She’s well stocked with the essentials she needs to treat her patients. Peseshet is a swnw, or a doctor. In order to become one, she had to train as a scribe and study the medical papyri stored at the Per Ankh, the House of Life. Now, she teaches her own students there. Before teaching, Peseshet has a patient to see. One of the workers at the temple construction site has injured his arm. When Peseshet arrives, the laborer’s arm is clearly broken, and worse, the fracture is a sed, with multiple bone fragments. Peseshet binds and immobilizes the injury. Her next stop is the House of Life. On her way, a woman intercepts Peseshet in the street. The woman’s son has been stung by a scorpion. Peseshet has seen many similar stings and knows exactly what to do. She must say an incantation to cast the poison out. She begins to recite the spell, invoking Serqet, patron of physicians and goddess of venomous creatures. Peseshet recites the spell as if she is Serqet. This commanding approach has the greatest chance at success. After she utters the last line, she tries to cut the poison out with a knife for good measure. Peseshet packs up to leave, but the woman has another question. She wants to find out if she is pregnant. Peseshet explains her fail-safe pregnancy test: plant two seeds: one barley, one emmer. Then, urinate on the seeds every day. If the plants grow, she’s pregnant. A barley seedling predicts a baby boy, while emmer foretells a girl. Peseshet also recommends a prayer to Hathor, goddess of fertility. When Peseshet finally arrives at the House of Life, she runs into the doctor-priest Isesi. She greets Isesi politely, but she thinks priests are very full of themselves. She doesn’t envy Isesi’s role as neru pehut, which directly translates to herdsman of the anus to the royal family, or, guardian of the royal anus. Inside, the House of Life is bustling as usual with scribes, priests, doctors, and students. Papyri containing all kinds of records, not just medical information, are stored here. Peseshet’s son Akhethetep is hard at work copying documents as part of his training to become a scribe. He’s a particularly promising student, but he was admitted to study because Peseshet is a scribe, as was her father before her. Without family in the profession, it’s very difficult for boys, and impossible for girls, to pursue this education. Peseshet oversees all the female swnws and swnws-in-training in Memphis. The men have their own overseer, as the male doctors won’t answer to a woman. Today, Peseshet teaches anatomy. She quizzes her students on the metu, the body’s vessels that transport blood, air, urine, and even bad spirits. Peseshet is preparing to leave when a pale, thin woman accosts her at the door and begs to be examined. The woman has a huge, sore lump under her arm. Peseshet probes the growth and finds it cool to the touch and hard like an unripe hemat fruit. She has read about ailments like this, but never seen one. For this tumor there is no treatment, medicine or spell. All the texts give the same advice: do nothing. After delivering the bad news, Peseshet goes outside. She lingers on the steps of the House of Life, admiring the city at dusk. In spite of all her hard work, there will always be patients she can’t help, like the woman with the tumor. They linger with her, but Peseshet has no time to dwell. In a few short weeks, the Nile’s annual flooding will begin, bringing life to the soil for the next year’s harvest and a whole new crop of patients.

**P606 2018-06-27 A day in the life of an ancient Egyptian doctor - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=606)

翻译人员: Riley WANG 校对人员: Lipeng Chen埃及孟菲斯， 又是酷热难当的一天。随着阳光照亮尼罗河， 帕瑟珊检查着自己的物品。蜂蜜、大蒜、小茴香、金合欢树叶、雪松油。她装备好了用来 治疗病人的各种必需品。帕瑟珊是一名医生，为了成为医生，她需要先作为记录官 接受训练，学习生命之屋 Per Ankh 中 纸莎草纸上记录的医学知识。现在，她在那里教授其他学生。在上课之前，她先要去看一个病人。神庙建筑工地的一个工人 弄伤了自己的手臂。帕瑟珊到达工地时，发现这名工人的手臂 显然骨折了，更糟的是，骨折很严重， 形成了几块小骨头碎片。帕瑟珊对伤处做了捆绑固定处理。她接下来要去生命之屋。途中，一名妇女叫住帕瑟珊。因为她的儿子被蝎子蛰伤。帕瑟珊见过许多相似的蜇伤， 并且很清楚该如何治疗。她必须念一种咒语让毒液流出，她开始念诵咒语，召唤医生庇佑者、 毒物之神塞尔凯特。帕瑟珊念着咒语， 仿佛自己就是塞尔凯特。这种威严的做法有极高的成功率。在她念诵完最后一行咒语，她试着用小刀划开伤处 让毒液流出。帕瑟珊收拾行装继续前行， 但这位妇女还有一个问题。她想要知道自己是否怀有身孕，帕瑟珊告诉她一种安全的验孕方法：种下两颗种子： 一颗大麦，一颗二粒小麦每天用尿液浇灌它们，如果种子发芽，那么她就怀孕了。大麦种子发芽预示着怀有男婴，二粒小麦发芽则预示着怀有女婴。帕瑟珊也建议她 向生育女神哈瑟尔祷告。当帕瑟啥最终到达生命之屋，她碰到了祭司医生伊塞西。她礼貌地向伊塞西打招呼， 但她认为祭司们都非常自傲。她并不嫉妒伊塞西，他直接从牧人转变成 皇家直肠医生，也叫做皇家肛门卫士。生命之屋里的人 如往常一样步履匆匆，包括记录官，祭司，医生，和学生们。除了医学，纸莎草文献 也包含其他各类记录，都存放在生命之屋中。帕瑟珊的儿子阿克提还特 正在努力抄写文件，这是要成为记录官 所要接受的培训之一。他前程一片大好，但是他被允许学习 是因为母亲帕瑟珊是一名记录官。而帕瑟珊的父亲也曾任该职。若没有家人担任此类职位，接受教育对于男生来说 是非常困难的，对于女生则更是不可能。帕瑟珊管理着孟菲斯 所有女性医师和正接受培训的女学生。男性医师则有其他监理人员，因为他们不会回答女性提出的问题。今天，帕萨珊教的是解剖学。她对学生进行提问，问题是关于身体中运输血液、空气、尿液、和不良精神的通道。帕瑟珊正准备离开时，一名苍白瘦弱的女性 上前请求看诊。这位女性的手臂上 长了一个大大的肿块，帕瑟珊进行了检查， 发现肿块摸起来是凉的，坚硬地像一个尚未熟透的血肿果实。她曾读到过这类病症， 但却并未亲眼见过。没有方法、药物或咒语可以 用来治疗这种肿块。所有的文字记载 都给出同样的建议：什么也不做。帕瑟珊告知她这个坏消息， 便走出大门。她在生命之屋的台阶处逗留了一会儿，欣赏着黄昏时分的城市，虽然她努力工作，但总会有她无能为力的病人，就像刚才那个长有肿块的妇女。这些病人在她脑海挥之不去， 但她没有时间总想着这些。因为再过几周，每年一次的尼罗河洪水即将开始，洪水为土壤带来生命， 孕育第二年的丰收，同时也会带来大批的病患。

**P607 2018-06-27 How the Normans changed the history of Europe - Mark Robinson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=607)

In the year 1066, 7000 Norman infantry and knights sailed in warships across the English Channel. Their target: England, home to more than a million people. Theirs was a short voyage with massive consequences. And around the same period of time, other groups of Normans were setting forth all across Europe, going on adventures that would reverberate throughout that continent’s history. So who were these warriors and how did they leave their mark so far and wide? Our story begins over 200 years earlier, when Vikings began to settle on the shores of northern France as part of a great Scandinavian exodus across northern Europe. The French locals called these invaders Normans, named for the direction they came from. Eventually, Charles, the king of the Franks, negotiated peace with the Viking leader Rollo in 911, granting him a stretch of land along France’s northern coast that came to be known as Normandy. The Normans proved adaptable to their newly settled life. They married Frankish women, adopted the French language, and soon started converting from Norse paganism to Christianity. But though they adapted, they maintained the warrior tradition and conquering spirit of their Viking forebears. Before long, ambitious Norman knights were looking for new challenges. The Normans’ best-known achievement was their conquest of England. In 1066, William, the Duke of Normandy, disputed the claim of the new English king, Harold Godwinson. Soon after landing in England, William and his knights met Harold’s army near the town of Hastings. The climactic moment in the battle is immortalized in the 70-meter-long Bayeux Tapestry, where an arrow striking Harold in the eye seals the Norman victory. William consolidated his gains with a huge castle-building campaign and a reorganization of English society. He lived up to his nickname "William the Conqueror" through a massive survey known as the Domesday Book, which recorded the population and ownership of every piece of land in England. Norman French became the language of the new royal court, while commoners continued to speak Anglo-Saxon. Over time, the two merged to give us the English we know today, though the divide between lords and peasants can still be felt in synonym pairs such as cow and beef. By the end of the 12th century, the Normans had further expanded into Wales, Scotland, and Ireland. Meanwhile, independent groups of Norman knights traveled to the Mediterranean, inspired by tales of pilgrims returning from Jerusalem. There, they threw themselves into a tangled mass of conflicts among the established powers all over that region. They became highly prized mercenaries, and during one of these battles, they made the first recorded heavy cavalry charge with couched lances, a devastating tactic that soon became standard in medieval warfare. The Normans were also central to the First Crusade of 1095-99, a bloody conflict that re-established Christian control in certain parts of the Middle East. But the Normans did more than just fight. As a result of their victories, leaders like William Iron-Arm and Robert the Crafty secured lands throughout Southern Italy, eventually merging them to form the Kingdom of Sicily in 1130. Under Roger II, the kingdom became a beacon of multicultural tolerance in a world torn apart by religious and civil wars. Muslim Arab poets and scholars served in the royal court alongside Byzantine Greek sailors and architects. Arabic remained an official language along with Latin, Greek, and Norman French. The world’s geographical knowledge was compiled in The Book of Roger, whose maps of the known world would remain the most accurate available for 300 years. And the churches built in Palermo combined Latin-style architecture, Arab ceilings, and Byzantine domes, all decorated with exquisite golden mosaics. So if the Normans were so successful, why aren’t they still around? In fact, this was a key part of their success: not just ruling the societies they conquered, but becoming part of them. Although the Normans eventually disappeared as a distinct group, their contributions remained. And today, from the castles and cathedrals that dot Europe’s landscape to wherever the English language is spoken, the Norman legacy lives on.

**P607 2018-06-27 How the Normans changed the history of Europe - Mark Robinson**

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翻译人员: Tianyang Liu 校对人员: Jenny Yang公元1066年，7000名诺曼步兵及骑兵驾驶战船横渡英吉利海峡。他们的目标是英格兰，一个拥有上百万人口的国家。他们的航行距离不长却带来巨大的影响。与此同时，更多的诺曼人正远渡整个欧洲，进行着将会为这片大陆带来长久深刻影响的冒险之旅。那么，这些战士究竟是谁？他们又是如何在如此广阔的范围内 留下自己的印记的呢？我们的故事开始于此前两百多年，届时维京人开始在法国北部海岸上定居，组成了一次横跨北部欧洲的 斯堪的纳维亚大迁移。法国当地人将这些侵入者称为诺曼人，这个称呼源自于他们到来的方向。最终，西法兰克国王查理三世与维京首领于公元911年达成和平协议，授予他法国北海岸一片土地的所有权。这片土地就是诺曼底。事实证明诺曼人适应了他们的新生活。他们与法兰克女人结婚，学习了法语，并且很快从北欧异教转而信仰基督教。但是虽然他们做出了适应新生活的改变，他们仍然保留了源于维京祖先的战士传统和征服精神。不久之后，雄心壮志的诺曼骑士们 开始寻求新的挑战。诺曼人最知名的成就是对英格兰的征服。公元1066年，诺曼底公爵威廉一世对英格兰新国王哈罗德·戈德温森的继承发出挑战。在登陆英格兰后不久，威廉和他的骑士们就与哈罗德的军队 在黑斯廷斯镇附近兵戎相见。这场战役的高潮时刻被永远地记录在一条70米长的贝叶挂毯中。画面中，一支插入哈罗德眼睛的箭 封存了诺曼人的胜利。威廉通过组织一次巨大城堡的修建 和对英国社会的重塑巩固他的所得。他的别称“征服者威廉”实至名归，他命令完成的大型调查记录 《末日审判书（英国土地志）》证明了这一点。那其中记录了英格兰每一块土地的人口及归属。诺曼法语成为了新英国朝廷的语言，同时平民仍然使用盎格鲁-撒克逊语（古英语）。久而久之，这两种语言相互融合 成为了我们今天所熟知的英语，即便如此我们仍然可以感受到贵族与佃农之间的差距。例如同义词对中的 牛（cow，源于古英语）和牛肉（beef，源于法语bœuf）。在十二世纪末期，诺曼人扩张到了威尔士，苏格兰，以及爱尔兰。同时，独立的诺曼骑士团体游历到了地中海地区，受到了由耶路撒冷返回的朝圣者们的故事的启迪。在那里，他们投身于大量的所有该地区政权之间的纠缠不清的冲突当中。他们成为了极有价值的雇佣兵。在其中一个战役中，他们使用了历史上首次记载的长矛重骑兵，这种强大的战术很快成为了中古战争中的标配。诺曼人同样是公元1095-99年 第一次十字军东征的核心力量。这是一次重新建立了中东部分地区基督教掌权的一次血腥冲突。但是诺曼人做的不仅仅是打斗。作为他们胜利的结果，像铁臂威廉和狡诈者罗伯特一样的首领保护了意大利南部的土地，最终在1130年将它们合并建立了西西里王国。在鲁杰罗二世的统治下，王国在当时因宗教战争及内战分崩离析的世界中成为了多文化包容的指路明灯。阿拉伯穆斯林诗人和学者在朝廷中效力的同时，希腊拜占庭航海家及建筑师也在王国工作。阿拉伯语和拉丁语、希腊语、诺曼法语一道成为官方语言。世界上的地理学知识都被收集在了《鲁杰罗之书》中，其中的已知世界的地图在之后的三百年中仍然保持最为精确。在巴勒莫修建的教堂结合了拉丁风格建筑，阿拉伯屋顶，和拜占庭拱顶，并全部装饰以精美的黄金马赛克。那么，如果诺曼人如此成功， 为什么如今他们却消失不见？实际上，这其实是他们成功的一大关键：不仅仅统治他们征服的社会，而是融入他们。虽然诺曼人最终作为独立的民族消失了，他们的贡献仍然留存。今天，从那些散布于欧洲的城堡及大教堂一直到使用英语的地方，诺曼人的遗赠永存。

**P608 2018-07-11 Zen kōans - unsolvable enigmas designed to break your brain - Puqun L**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=608)

How do we explain the unexplainable? This question has inspired numerous myths, religious practices, and scientific inquiries. But Zen Buddhists practicing throughout China from the 9th to 13th century asked a different question – why do we need an explanation? For these monks, blindly seeking answers was a vice to overcome, and learning to accept the mysteries of existence was the true path to enlightenment. But fighting the urge to explain the unexplainable can be difficult. So to help practice living with these mysteries, the meditating monks used a collection of roughly 1,700 bewildering and ambiguous philosophical thought experiments called kōans. The name, originally gong-an in Chinese, translates to “public record or case." But unlike real-world court cases, kōans were intentionally incomprehensible. They were surprising, surreal, and frequently contradicted themselves. On the surface, they contained a proverb about the Zen Buddhist monastic code - such as living without physical or mental attachments, avoiding binary thinking, and realizing one’s true “Buddha-nature." But by framing those lessons as illogical anecdotes, they became tests to help practicing monks learn to live with ambiguity and paradox. By puzzling through these confusing “cases," meditating monks could both internalize and practice Buddhist teachings. Hopefully, they would let go of the search for one true answer and trigger a spiritual breakthrough. Since these are intentionally unexplainable, it would be misguided to try and decipher these stories ourselves. But like the monks before us, we can puzzle over them together, and investigate just how resistant they are to simple explanations. Consider this kōan illustrating the practice of no-attachment. Two monks, Tanzan and Ekido, are traveling together down a muddy road. Ahead they see an attractive traveler, unable to cross the muddy path. Tanzan politely offers his help, carrying the traveler on his back across the street, and placing her down without a word. Ekido was shocked. According to monastic law, monks were not supposed to go near women, let alone touch a beautiful stranger. After miles of walking, Ekido could no longer restrain himself. “How could you carry that woman?” Tanzan smiled, “I left the traveler there. Are you still carrying her?” Like all kōans, this story has numerous interpretations. But one popular reading suggests that despite never having physically carried the traveler, Ekido broke monastic law by mentally "clinging to" the woman. This type of conflict – examining the grey area between the letter of the law and the spirit of the law – was common in kōans. In addition to exploring ambiguity, kōans often ridiculed characters claiming total understanding of the world around them. One such example finds three monks debating a temple flag rippling in the wind. The first monk refers to the flag as a moving banner, while the second monk insists that they are not seeing the flag move, but rather the wind blowing. They argue back and forth, until finally, a third monk intervenes, “It is not the flag moving, nor the wind blowing, but rather the movement of your minds!” One interpretation of this kōan plays on the supposed wisdom of the arguing monks – the first asserting the importance of the observable world, the second favoring deeper knowledge we can infer from that world. But each monk’s commitment to his own “answer” blinds him to the other’s insight, and in doing so, defies an essential Buddhist ideal: abolishing binary thinking. The third monk identifies their conflict as a perceptual one – both arguing monks fail to see the larger picture. Of course, all these interpretations only hint at how to wrestle with these kōans. Neither the wisdom from practicing monks before us, nor the supposedly wise characters in these stories can resolve them for you. That’s because the purpose of these kōans isn’t reaching a simple solution. It’s the very act of struggling with these paradoxical puzzles which challenge our desire for resolution, and our understanding of understanding itself.

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翻译人员: Sally Yang 校对人员: congmei Han我们应如何解释不可解的事物？这个问题衍生出了无数神话、宗教习俗和科学调查。但九世纪至十三世纪的 中国古代禅师们却抱有不同的疑问——为何我们需要找出解释呢？对这些禅师们来说，盲目地追寻答案 是一种需要克服的恶习，而学会接受存在之不可解才是通往开悟的真正道路。然而，解释不可解之谜 常常是一种难以克服的冲动，所以为了让自己习惯 和谜题共存，禅师们借助了一千七百则 被人称作“公案”的令人不解、寓意不明的 哲学思想实验。“公案”原意指 官府用以判断是非的案牍。但禅宗的“公案”内容却扑朔迷离， 这是有意为之的。它们令人惊奇、十分荒诞、 且时常自我矛盾。表面上，一则公案 似乎意指某条禅宗清规——例如放下执念，避免二元对立的思维和了解自己真正的“佛性”等等。但把这些教谕通过 不合逻辑的小故事呈现，它们就变成了一个个测试， 让禅师们习得与迷惘和矛盾共存的方法。冥想中的禅师们分析“公案”时，便能同时内化和实践佛的教诲。假以时日，他们能学会放下 对唯一的真理的追寻，抵达开悟的境界。由于公案本来就不可解释，我们不应该尝试着 自己解读这些故事。而应如从古至今的无数禅师一般，我们可以一起为它们绞尽脑汁，研究它们到底是多么难以 被简单地诠释。比如这个描述“破我执”的公案。坦山禅师与一位僧人出游时， 走过一条泥泞路，碰到了一名美貌的旅人 正因为无法跨过小路而烦恼。坦山礼貌地伸出援手，将旅人背过了泥泞路，然后默默地把她放了下来。一旁的朋友很吃惊。根据佛教清规，僧人不可近女色，更不可触碰貌美的陌生人。又走了几里路， 朋友才忍不住说道：“你怎么能就这样把她背过去呢？“坦山笑道：“我早就把她放下了。 你还背着吗？“如同其它公案一样， 这个故事也有着多种诠释。一种比较普遍的说法是坦山的僧人朋友虽未 实际上背负旅人，心中却还挂念着她， 打破了佛教清规。这种矛盾揭示了法律的字面意义 和其精神之间的灰色地带，是许多公案的主题。除了探索事物的模棱两可，公案时常挖苦那些自以为无所不知的人。例如《风动幡动公案》中，三个僧人对着寺庙前的 旗子展开的争论。第一个僧人说旗子在动，但第二个僧人却认为旗子没动，是风在动。他们争论不休， 直到第三个僧人打断他们，说：“不是旗子在动， 也不是风在动，而是你们的心在动。”这个公案可以被看作 对前两个僧人的“智慧”的讽刺。第一个执着于 可观察的世界的重要性，第二个更注重于考察其背后的奥义。但两个僧人对自己的“答案”的执着使他们拒绝认同对方的看法。如此，他们违反了佛教的根本理念： 摒除二元对立的思维。第三个僧人认为问题在于 两人的心被外物迷惑了，一叶障目，不见泰山。当然了，这些诠释只不过提示了 我们要如何看待这些公案。无论是前人的智慧，还是故事中的得道高僧，都无法真正解答它们。因为公案存在的意义 不在于找出解答。寻找答案的过程本身考验着我们对寻找出答案的执着以及我们对自己的 思考过程了解多少。

**P609 2018-07-12 Did ancient Troy really exist - Einav Zamir Dembin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=609)

When Homer’s Iliad was first written down in the 8th century BCE, the story of the Trojan war was already an old one. From existing oral tradition, audiences knew the tales of the long siege, the epic duels outside the city walls, and the cunning trick that finally won the war. In the end, the magnificent city was burned to the ground, never to rise again. But had it ever existed? By the time the field of archaeology began to take shape in the 19th century, many were skeptical, considering the epic to be pure fiction, a founding myth imagining a bygone heroic era. But some scholars believed that behind the superhuman feats and divine miracles there must have been a grain of historical truth - a war that was really fought, and a place where it happened. Frank Calvert was one such believer. He had spent his youth traveling and learning about ancient civilizations before accompanying his brother Frederick on a diplomatic mission to the northwest Anatolian region of Çanakkale. It was here that Homer described the Greek encampment at the mouth of the Scamander river. And it was here that fate brought Frank into contact with a journalist and geologist named Charles Maclaren. Locals and travelers had long speculated that Troy might’ve stood on one of the surrounding hilltops. But Maclaren had been one of the first to publish a detailed topographical study of the area. He believed he had found the site – a 32-meter mound known by the name Hisarlık, derived from the Turkish word for “fortress.” Soon after meeting with him in 1847, the Calverts bought 2,000 acres of farmland that included part of the hill. Before they could explore any further, the Crimean War broke out and forestalled their archaeological ambitions for several years. After the war’s end, Frank Calvert began to survey the site, but lacked the funds for a full excavation. This was where the wealthy German businessman and amateur archaeologist Heinrich Schliemann came in. At Calvert’s invitation, Schliemann visited the grounds in 1868, and decided to excavate. Eager to find the ancient city, Schliemann tore massive trenches all the way to the base of the hill. There, he uncovered a hoard of precious artifacts, jewelry, and metalwork, including two diadems and a copper shield. Schliemann took full credit for the discovery, announcing that he had found Troy and the treasure of its king Priam. But the real treasure was elsewhere. When later archaeologists studied the site, they realized that the mound consisted of no less than nine cities, each built atop the ruins of the last. The layer Schliemann had uncovered dated back to the Mycenaean Age, more than 1,000 years too early for Homer. But inside the mound was indeed evidence for a city that had thrived during the Bronze Age, with charred stone, broken arrowheads, and damaged human skeletons suggesting a violent end. It was Troy VII, contained in the middle layers and now ravaged for a second time by Schliemann’s careless excavation. The settlement, spanning some 200,000 square meters and home to as many as 10,000 people, thrived until around 1180 BCE. Its position at the southern entrance of the Dardanelles strait would’ve made a formidable strategic location for both defense and trade. Most importantly, there are the remains of a massive fortification wall – perhaps the very same one from which Priam and Hector once watched the Greeks approach. Of course, it’s difficult to be certain that these ruins are the true remains of ancient Troy, and scholars still dispute whether the Trojan War as described by Homer ever happened. Yet the evidence is strong enough that UNESCO has labelled Hisarlık the archeological site of Troy. Regardless of its identity, thanks to persistence, a bit of faith, and a lot of research, archaeologists are bringing the long-buried secrets of an ancient, lost city to light.

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翻译人员: Riley WANG 校对人员: Lipeng Chen在《荷马史诗》写就的公元前8世纪，特洛伊战争已经算是 一个流传很久的故事了。从传统的口头叙述中，人们知道在故事中 特洛伊城遭到长期围困，城墙外展开了传奇的对战，以及赢下战争所用到的狡猾计谋。这座辉煌的城市最终被付之一炬，再也没能重新崛起。但它真的存在么？19世纪时考古学研究初见雏形，许多人对特洛伊城持有怀疑态度， 认为史诗记载只不过是纯粹的虚构。是一种对久远英雄年代 产生的神秘想象。但是一些学者认为在这些超人功绩和神灵奇迹的背后，必然会存在一丝历史意义上的真实性——一场真实发生过的战争，以及它发生的地点。弗兰克·卡尔沃特就持有这种观点。他在青年时期不断游历 并学习古代文明，之后陪伴哥哥弗雷德里克因外交任务来到了土耳其恰纳卡莱的 安纳托利亚的西北地区。荷马就是在此处描绘了希腊军的营地即斯卡曼德洛斯河口。也是在此，命运让弗兰克结识了记者，同时也是地质学家的 查尔斯·麦克拉伦当地人和游客长期以来都在猜测特洛伊城可能位于周围的山峰之中。但是麦克拉伦则是发布此地详细地形图的第一人。他认为自己找到了遗址——一个32米，名为希沙立克的土堆。其名字来源于土耳其语的“堡垒”。1847年，卡尔弗特见到麦克拉伦之后，便买下了2000公顷的农田，其中就包括这座山的一部分。在他们继续进行探索之前，克里米亚战争爆发了，使他们的考古雄心搁置了数年。战争结束后，弗兰克·卡尔弗特开始考察这片地区。但是他缺乏进行全面发掘的资金。这时，轮到富有的德国商人同时也是业余考古爱好者的 海因里希·谢里曼出场。应卡尔弗特之邀，谢里曼在1868年到访了此地 并决定进行挖掘。他热切地希望找到这座古老城市，他挖了大量沟渠， 一直通到山的底部。就在那里，他发现了 聚集在一起的宝物，珠宝，以及金属制品，包括两个皇冠和一个铜盾。谢里曼认为此次发现 都是自己的功劳，并宣称自己找到了特洛伊城，找到了普利阿莫斯国王的宝藏。但真正的宝藏却在别处。考古学家随后对遗址进行勘察，他们意识到这个土堆 由九个以上的城市构成，每一个都是在 上一个废墟的基础上建成。谢里曼发现的那层遗迹 可以追溯到迈锡尼时代，这比荷马所在的年代早了1000多年。但是土堆内的证据确实表明青铜时代这里曾有某个繁盛的城市，那些烧焦的石头，破损的箭头，以及破损的人类骨架， 标志着一个暴乱的终结。在中层，包含着特洛伊VII遗迹由于谢里曼的鲁莽挖掘 而遭到了二次破坏。城区覆盖了大约20万平方米，多达1万人在此生活，城市繁荣发展直至公元前1180年。它位于达达尼尔海峡的南方入口处，使其占据坚固的战略位置 用以防御和贸易。最重要的是， 这里有巨大的防御工事围墙的遗迹，也许普利阿莫斯王和赫克托尔就曾在此观望希腊人的进攻。当然，我们无法确定这些遗址是否是真正的特洛伊古城遗迹，学者们仍在争论荷马描述的特洛伊战争是否真实发生过。但是在充足的证据面前，联合国教科文组织 将希沙立克认定为特洛伊古迹。不管其身份如何，凭着坚持，和一些信念，以及大量的研究，考古学家终于使这长久以来埋藏地下的古老失落的城市重见天日。

**P610 2018-07-13 The breathtaking courage of Harriet Tubman - Janell Hobson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=610)

Escaping slavery; risking everything to save her family; leading a military raid; championing the cause of women’s suffrage; these are just a handful of the accomplishments of one of America’s most courageous heroes. Harriet Tubman was born Araminta Ross in Dorchester County, Maryland, in the early 1820s. Born into chattel slavery, Araminta, or Minty, was the fifth of nine children. Two of Minty’s older sisters were sold to a chain gang. Even as a small child, Minty was hired out to different owners, who subjected her to whippings and punishment. Young Minty’s life changed forever on an errand to a neighborhood store. There, an overseer threw a two-pound weight at a fugitive enslaved person, missed, and struck Minty instead. Her injury caused her to experience sleeping spells, which we know of today as narcolepsy, for the rest of her life. Minty’s owner tried to sell her, but there were no buyers for an enslaved person who fell into sleeping spells. She was instead put to work with her father, Ben Ross, who taught her how to lumber. Lumbering increased Minty’s physical strength and put her in touch with free black sailors who shipped the wood to the North. From them, Minty learned about the secret communications that occurred along trade routes, information that would prove invaluable later in her life. In this mixed atmosphere of free and enslaved blacks working side by side, Minty met John Tubman, a free black man she married in 1844. After marriage, she renamed herself Harriet, after her mother. Harriet Tubman’s owner died in 1849. When his widow planned to sell off her enslaved human beings, Harriet feared she would be sold away from everyone she loved. She had heard of an “underground railroad," a secret network of safe houses, boat captains, and wagon drivers willing to harbor fugitive enslaved people on their way north. So Tubman fled with two of her brothers, Ben and Harry. They eventually turned back, fearing they were lost. But in one of her sleeping spells, Harriet dreamed that she could fly like a bird. Looking down below, she saw the path to liberation. And in the autumn of 1849, she set out on her own, following the North Star to Pennsylvania, and to freedom. Tubman returned to the South 13 times to free her niece, brothers, parents, and many others. She earned the nickname Black Moses and worked diligently with fellow abolitionists to help enslaved people escape, first to the North, and later to Canada. Harriet Tubman worked as a Union army nurse, scout, and spy during the Civil War. In 1863, she became the first woman in United States history to plan and lead a military raid, liberating nearly 700 enslaved persons in South Carolina. After the war, the 13th Amendment to the U.S. Constitution legally abolished slavery, while the 14th expanded citizenship and the 15th gave voting rights to formerly enslaved black men. But she was undaunted, and she persisted. She raised funds for formerly enslaved persons and helped build schools and a hospital on their behalf. In 1888, Tubman became more active in the fight for women’s right to vote. In 1896, she appeared at the founding convention of the National Association of Colored Women in Washington D.C. and later at a woman’s suffrage meeting in Rochester, New York. There she told the audience: “I was a conductor on the Underground Railroad, and I can say what many others cannot. I never ran my train off the track, and I never lost a passenger.” As her fame grew, various friends and allies helped her in the fight to collect a veteran’s pension for her service in the Union Army. In 1899, she was finally granted $20 a month. In a fitting twist of fate, the United States Treasury announced in 2016 that Tubman’s image will appear on a redesigned twenty dollar bill. Harriet Tubman died on March 10, 1913. Even on her deathbed at age 91, she kept the freedom of her people in mind. Her final words were: "I go away to prepare a place for you.”

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翻译人员: Liu Qi 校对人员: Yanyan Hong摆脱奴隶身份，赌上一切，只为拯救家人，领导军队突袭，投身妇女选举权事业，作为美国最勇敢的英雄之一，这些只是她所取得的 成就中的一小部分。哈莉特 · 塔布曼（Harriet Tubman）， 原名阿拉明塔 · 罗斯（Araminta Ross），出生于 19 世纪 20 年代早期的 马里兰州里的多切斯特郡。生而为奴的阿拉明塔，小名明蒂， 在九个孩子之中排行第五。明蒂的两个姐姐被卖， 成了带着镣铐干活的苦力。从小开始，明蒂就被雇给两个不同的主人，受到鞭打和惩罚。一次，年幼的明蒂去附近商店跑腿， 从此，她的人生永远地改变了。在那个商店，监督员向一个 黑人逃奴砸去一块两磅的砝码，没有砸中逃奴， 却意外砸中了明蒂。受伤之后，她仿佛中了睡魔的诅咒，就是我们现在所说的嗜睡症，一辈子都昏昏欲睡。明蒂的主人想把她卖掉，但没有买主想要购买 中了睡魔诅咒的奴隶。所以她被安排到跟着她爸爸， 本 · 罗斯（Ben Ross），一起干活，她爸爸教会她伐木。伐木使明蒂的身体强壮起来，让她接触到将木材运往 北方的自由黑人水手。从他们身上， 明蒂学会了贸易线路一带秘密沟通方式，后来证明这些信息 在她生命中十分重要。在自由黑人和奴役黑人 并肩工作的混合环境下，明蒂遇到了自由黑人约翰 · 塔布曼 （John Tubman），并于 1844 年结婚。婚后按照母亲的名字， 她改名为哈丽特。1849 年，哈莉特 · 塔布曼的主人去世。当他的遗孀打算把奴隶卖掉时，哈莉特害怕被卖到远方， 被迫离开她爱的所有人。她听说有一条“地下铁路”，有一些秘密的安全屋，船长，和马车车夫愿意将逃亡的奴隶带到北方去。所以塔布曼和她的两个兄弟， 本和哈利，一起逃走了。因为害怕迷路， 他们最终回头了。但是在一次入魔般的睡梦中，哈丽特梦见她能像鸟一样飞翔。从天上往下看时， 她看到了通往自由的道路。在 1849 年秋天，她独自出发，跟着北极星指引， 去了宾夕法尼亚州，获得了自由。塔布曼先后 13 次返回南方， 解救了她的侄女、兄弟、父母、和许多其他人。她获得了黑人摩西的绰号，并与废奴主义者一起努力工作，帮助奴隶逃脱，先到北方，后来到加拿大。内战中，哈莉特 · 塔布曼 在联军中担任护士、侦探、和间谍。1863 年，她成为了美国历史上第一位策划和领导了军事突袭的女性，在南卡罗来纳州解放了近 700 名奴隶。内战之后，美国宪法第 13 次修正案从法律上废止了奴隶制度，之后第 14 次修正案扩大了公民权，第 15 次修正案赋予了 曾被奴役地黑人男性们投票权，但她毫不畏惧，不屈不挠。她为曾被奴役的人们筹集资金，并帮助他们建立学校和医院。1888 年，塔布曼更加积极地参与 争取妇女投票权的斗争。1896 年， 她现身于 在华盛顿特区召开的黑人女性全国联盟创始大会。之后又现身于纽约罗切斯特举行的 女性选举权会议上。会上，她告诉观众：“我曾是地下铁路的列车长，我可以说其他人不能说的事情。我开的火车从来没有脱轨， 也从来没有弄丢一名乘客。”随着她的名气增长，许多朋友和盟友帮助她争取在联邦军服务后应得的 退伍军人退休金。1899 年，她终于获得了 每月 20 美元的退休金。命运扭转，美国财政部在 2016 年宣布，塔布曼的形象将出现在 重新设计的二十美元钞票上。哈里特 · 塔布曼 于1913年3月10日去世。即便 91 岁的高龄躺在床上，她仍然心系人民的自由。她临终的最后一句话是：我要去为你们准备自由的净土。

**P611 2018-07-14 How can you change someone's mind (hint - facts aren't always enough)**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=611)

Three people are at a dinner party. Paul, who’s married, is looking at Linda. Meanwhile, Linda is looking at John, who’s not married. Is someone who’s married looking at someone who’s not married? Take a moment to think about it. Most people answer that there’s not enough information to tell. And most people are wrong. Linda must be either married or not married—there are no other options. So in either scenario, someone married is looking at someone who’s not married. When presented with the explanation, most people change their minds and accept the correct answer, despite being very confident in their first responses. Now let’s look at another case. A 2005 study by Brendan Nyhan and Jason Reifler examined American attitudes regarding the justifications for the Iraq War. Researchers presented participants with a news article that showed no weapons of mass destruction had been found. Yet many participants not only continued to believe that WMDs had been found, but they even became more convinced of their original views. So why do arguments change people’s minds in some cases and backfire in others? Arguments are more convincing when they rest on a good knowledge of the audience, taking into account what the audience believes, who they trust, and what they value. Mathematical and logical arguments like the dinner party brainteaser work because even when people reach different conclusions, they’re starting from the same set of shared beliefs. In 1931, a young, unknown mathematician named Kurt Gödel presented a proof that a logically complete system of mathematics was impossible. Despite upending decades of work by brilliant mathematicians like Bertrand Russell and David Hilbert, the proof was accepted because it relied on axioms that everyone in the field already agreed on. Of course, many disagreements involve different beliefs that can’t simply be reconciled through logic. When these beliefs involve outside information, the issue often comes down to what sources and authorities people trust. One study asked people to estimate several statistics related to the scope of climate change. Participants were asked questions, such as “how many of the years between 1995 and 2006 were one of the hottest 12 years since 1850?” After providing their answers, they were presented with data from the Intergovernmental Panel on Climate Change, in this case showing that the answer was 11 of the 12 years. Being provided with these reliable statistics from a trusted official source made people more likely to accept the reality that the earth is warming. Finally, for disagreements that can’t be definitively settled with statistics or evidence, making a convincing argument may depend on engaging the audience’s values. For example, researchers have conducted a number of studies where they’ve asked people of different political backgrounds to rank their values. Liberals in these studies, on average, rank fairness— here meaning whether everyone is treated in the same way—above loyalty. In later studies, researchers attempted to convince liberals to support military spending with a variety of arguments. Arguments based on fairness— like that the military provides employment and education to people from disadvantaged backgrounds— were more convincing than arguments based on loyalty— such as that the military unifies a nation. These three elements— beliefs, trusted sources, and values— may seem like a simple formula for finding agreement and consensus. The problem is that our initial inclination is to think of arguments that rely on our own beliefs, trusted sources, and values. And even when we don’t, it can be challenging to correctly identify what’s held dear by people who don’t already agree with us. The best way to find out is simply to talk to them. In the course of discussion, you’ll be exposed to counter-arguments and rebuttals. These can help you make your own arguments and reasoning more convincing and sometimes, you may even end up being the one changing your mind.

**P611 2018-07-14 How can you change someone's mind (hint - facts aren't always enough)**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=611)

翻译人员: Riley WANG 校对人员: Lipeng Chen三个人正在参加晚宴。已婚的保罗正盯着琳达看。与此同时，琳达却盯着未婚的约翰。有没有谁已经结婚 却盯着未婚的人看呢？花点时间想一想。大多数人回答说 没有足够的信息能够判断。但他们都错了。琳达必然是已婚或是未婚， 没有其他可能。因此不管在哪一种情况下， 都存在已婚的某人在看着未婚的某人。当给出这个解释时， 大多数人都改变了他们的想法，并且接受了这个正确答案，即便他们当时对自己 第一次的回答十分自信。现在我们再来看看另一个问题。2005年，Brendan Nyhan 和 Jason Reifler 进行了一项研究调查了美国人对于伊拉克战争是否正义的态度。研究员们展示给参与者一篇新的文章，内容是说没有找到大规模杀伤性武器。但是许多参与人员不仅继续相信 大规模杀伤性武器存在，并且甚至更坚定自己原来的想法。为何观点有时能改变人们的想法 而有时却起到反作用？观点若要更具说服力 需要建立在充分了解受众的基础上，考虑到他们相信什么，他们信任谁，以及他们在乎什么。对于晚宴问题这样的趣味智力题 数理逻辑的观点之所以行得通在于即便人们得到不同的结论，他们是基于相同的价值观 进行思考。1931年，一位年轻而默默无闻的数学家 Kurt Gödel 证明了一个逻辑上完备的数学体系是不可能的。即便经过杰出数学家 Bertrand Russell和 David Hilbert 数十年的努力，这项证明仍然被接受了，因为它建立在该领域已经承认的公理上。当然，许多不同意见包含有不同的看法这些不同意见无法 通过逻辑简单调和。当这些想法涉及到外部信息，问题经常变成人们信任 哪些信息来源和权威人士。一项研究让人们对气候变化领域的数据做出预测。参加者需要回答一些问题，例如1995年至2006年这12年间，有多少年是1850年来最炎热的年份。在参与者提供答案之后，他们会看到来自 气候变化政府小组的数据，数据会先显示出答案是11年。当看到这些来自值得信任的官方数据，人们更倾向于接受全球变暖的事实。最后，对于完全不能靠数据或证据解决的不同意见来说，给出令人信服的观点可能在于抓住受众所在乎的东西。例如，研究人员进行了一些研究，他们询问了不同政治背景的人们让他们对自己的价值观进行排位。平均来看，在这项研究中自由党人士认为 人人平等比忠诚更重要。在之后的研究中， 研究者们试图用各种观点说服自由派人士支持军费开支。基于平等的观点——例如军队为那些来自贫困家庭的人们提供就业以及教育——比基于忠诚的观点更有说服力比如军队使国家团结。以下三种要素——信仰，可信的信息来源以及价值观——可能看上去是取得共识的简单公式。但问题在于 我们在一开始仍倾向于以自己的信仰、可信消息来源和价值观 为基础构想观点。即便我们不这样做，正确识别出意见不同的人们看重什么也是一件很困难的事情。最好的办法是和他们聊天。在讨论的过程中，你会接触到反面观点和驳斥。这些可以帮助你 完善自己的观点和推理，甚至有时候，最终改变你想法的人 可能就是你自己。

**P612 2018-07-20 What really happened to the Library of Alexandria - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=612)

2,300 years ago, the rulers of Alexandria set out to fulfill one of humanity’s most audacious goals: to collect all the knowledge in the world under one roof. In its prime, the Library of Alexandria housed an unprecedented number of scrolls and attracted some of the Greek world’s greatest minds. But by the end of the 5th century CE, the great library had vanished. Many believed it was destroyed in a catastrophic fire. The truth of the library’s rise and fall is much more complex. The idea for the library came from Alexander the Great. After establishing himself as a conqueror, the former student of Aristotle turned his attention to building an empire of knowledge headquartered in his namesake city. He died before construction began, but his successor, Ptolemy I, executed Alexander’s plans for a museum and library. Located in the royal district of the city, the Library of Alexandria may have been built with grand Hellenistic columns, native Egyptian influences, or a unique blend of the two--there are no surviving accounts of its architecture. We do know it had lecture halls, classrooms, and, of course, shelves. As soon as the building was complete, Ptolemy I began to fill it with primarily Greek and Egyptian scrolls. He invited scholars to live and study in Alexandria at his expense. The library grew as they contributed their own manuscripts, but the rulers of Alexandria still wanted a copy of every book in the world. Luckily, Alexandria was a hub for ships traveling through the Mediterranean. Ptolemy III instituted a policy requiring any ship that docked in Alexandria to turn over its books for copying. Once the Library’s scribes had duplicated the texts, they kept the originals and sent the copies back to the ships. Hired book hunters also scoured the Mediterranean in search of new texts, and the rulers of Alexandria attempted to quash rivals by ending all exports of the Egyptian papyrus used to make scrolls. These efforts brought hundreds of thousands of books to Alexandria. As the library grew, it became possible to find information on more subjects than ever before, but also much more difficult to find information on any specific subject. Luckily, a scholar named Callimachus of Cyrene set to work on a solution, creating the pinakes, a 120-volume catalog of the library’s contents, the first of its kind. Using the pinakes, others were able to navigate the Library’s swelling collection. They made some astounding discoveries. 1,600 years before Columbus set sail, Eratosthenes not only realized the earth was round, but calculated its circumference and diameter within a few miles of their actual size. Heron of Alexandria created the world’s first steam engine over a thousand years before it was finally reinvented during the Industrial Revolution. For about 300 years after its founding in 283 BCE, the library thrived. But then, in 48 BCE, Julius Caesar laid siege to Alexandria and set the ships in the harbor on fire. For years, scholars believed the library burned as the blaze spread into the city. It's possible the fire destroyed part of the sprawling collection, but we know from ancient writings that scholars continued to visit the library for centuries after the siege. Ultimately, the library slowly disappeared as the city changed from Greek, to Roman, Christian, and eventually Muslim hands. Each new set of rulers viewed its contents as a threat rather than a source of pride. In 415 CE, the Christian rulers even had a mathematician named Hypatia murdered for studying the library’s ancient Greek texts, which they viewed as blasphemous. Though the Library of Alexandria and its countless texts are long gone, we’re still grappling with the best ways to collect, access, and preserve our knowledge. There’s more information available today and more advanced technology to preserve it, though we can’t know for sure that our digital archives will be more resistant to destruction than Alexandria’s ink and paper scrolls. And even if our reservoirs of knowledge are physically secure, they will still have to resist the more insidious forces that tore the library apart: fear of knowledge, and the arrogant belief that the past is obsolete. The difference is that, this time, we know what to prepare for.

**P612 2018-07-20 What really happened to the Library of Alexandria - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=612)

翻译人员: Riley WANG 校对人员: Carol Wang2300 年前，亚历山大港的统治者意图实现人类最大胆的目标：将世界上的所有知识汇集一处。在亚历山大港图书馆鼎盛时期，它馆藏的卷轴 数量之多史无前例，并吸引了一些希腊 最伟大的学者前来。但到公元 5 世纪末，这座 雄伟的图书馆消失了。许多人认为，它毁于一场大火，其实，图书馆崛起和 衰落的真相更为复杂。图书馆这一构想 来自于亚历山大大帝，在他所向披靡、征服各处之后，曾师从亚里士多德的他，将目标转向建造一座知识帝国， 建在以他名字命名的城市。图书馆开建之前，他就去世了。但他的继任者托勒密一世，继续执行亚历山大的计划， 开始建造博物馆和图书馆。亚历山大港图书馆位于城市的皇家区域，人们推测其建筑 包含高大的希腊圆柱，且受到当地埃及人的影响，或是融合二者特点—— 现存资料中没有其建筑细节。我们能够确定的是 它拥有演讲厅、教室、书架。图书馆建成后，托勒密一世开始用以希腊和 埃及为主的卷轴填充图书馆。他出资邀请学者 在亚历山大港居住和学习。这些学者贡献的手稿 使得图书馆内文献不断增加，但亚历山大港的统治者 仍希望获得世上所有书籍拷贝。幸运的是，地中海地区的船只 都会经过亚历山大港，托勒密三世制定政策， 要求所有停靠亚历山大港的船只呈上书籍供图书馆誊抄。一旦复制完成后，书籍会保存在图书馆， 而把复制版归还给船只。还雇佣了一些搜书者，前去地中海地区找寻新书，亚历山大港的统治者停止出口 埃及人制作卷轴的纸莎草纸，来试图打压竞争对手，这项举措为亚历山大港 带来了数十万的书籍。随着图书馆规模扩大，人们虽能找到更多领域的信息，但找寻某特定科目 信息时，却很困难。幸运的是，学者卡利马科斯 着手解决了这一问题，他编纂了书册总录，多达120卷，这是史上第一本书册目录。利用书册目录，人们才能在日益增大的 图书馆藏中定位书籍。他们有了一些惊人的发现，在哥伦布出海航行的 1600 年前，埃拉托斯特尼不仅发现地球是圆的，还算出了地球的周长和直径，计算结果与实际仅差几英里。亚历山大港的希罗造出了 世界上第一台蒸汽发动机，这比工业革命时期 再次发明的蒸汽机时间早了一千多年。自公元前 283 年建成后的 300 年间，图书馆繁荣发展。但是在公元前 48 年， 尤里乌斯·凯撒包围了亚历山大港，并点火烧了港口停留的船只。多年来，学者们一直认为 大火蔓延至城区而烧毁了图书馆。大火可能烧毁了部分馆藏书籍，但从古代的文字记录中发现，在围困发生后的几个世纪里， 学者们依然继续拜访图书馆。最终，图书馆在统治者的 更迭中慢慢消失了，从希腊人到罗马人、基督徒、到最终被穆斯林统治。每届统治者都将馆藏视为威胁，而不是引以为傲的资源。在公元 415 年，基督教统治者甚至谋杀了 数学家希帕提娅，只因她研究了图书馆的 古希腊的文字资料，这些资料被视为亵渎神灵。虽然亚历山大图书馆 和其不计其数的资料已消失，我们仍在努力 找出最佳办法来收集、获取、和保存我们的知识。如今的信息数量更多，也有更先进的技术来保存它们，但我们无法确定是否这些数字化资料 比亚历山大图书馆的纸墨卷更能经受各种损害。即使我们的知识储备 在物理上是安全的，但它们仍然要对抗其他摧毁图书馆的更可怕力量：对知识的恐惧和认为过去的即过时的 自大想法。不同的是，这一次， 我们知道要应对什么。

**P613 2018-07-24 Can you solve the rogue AI riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=613)

A hostile artificial intelligence called NIM has taken over the world’s computers. You’re the only person skilled enough to shut it down, and you’ll only have one chance. You’ve broken into NIM’s secret lab, and now you’re floating in a raft on top of 25 stories of electrified water. You’ve rigged up a remote that can lower the water level by ejecting it from grates in the sides of the room. If you can lower the water level to 0, you can hit the manual override, shut NIM off, and save the day. However, the AI knows that you’re here, and it can lower the water level, too, by sucking it through a trapdoor at the bottom of the lab. If NIM is the one to lower the water level to 0, you’ll be sucked out of the lab, resulting in a failed mission. Control over water drainage alternates between you and NIM, and neither can skip a turn. Each of you can lower the water level by exactly 1, 3, or 4 stories at a time. Whoever gets the level exactly to 0 on their turn will win this deadly duel. Note that neither of you can lower the water below 0; if the water level is at 2, then the only move is to lower the water level 1 story. You know that NIM has already computed all possible outcomes of the contest, and will play in a way that maximizes its chance of success. You go first. How can you survive and shut off the artificial intelligence? Pause here if you want to figure it out for yourself. Answer in: 3 Answer in: 2 Answer in: 1 You can’t leave anything up to chance - NIM will take any advantage it can get. And you’ll need to have a response to any possible move it makes. The trick here is to start from where you want to end and work backwards. You want to be the one to lower the water level to 0, which means you need the water level to be at 1, 3, or 4 when control switches to you. If the water level were at 2, your only option would be to lower it 1 story, which would lead to NIM making the winning move. If we color code the water levels, we can see a simple principle at play: there are “losing” levels like 2, where no matter what whoever starts their turn there does, they’ll lose. And there are winning levels, where whoever starts their turn there can either win or leave their opponent with a losing level. So not only are 1, 3, and 4 winning levels, but so are 5 and 6, since you can send your opponent to 2 from there. What about 7? From 7, all possible moves would send your opponent to a winning level, making this another losing level. And we can continue up the lab in this way. If you start your turn 1, 3, or 4 levels above a losing level, then you’re at a winning level. Otherwise, you’re destined to lose. You could continue like this all the way to level 25. But as a shortcut, you might notice that levels 8 through 11 are colored identically to 1 through 4. Since a level’s color is determined by the levels 1, 3, and 4 stories below it, this means that level 12 will be the same color as level 5, 13 will match 6, 14 will match 7, and so on, In particular, the losing levels will always be multiple of 7, and two greater than multiples of 7. Now, from your original starting level of 25, you have to make sure your opponent starts on a losing level every single turn— if NIM starts on a winning level even once, it’s game over for you. So your only choice on turn 1 is to lower the water level by 4 stories. No matter what the AI does, you can continue giving it losing levels until you reach 0 and trigger the manual override. And with that, the crisis is averted. Now, back to a less stressful kind of surfing.

**P613 2018-07-24 Can you solve the rogue AI riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=613)

翻译人员: Sizhen Wang 校对人员: Sylvie Han一个邪恶的人工智能 NIM 控制了全世界的电脑。你是唯一一个有能力关闭它的人，且你只有一次机会。你闯入了 NIM 的秘密实验室，现在正坐在浮在 25 层高的 带电水上的一个皮筏艇里。你已装配了一个遥控器，它可以通过把水从房间两侧的格子 排走来降低水位。如果你可以把水位降到 0，你就可以按下手动操作按钮，关闭 NIM并拯救世界。但是这个 AI 知道你在这，它也能通过用实验室底部的 活板门抽水，让水位降低。如果 NIM 把水位降低到了 0，你就会被吸出实验室，从而导致任务失败。你和 NIM 轮流排水，谁也不可以跳过任何一轮。你们俩每轮可以把水位降低刚好 1 层，3 层或 4 层。谁在轮到自己时把水位降到了 0谁就是这生死之战的赢家。注意，你们俩谁都不能让 水位降到 0 以下；假如水位在 2，那你们就一次只能让水位降 1 层。你知道 NIM 已经计算出了 这场比赛的所有可能结果，而且它会选择以能让它自己 赢的可能性最大化的方式来玩。你先出招。你要怎样才可以存活下来 并终结这个人工智能呢？如果你想自己想想的话， 请在这里暂停。答案揭晓倒计时：3答案揭晓倒计时：2答案揭晓倒计时：1你不可以把任何一步交给命运—— NIM 会利用任何潜在优势。你得准备好应对 NIM 所有招数的措施。这里的技巧是从理想结局开始进行倒推。你想成为那个把水位降到 0 的人，意味着你需要水位在轮到你时在 1，3 或 4 的位置。如果水位当时在 2 的位置，你唯一的选择便会是让水位降低 1 层，这就会让 NIM 获胜。如果我们用颜色标记一下这些水位，我们就会发现玩这个游戏的一个简单原则：游戏里存在一些“必输”层，比如第 2 层，一旦轮到那一层，无论是谁都必输无疑。游戏里也存在一些必胜层， 无论是谁轮到那些层谁都能赢或是把他们的对手逼到必输层。所以不只是 1，3 和 4是必胜层，5 和 6 也是，因为从那些位置你可以 把你的对手送到第 2 层。那么第 7 层是什么情况呢？到了第 7 层，所有可能的移动 都会把你的对手送到必胜层，所以这又是一个必输层。我们可以继续这样往上推理。如果轮到你时你在一个必输层 上面 1，3 或 4 层的位置，那你就位于一个必胜层。否则，你必输无疑。你可以像这样一路推理到第 25 层。不过还有一条捷径，你可能注意到了，第 8 到 11 层和 第 1 到 4 层的颜色是一样的。由于层级的颜色取决于 位于它下面 1，3 或 4 层的颜色，所以第 12 层的颜色会和第 5 层的颜色一样，13 会和 6 一样，14 会和 7 一样，以此类推，必输层的层数永远会是 7 的倍数，以及比 7 的倍数大 2 的数。现在，从你的出发点 25 层起，你得确保你的对手在任何一局中 都位于必输层——因为一旦 NIM 处于必胜层，哪怕是一次，你就完了。所以在第一轮时你唯一的选择 就是让水位降低 4 层。这样无论 AI 怎么做，你都可以把必输层推给它直到你到达第 0 层， 启动手动操作装置。这样危机就解除了。现在，回到一种 更轻松的冲浪里吧（即上网）。

**P614 2018-07-25 How do cigarettes affect the body - Krishna Sudhir**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=614)

Cigarettes aren’t good for us. That’s hardly news--we’ve known about the dangers of smoking for decades. But how exactly do cigarettes harm us? Let’s look at what happens as their ingredients make their way through our bodies, and how we benefit physically when we finally give up smoking. With each inhalation, smoke brings its more than 5,000 chemical substances into contact with the body’s tissues. From the start, tar, a black, resinous material, begins to coat the teeth and gums, damaging tooth enamel, and eventually causing decay. Over time, smoke also damages nerve-endings in the nose, causing loss of smell. Inside the airways and lungs, smoke increases the likelihood of infections, as well as chronic diseases like bronchitis and emphysema. It does this by damaging the cilia, tiny hairlike structures whose job it is to keep the airways clean. It then fills the alveoli, tiny air sacs that enable the exchange of oxygen and carbon dioxide between the lungs and blood. A toxic gas called carbon monoxide crosses that membrane into the blood, binding to hemoglobin and displacing the oxygen it would usually have transported around the body. That’s one of the reasons smoking can lead to oxygen deprivation and shortness of breath. Within about 10 seconds, the bloodstream carries a stimulant called nicotine to the brain, triggering the release of dopamine and other neurotransmitters including endorphins that create the pleasurable sensations which make smoking highly addictive. Nicotine and other chemicals from the cigarette simultaneously cause constriction of blood vessels and damage their delicate endothelial lining, restricting blood flow. These vascular effects lead to thickening of blood vessel walls and enhance blood platelet stickiness, increasing the likelihood that clots will form and trigger heart attacks and strokes. Many of the chemicals inside cigarettes can trigger dangerous mutations in the body’s DNA that make cancers form. Additionally, ingredients like arsenic and nickel may disrupt the process of DNA repair, thus compromising the body’s ability to fight many cancers. In fact, about one of every three cancer deaths in the United States is caused by smoking. And it’s not just lung cancer. Smoking can cause cancer in multiple tissues and organs, as well as damaged eyesight and weakened bones. It makes it harder for women to get pregnant. And in men, it can cause erectile dysfunction. But for those who quit smoking, there’s a huge positive upside with almost immediate and long-lasting physical benefits. Just 20 minutes after a smoker’s final cigarette, their heart rate and blood pressure begin to return to normal. After 12 hours, carbon monoxide levels stabilize, increasing the blood’s oxygen-carrying capacity. A day after ceasing, heart attack risk begins to decrease as blood pressure and heart rates normalize. After two days, the nerve endings responsible for smell and taste start to recover. Lungs become healthier after about one month, with less coughing and shortness of breath. The delicate hair-like cilia in the airways and lungs start recovering within weeks, and are restored after 9 months, improving resistance to infection. By the one-year anniversary of quitting, heart disease risk plummets to half as blood vessel function improves. Five years in, the chance of a clot forming dramatically declines, and the risk of stroke continues to reduce. After ten years, the chances of developing fatal lung cancer go down by 50%, probably because the body’s ability to repair DNA is once again restored. Fifteen years in, the likelihood of developing coronary heart disease is essentially the same as that of a non-smoker. There’s no point pretending this is all easy to achieve. Quitting can lead to anxiety and depression, resulting from nicotine withdrawal. But fortunately, such effects are usually temporary. And quitting is getting easier, thanks to a growing arsenal of tools. Nicotine replacement therapy through gum, skin patches, lozenges, and sprays may help wean smokers off cigarettes. They work by stimulating nicotine receptors in the brain and thus preventing withdrawal symptoms, without the addition of other harmful chemicals. Counselling and support groups, cognitive behavioral therapy, and moderate intensity exercise also help smokers stay cigarette-free. That’s good news, since quitting puts you and your body on the path back to health.

**P614 2018-07-25 How do cigarettes affect the body - Krishna Sudhir**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=614)

翻译人员: Annie Zhang 校对人员: Yinchun Rui香烟对我们无益这已经不算是新闻了 -- 几十年来我们一直都知道抽烟的危害。但是香烟到底是 怎么伤害我们的？让我们看看 当香烟的成分进入我们的身体时会发生什么，以及戒烟后对身体有什么好处。每吸一次烟，烟雾会携带五千以上的 化学成分和身体组织接触。从一开始， 焦油， 一种黑色的树枝材料，会覆盖牙齿和牙龈损伤牙釉质， 最终导致腐烂。随着时间的推移， 烟雾也会伤害鼻子中的神经末梢导致嗅觉丢失。在气道和肺内部，抽烟会增加感染的可能性，以及慢性疾病 比如支气管炎和肺气肿。它是通过破坏纤毛来实现的，微小的毛发状结构 其作用是保持气道清洁。然后填充肺泡，微小的空气囊 能使氧气和二氧化碳在肺部和血液之间交换。一个叫一氧化碳的毒气 穿过膜进入血液，使血红蛋白结合以及置换氧气它通常会在身体周围传播。这就是吸烟可导致 缺氧和呼吸急促的原因之一。在大概十秒的范围内，血液携带一种叫做 尼古丁的兴奋剂进入大脑，多巴胺和其他神经递质 释放的触发，包括内啡肽，会通过制造愉快的感觉 使吸烟上瘾香烟携带的尼古丁和其他化学成分会使血脉缢缩同时损伤它们脆弱的内皮细胞限制血流。这些血管效应会导致血脉壁增厚和提高血小板的黏度提高血块形成的可能性引发心脏病发作和中风。香烟里面许多的化学成分 可以引发严重的基因突变使癌症形成此外， 砷和镍等成分也许会破坏DNA修复的过程，从而损害身体对抗许多癌症的能力。事实上， 在美国三分之一的 癌症死亡是吸烟导致的。而且不只是肺癌。吸烟既可以使多个组织和器官致癌又可以使视力受损甚至骨骼变弱。它使女性受孕变得更加困难。和使男性有勃起功能的障碍但是对于那些戒烟的人来说，有一个巨大的好处跟几乎立即和持久的身体益处吸烟者抽完最后一支烟的 二十分钟后他们的心跳和血压 就开始恢复正常了十二个小时之后， 一氧化碳达到标准增加血液携氧能力停止一天之后，血压和心跳回归正常 使心脏病突发的危险降低两天之后，负责嗅觉和味觉的 神经末梢开始恢复肺在大概一个月之后变得更健康减少咳嗽和呼吸急促。毛发似的纤毛在呼吸道和肺内几周内开始恢复，和九个月后结束修复， 提高抗感染能力戒烟后的一周年，心脏病风险骤然跌落到一半 同时血管功能改善。五年内，血栓形成的几率大大下降，中风风险持续减少。十年后， 罹患致命肺癌的机会下降到50%，大概是因为又一次恢复 身体修复DNA的能力。十五年内， 患发冠心病的可能性基本上和非吸烟者相同。假装这一切都很容易实现 是没有意义的。戒烟可导致焦虑和抑郁，由于戒断尼古丁导致的。但幸运的是， 这种影响通常是暂时的。感谢越来越多的工具库， 戒烟变得越来越容易。口香糖替代尼古丁的疗法，皮肤贴片，含片，和喷雾可以帮助吸烟者戒烟它们通过刺激大脑中的 尼古丁受体来起作用从而防止戒断症状，不含其他有害化学物质。咨询和互助小组，认知行为疗法，和中等强度运动也可以帮助吸烟者 保持不吸烟的状态这是一个好消息从戒烟让你和你的身体 回到健康的道路上开始。

**P615 2018-07-25 What would happen if every human suddenly disappeared - Dan Kwartler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=615)

Human beings are everywhere. With settlements on every continent, we can be found in the most isolated corners of Earth’s jungles, oceans, and tundras. Our impact is so profound, most scientists believe humanity has left a permanent mark on Earth’s geological record. So what would happen if suddenly, every human on Earth disappeared? With no one maintaining them, some of our creations backfire immediately. Hours after we disappear, oil refineries malfunction, producing month-long blazes at plants like the ones in western India, the southern United States, and South Korea. In underground rail systems like those in London, Moscow, and New York City, hundreds of drainage pumps are abandoned, flooding the tunnels in just three days. By the end of the first week, most emergency generators have shut down, and once the fires have gone out, the earth goes dark for the first time in centuries. After the first catastrophic month, changes come more gradually. Within 20 years, sidewalks have been torn apart by weeds and tree roots. Around this time, flooded tunnels erode the streets above into urban rivers. In temperate climates, the cycle of seasons freezes and thaws these waterways, cracking pavement and concrete foundations. Leaking pipes cause the same reaction in concrete buildings, and within 200 winters, most skyscrapers buckle and tumble down. In cities built in river deltas like Houston, these buildings eventually wash away completely - filling nearby tributaries with crushed concrete. Rural and suburban areas decay more slowly, but in largely unsurprising ways. Leaks, mold, bug and rodent infestations - all the usual enemies of the homeowner- now go uncontested. Within 75 years, most houses' supporting beams have rotted and sagged, and the resulting collapsed heap is now home to local rodents and lizards. But in this post-human world, “local” has a new meaning. Our cities are full of imported plants, which now run wild across their adopted homes. Water hyacinth coat the waterways of Shanghai in a thick green carpet. Poisonous giant hogweeds overgrow the banks of London’s Thames River. Chinese Ailanthus trees burst through New York City streets. And as sunken skyscrapers add crumbled concrete to the new forest floor, the soil acidity plummets, potentially allowing new plant life to thrive. This post-human biodiversity extends into the animal kingdom, as well. Animals follow the unchecked spread of native and non-native plants, venturing into new habitats with the help of our leftover bridges. In general, our infrastructure saves some animals and dooms others. Cockroaches continue to thrive in their native tropical habitats, but without our heating systems, their urban cousins likely freeze and die out in just two winters. And most domesticated animals are unable to survive without us – save for a handful of resourceful pigs, dogs, and feral housecats. Conversely, the reduced light pollution saves over a billion birds each year whose migrations were disrupted by blinking communication tower lights and high-tension wires. And mosquitos multiply endlessly in one of their favorite manmade nurseries – rubber tires, which last for almost a thousand years. As fauna and flora flourish, Earth’s climate slowly recovers from millennia of human impact. Within 35,000 years, the plant cycle removes the last traces of lead left by the Industrial Revolution from Earth’s soil, and it may take up to 65,000 years beyond that for CO2 to return pre-human levels. But even after several million years, humanity’s legacy lives on. Carved in unyielding granite, America’s Mt. Rushmore survives for 7.2 million years. The chemical composition of our bronze sculptures keeps them recognizable for over 10 million. And buried deep underground, the remnants of cities built on floodplains have been preserved in time as a kind of technofossil. Eventually, these traces, too, will be wiped from the planet’s surface. Humanity hasn’t always been here, and we won’t be here forever. But by investigating the world without us, perhaps we can learn more about the world we live in now.

**P615 2018-07-25 What would happen if every human suddenly disappeared - Dan Kwartler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=615)

翻译人员: Lipeng Chen 校对人员: Hanlin Wang人类无处不在，安居在每一片大陆，我们存在于世界上最与世隔绝的丛林，海洋，和平原。我们的影响如此之深刻， 以至于大多科学家们相信人类在这个地球上 已留下了永久的痕迹。那么如果所有人都突然消失了， 地球会怎么样呢？当没有人保养时， 我们的一些创造产物会立刻表现异常。在我们消失后的几小时后， 炼油厂会瘫痪，并会持续数月地对周围植物喷射火焰； 这种事会发生在印度西部，美国南部，还有南韩。而比如伦敦，莫斯科，和纽约的地下铁路系统，数以百计的排水设施将被废弃， 地下隧道将在三天内被洪水淹没。一周之后，大多数应急发电机关机，而当火也熄灭时，地球将会在这几个世纪以来 第一次回到黑暗的怀抱。第一个多灾多难的月份过去之后， 变化会慢慢放缓。20年之内，街道两侧会 布满植草以及树根。这段时间，被水淹没的隧道已经生锈， 而上面的街道变成的河流。在温带气候的环境中，随着季节循环， 这些水流时冻时化，对周围街道和坚固设施产生冲击和破坏。漏水的管道在大楼中也会造成同样的破坏，大多数摩天大楼撑不过两百个冬天 就会崩裂倒塌。在如休斯顿这种 依河流三角洲所建的城市里，这些大楼将被完全冲走——致使周围的水域 布满破碎的钢筋水泥。郊区和乡村的衰败会缓慢一些，但大多会以不出乎意料的方式进行。漏水、霉菌、虫害 以及鼠害——那些家户常见的敌人——现在肆无忌惮了。75年之内，大多数房屋的支撑横梁 会腐败、下陷，而造成的坍塌就成了 当地的老鼠和蜥蜴的家园。但是在这个后人类的世界， “土生土长”有了全新的含义。充满入侵植物的城市，将被肆意生长的它们完全占领。凤眼蓝（原产于南美）将在上海的水道上 形成一层厚厚的绿色覆盖。有毒的大型大豕草（原产于高加索地区）将漫上 英国泰晤士河的河岸。中国臭椿将占领纽约市的街道。而且当塌陷的摩天大楼 给新的森林地表增加建筑残块时，土地酸度会急剧上升，给了新植物潜在的繁荣生长的机会。这种后人类的生态多样性同样也 延伸到了动物世界。动物追随本地或引进植物无限制的扩张，依靠我们留下的桥梁进入新的领地。总的来说，我们的基建拯救了一些动物， 同时也毁灭了另一些动物。蟑螂继续在它们原产的热带领域繁衍生息，但是没有了我们的供暖系统，它们在城市的种群将在两个冬天 受冻，最终消亡。大多数家养动物在没有我们的情况下 将无法生存——仅剩下一些机智的猪、狗以及家猫。相反，削减的光污染每年将拯救 超过十亿只候鸟，因为以往它们的迁徙受到闪亮的信号灯以及高压电线的阻碍。蚊子将在它们最爱的 人造乐园之一——橡胶轮胎中继续 繁衍生息超过千年。随着动植物不断繁衍，地球的气候将从人类数千年的 影响中逐渐恢复过来。35000年以内，植物循环将从土地中移除工业革命留下的最后一丁点铅，而二氧化碳量将至少需要65000年才能回到人类文明前的水平。但是即使数百万年之后， 人类的遗产依然存在。它们被雕刻在坚硬的花岗岩中，美国的拉什莫尔山将存在720万年。我们的铜制雕塑因其化学成分将留存超过1000万年的时间。深埋在地下，建造在涝原上的城市的废墟，将以化石的形式被保留下来。最终，这些遗迹也会被从地球表面抹去。人类文明并非亘古永存， 我们也不会永久存在。但是通过考察没有我们的世界，也许我们可以更好地了解 我们现在赖以生存的世界。

**P616 2018-07-25 Why is Aristophanes called 'The Father of Comedy' - Mark Robinson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=616)

At the annual Athenian drama festival in 426 BC, a comic play called The Babylonians, written by a young poet named Aristophanes, was awarded first prize. But the play’s depiction of Athens’ conduct during the Peloponnesian War was so controversial that afterwards, a politician named Kleon took Aristophanes to court for "slandering the people of Athens in the presence of foreigners." Aristophanes struck back two years later with a play called The Knights. In it, he openly mocked Kleon, ending with Kleon’s character working as a lowly sausage seller outside the city gates. This style of satire was a consequence of the unrestricted democracy of 5th century Athens and is now called "Old Comedy." Aristophanes’ plays, the world’s earliest surviving comic dramas, are stuffed full of parodies, songs, sexual jokes, and surreal fantasy. They often use wild situations, like a hero flying to heaven on a dung beetle, or a net cast over a house to keep the owner’s father trapped inside, in order to subvert audience expectations. And they’ve shaped how comedy’s been written and performed ever since. The word "comedy" comes from the Ancient Greek "komos," – revel, and "oide," – singing, and it differed from its companion art form, "tragedy" in many ways. Where ancient Athenian tragedies dealt with the downfall of the high and mighty, their comedies usually ended happily. And where tragedy almost always borrowed stories from legend, comedy addressed current events. Aristophanes’ comedies celebrated ordinary people and attacked the powerful. His targets were arrogant politicians, war-mongering generals, and self-important intellectuals, exactly the people who sat in the front row of the theatre, where everyone could see their reactions. As a result, they were referred to as komoidoumenoi: "those made fun of in comedy." Aristophanes’ vicious and often obscene mockery held these leaders to account, testing their commitment to the city. One issue, in particular, inspired much of Aristophanes’ work: the Peloponnesian War between Athens and Sparta. In Peace, written in 421 BC, a middle-aged Athenian frees the embodiment of peace from a cave, where she’d been exiled by profiteering politicians. Then, in the aftermath of a crushing naval defeat for Athens in 411 BC, Aristophanes wrote "Lysistrata." In this play, the women of Athens grow sick of war and go on a sex strike until their husbands make peace. Other plays use similarly fantastic scenarios to skewer topical situations, such as in "Clouds," where Aristophanes mocked fashionable philosophical thinking. The hero Strepsiades enrolls in Socrates’s new philosophical school, where he learns how to prove that wrong is right and that a debt is not a debt. No matter how outlandish these plays get, the heroes always prevail in the end. Aristophanes also became the master of the parabasis, a comic technique where actors address the audience directly, often praising the playwright or making topical comments and jokes. For example, in "Birds," the Chorus takes the role of different birds and threatens the Athenian judges that if their play doesn’t win first prize, they’ll defecate on them as they walk around the city. Perhaps the judges didn’t appreciate the joke, as the play came in second. By exploring new ideas and encouraging self-criticism in Athenian society, Aristophanes not only mocked his fellow citizens, but he shaped the nature of comedy itself. Hailed by some scholars as the father of comedy, his fingerprints are visible upon comic techniques everywhere, from slapstick to double acts to impersonations to political satire. Through the praise of free speech and the celebration of ordinary heroes, his plays made his audience think while they laughed. And his retort to Kleon in 425 BC still resonates today: “I’m a comedian, so I’ll speak about justice, no matter how hard it sounds to your ears.”

**P616 2018-07-25 Why is Aristophanes called 'The Father of Comedy' - Mark Robinson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=616)

翻译人员: Yifan L公元前426年， 在一年一度的雅典戏剧节上，有一处喜剧叫做《巴比伦人》是由一位名叫阿里斯托芬 的年轻诗人所写的,它斩获了头奖。但是，这部喜剧对雅典人 在伯罗奔尼撒战争中的行为描述颇具争议， 以至于后来，一位名叫克利翁的政客 将阿里斯托芬告上法庭，指责他“在外邦人面前诋毁雅典人。”两年后，阿里斯托芬 用他的新喜剧《骑士》回击指控。在这剧中，他公开嘲弄克利翁，把他的角色写成一个在城门外卖香肠的小贩。这种讽刺喜剧的形成归功于5世纪 雅典不加制约的民主制度，而在现在已经被称为“旧喜剧”。阿里斯托芬的剧作 是世界上可追溯的最早的喜剧，他的作品中充斥着滑稽模仿、 歌曲、低俗笑话和超现实主义的幻想。他经常描述荒唐的故事，比如说，一个英雄 乘坐屎壳郎飞向天堂，或者一只从天而降的网 把房主的父亲困在里面，这些作品都颠覆了观众的想象。而且他们还奠定了 今后喜剧的写作和演出方式。“喜剧”一次由两个古希腊词组成， “komos” （狂欢），和“oide” （唱歌），它与另外一个对应的艺术形式 —悲剧，是很不同的。古代雅典悲剧描述了 贵族与帝王们的衰落而喜剧大多是大团圆结局。悲剧作品大多引用神话故事，而喜剧更着重于当下时事。阿里斯托芬的喜剧 拥护民众，反对强权，他嘲弄的对象包括傲慢的政客，好战的军官，自以为是的知识分子，而他们正是那些坐在剧院最前排的人，观众们能清楚地看到 他们对于剧目的反应。因此，这些人被称为 “komoidoumenoi”，意为“在喜剧中被戏弄的人”。阿里斯托芬带有恶意 而且下流的嘲弄警示着统治者们， 使他们时刻记住自己的职责。雅典与斯巴达之间的 伯罗奔尼撒战争是阿里斯托芬创作的主要灵感之一。在公元前421年创作的《和平》中，一位雅典中年人从洞穴中 解放了和平的化身，她曾被牟取暴利的 雅典政客们放逐。公元前411年， 在雅典人海战全面失势后，阿里斯托芬创作了 《利西翠妲》（Lysistrata）在这部戏剧中， 雅典的女人们厌倦了战争，发动了性罢工， 逼迫她们的丈夫与敌方和解。其他的剧目同样运用幻想的情景 来反映时事政况例如在《云》中，阿里斯托芬嘲弄了 当时流行的哲学思考主人公史萃普赛底斯 去苏格拉底的新哲学学校就读，他在那里学到了 证明对为错的方法，还有否认债款的诡辩法。不论这些剧情发展变得多荒唐， 主人公总是会获胜。阿里斯托芬还充分运用了 合唱团主唱段的技巧这种喜剧技巧让演员 直接对观众们演说，常常是赞美剧本， 对时事进行评论或者开玩笑例如在作品《鸟》中，合唱团演员扮演各类飞鸟，威胁雅典评委们 让他们的剧目拿头等奖，如果不从，就在他们穿过街道时 把鸟粪排泄到他们头上。似乎评委们并不待见这种幽默，因此这部剧只拿了第二名。通过探索新的点子，并且鼓励雅典社会 进行自我批判，阿里斯托芬不仅嘲弄了他的城邦人，还诠释了喜剧的本质。他被一些学者们称为“喜剧之父”，各地的喜剧手法中都有他的影子，比如打闹喜剧、双人喜剧、身份模仿还有政治讽刺剧。通过歌颂言论自由和平民英雄，他的喜剧不仅让人发笑， 也使人深思。在公元前425年， 他对克利翁的回击仍让我们记忆犹新："我是一个喜剧作家， 所以不论你爱不爱听，我都会为维护公正而说话。"

**P617 2018-07-25 Why should you read Edgar Allan Poe - Scott Peeples**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=617)

A high forehead topped by disheveled black hair, a sickly pallor, and a look of deep intelligence and deeper exhaustion in his dark, sunken eyes. Edgar Allan Poe’s image is not just instantly recognizable – it’s perfectly suited to his reputation. From the prisoner strapped under a descending pendulum blade, to a raven who refuses to leave the narrator’s chamber, Poe’s macabre and innovative stories of gothic horror have left a timeless mark on literature. But just what is it that makes Edgar Allan Poe one of the greatest American authors? After all, horror was a popular genre of the period, with many practitioners. Yet Poe stood out thanks to his careful attention to form and style. As a literary critic, he identified two cardinal rules for the short story form: it must be short enough to read in one sitting, and every word must contribute to its purpose. By mastering these rules, Poe commands the reader’s attention and rewards them with an intense and singular experience – what Poe called the unity of effect. Though often frightening, this effect goes far beyond fear. Poe’s stories use violence and horror to explore the paradoxes and mysteries of love, grief, and guilt, while resisting simple interpretations or clear moral messages. And while they often hint at supernatural elements, the true darkness they explore is the human mind and its propensity for self-destruction. In “The Tell-Tale Heart,” a ghastly murder is juxtaposed with the killer’s tender empathy towards the victim – a connection that soon returns to haunt him. The title character of "Ligeia" returns from the dead through the corpse of her husband’s second wife – or at least the opium-addicted narrator thinks she does. And when the protagonist of “William Wilson” violently confronts a man he believes has been following him, he might just be staring at his own image in a mirror. Through his pioneering use of unreliable narrators, Poe turns readers into active participants who must decide when a storyteller might be misinterpreting or even lying about the events they’re relating. Although he’s best known for his short horror stories, Poe was actually one of the most versatile and experimental writers of the nineteenth century. He invented the detective story as we know it, with “The Murders in the Rue Morgue,” followed by “The Mystery of Marie Roget” and “The Purloined Letter.” All three feature the original armchair detective, C. Auguste Dupin, who uses his genius and unusual powers of observation and deduction to solve crimes that baffle the police. Poe also wrote satires of social and literary trends, and hoaxes that in some cases anticipated science fiction. Those included an account of a balloon voyage to the moon, and a report of a dying patient put into a hypnotic trance so he could speak from the other side. Poe even wrote an adventure novel about a voyage to the South Pole and a treatise on astrophysics, all while he worked as an editor, producing hundreds of pages of book reviews and literary theory. An appreciation of Poe’s career wouldn’t be complete without his poetry: haunting and hypnotic. His best-known poems are songs of grief, or in his words, “mournful and never-ending remembrance.” “The Raven,” in which the speaker projects his grief onto a bird who merely repeats a single sound, made Poe famous. But despite his literary success, Poe lived in poverty throughout his career, and his personal life was often as dark as his writing. He was haunted by the loss of his mother and his wife, who both died of tuberculosis at the age of 24. Poe struggled with alcoholism and frequently antagonized other popular writers. Much of his fame came from posthumous – and very loose – adaptations of his work. And yet, if he could’ve known how much pleasure and inspiration his writing would bring to generations of readers and writers alike, perhaps it may have brought a smile to that famously brooding visage.

**P617 2018-07-25 Why should you read Edgar Allan Poe - Scott Peeples**

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翻译人员: Sally Yang 校对人员: Wanna Shi高高的额头和蓬乱的黑发，病态的肤色，一双深邃的黑眼睛里流露出智慧，埋藏着疲惫。埃德加 · 爱伦 · 坡（Edgar Allan Poe） 的外貌形象不仅让人一眼认得出，也完美贴合他的名声。不断下降的钟摆刃底下被捆绑住的囚犯，和栖息在主人公房里不愿离去的乌鸦——坡的哥特式作品构思新颖，情节恐怖对文学的发展产生了深远的影响。但究竟是什么让埃德加 · 爱伦 · 坡成为了美国文学伟人之一呢？毕竟当时恐怖题材很受欢迎，有许多人都写过。但坡之所以鹤立鸡群， 是因为他特别注重形式和风格作为一名文学批评家，他提出了短篇小说体裁的两条基本规则：短到必须能让读者一口气读完，且每一个字都需推动故事的发展。掌握了这两条规则后，坡便能牢牢抓住读者的注意力，带给读者奇特的，强烈的情感体验——他称其为“统一效果论”。虽然常常使人害怕，但这个效果 带来的不止是恐惧。坡的故事通过暴力和惊悚探索爱、忧郁、和罪恶中的矛盾和奥秘，同时避免粗浅的解读和明确的道德讯息。虽然作品中常出现超自然元素，但故事真正想要探索的黑暗是人的心理和自毁倾向。在《泄密的心》中，一场可怕的谋杀和凶手对受害者那温柔的同情并存。这份同情很快便使他得到了报应。《丽姬娅》中，丽姬娅通过丈夫的第二任妻子 的尸体起死回生——至少吸食鸦片成瘾的 主人公是这么认为的。《威廉 · 威尔逊》中的主人公疯狂地对他认为在纠缠他的男人下手时，他或许只是面对着镜中的自己。通过第一人称的不可靠叙事这一创举，坡促使读者积极主动地去分辨叙述者是不是曲解了现实，或者甚至是在故意撒谎。众所周知，坡的短篇恐怖小说最为出名，实际上，他是十九世纪文风最为多变，最有实验精神的作者之一。他是推理小说的鼻祖，代表作有《莫格街谋杀案》、《玛丽 · 罗杰疑案》和《被窃之信》。三篇小说里都出现了 史上首位安乐椅侦探人物：奥古斯特 · 杜平。他发挥自己敏锐的观察力和推理能力，解决了一起起让警察瞠目结舌的案件。坡也讽刺过当代的文学和社会思潮，还写过恶作剧， 其中有些成为了科幻小说的先驱。例如一次通往月球的热气球旅行，和一位濒死的病人被催眠，死后也能继续和催眠师对话的故事。坡还写过南极旅行的冒险小说和关于天体物理学的论文。当时他是一名杂志编辑，写了几百页的书评和文学理论。提到坡的文学生涯， 自然要提到他的诗歌：令人难以忘怀，如痴如醉。他最出名的诗歌都有着哀伤的基调， 或用他的话来说：“悲凄与永不止息的追忆。”《乌鸦》中，主人公将自己的悲伤投射在一只只会重复一句话的乌鸦上。该作使得坡声誉鹊起。但即使在文学上成绩斐然坡仍然一生贫困潦倒，他的个人经历和文风一样黑暗。他的母亲和妻子 都在 24 岁那年因肺结核而去世，使他受到了沉重的打击。坡经常酗酒也常招致其他出名作家的反感他的名声大多来自于他死后 对他的作品的一些不严谨的改编。不过，如果他知道自己的作品将带给一代又一代的读者和作者 多少乐趣和灵感，或许他那有名的忧郁的面容上 也会出现一丝微笑。

**P618 2018-07-27 Can you solve the Leonardo da Vinci riddle - Tanya Khovanova**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=618)

You’ve found Leonardo Da Vinci’s secret vault, secured by a series of combination locks. Fortunately, your treasure map has three codes: 1210, 3211000, and… hmm. The last one appears to be missing. Looks like you’re gonna have to figure it out on your own. There’s something those first two numbers have in common: they’re what’s called autobiographical numbers. This is a special type of number whose structure describes itself. Each of an autobiographical number’s digits indicates how many times the digit corresponding to that position occurs within the number. The first digit indicates the quantity of zeroes, the second digit indicates the number of ones, the third digit the number of twos, and so on until the end. The last lock takes a 10 digit number, and it just so happens that there’s exactly one ten-digit autobiographical number. What is it? Pause here if you want to figure it out for yourself! Answer in: 3 Answer in: 2 Answer in: 1 Blindly trying different combinations would take forever. So let’s analyze the autobiographical numbers we already have to see what kinds of patterns we can find. By adding all the digits in 1210 together, we get 4 – the total number of digits. This makes sense since each individual digit tells us the number of times a specific digit occurs within the total. So the digits in our ten-digit autobiographical number must add up to ten. This tells us another important thing – the number can’t have too many large digits. For example, if it included a 6 and a 7, then some digit would have to appear 6 times, and another digit 7 times– making more than 10 digits. We can conclude that there can be no more than one digit greater than 5 in the entire sequence. So out of the four digits 6, 7, 8, and 9, only one – if any-- will make the cut. And there will be zeroes in the positions corresponding to the numbers that aren’t used. So now we know that our number must contain at least three zeroes – which also means that the leading digit must be 3 or greater. Now, while this first digit counts the number of zeroes, every digit after it counts how many times a particular non-zero digit occurs. If we add together all the digits besides the first one – and remember, zeroes don’t increase the sum – we get a count of how many non-zero digits appear in the sequence, including that leading digit. For example, if we try this with the first code, we get 2 plus 1 equals 3 digits. Now, if we subtract one, we have a count of how many non-zero digits there are after the first digit – two, in our example. Why go through all that? Well, we now know something important: the total quantity of non-zero digits that occur after the first digit is equal to the sum of these digits, minus one. And how can you get a distribution where the sum is exactly 1 greater than the number of non-zero positive integers being added together? The only way is for one of the addends to be a 2, and the rest 1s. How many 1s? Turns out there can only be two – any more would require additional digits like 3 or 4 to count them. So now we have the leading digit of 3 or greater counting the zeroes, a 2 counting the 1s, and two 1s – one to count the 2s and another to count the leading digit. And speaking of that, it’s time to find out what the leading digit is. Since we know that the 2 and the double 1s have a sum of 4, we can subtract that from 10 to get 6. Now it’s just a matter of putting them all in place: 6 zeroes, 2 ones, 1 two, 0 threes, 0 fours, 0 fives, 1 six, 0 sevens, 0 eights, and 0 nines. The safe swings open, and inside you find... Da Vinci’s long-lost autobiography.

**P618 2018-07-27 Can you solve the Leonardo da Vinci riddle - Tanya Khovanova**

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翻译人员: Nancy Xu 校对人员: Zhao Harry你找到了列奥纳多·达·芬奇 的秘密地下室，地下室门口有一连串密码锁。幸运的是，你的寻宝地图上 有三串密码：1210，3211000，还有，呃...最后一串好像看不清了。看起来你只能 自己推断一下这串数字了。前两串数字有一些相似之处：这种数字叫作“自我描述数”，其特点是能够描述本身的数字结构。自我描述数的每一位数字代表了这一位置对应的数字 在整个数中出现的次数。第一位数表示数字0的个数，第二位数表示数字 1 的个数，第三位数表示数字 2 的个数， 之后的位数以此类推。第三行锁有十位数，巧合的是，正好有唯一的十位的自我描述数。这个数是多少呢？【如果你想要自己推导一下， 请在这里暂停】【答案即将揭晓：3】【答案即将揭晓：2】【答案即将揭晓：1】盲目尝试不同数字组合 恐怕要试到地老天荒。所以我们先分析一下 已有的这两组自我描述数来看看我们能找到什么规律。把 1210 的每位数加起来得到的和是4。这个结果的意义在于，每一位数字告诉了我们 特定一个数字在整数中出现的次数。所以我们的这个 十位数的自我描述数，每一位数加起来的和一定是10。这同时告诉了我们 另一个关键信息——这个数字不能有太多的大数，比如，假如这个数字有一个6和一个7，那么有的数字需要出现6次，另一个数字要出现7次——这样加起来就超过了十位数。所以我们可以判断出整个十位数里 不会有超过一位大于5的数。所以在6，7，8，9这四个数中，最多只能出现一个， 才能满足这一标准。而且，这十位数里会有0，代表了没有用到的数字。所以现在我们知道了 这个数至少要有三个0——这就意味着首位数不能小于 3。既然这个首位数表示 0 出现的次数，那么在它之后的每一位数表示的 就是一个非零数出现的次数。如果我们把首位数后 的每位数都加起来——注意，0 不会影响总和——我们会得到整个十位数中 非零数出现了多少个，包括首位数。举个例子，如果我们 把第一串数这样加和，我们得到 2+1=3，三个数。那么如果我们减 1，就会得到在首位数之后 出现的非零数的个数，在这个例子中也就是 2。为什么要这么处理数字呢？注意，我们现在 掌握了一个关键信息：在首位数后出现的非零数的总数等于这些数的总和减一。那么你要如何得到一个数， 使它的各位数之和正好比非零正数的总和大 1 呢？唯一的办法是使加数之一为 2，其余的都是 1。那么是多少个 1 呢？看起来只能有两个 1 ——因为一旦超过两个，就会出现 3 或 4 等 其他的数字用以表示 1 的出现次数。所以现在我们知道第一位数是 不小于 3 的表示 0 出现次数的数，还有表示 1 出现次数的数字 2，还有两个 1 ——表示 2 出现的次数，还有另一个表示第一位数 出现次数的数。说到这里，我们应该来推断一下首位数了。既然我们知道 2 和两个 1 的总和是 4，我们可以用 10 减掉 4，得到 6，现在就是如何排列它们的问题了：六个 0，两个 1，一个 2，零个 3，零个 4，零个 5，一个 6，零个 7，零个 8，零个 9。守护之翼张开，走进去你发现了...达芬奇失传已久的自传。

**P619 2018-07-31 The fascinating history of cemeteries - Keith Eggener**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=619)

Spindly trees, rusted gates, crumbling stone, a solitary mourner— these things come to mind when we think of cemeteries. But not so long ago, many burial grounds were lively places, with blooming gardens and crowds of people strolling among the headstones. How did our cemeteries become what they are today? Some have been around for centuries, like the world’s largest, Wadi al-Salaam, where more than five million people are buried. But most of the places we’d recognize as cemeteries are much younger. In fact, for much of human history, we didn’t bury our dead at all. Our ancient ancestors had many other ways of parting with the dead loved ones. Some were left in caves, others in trees or on mountaintops. Still others were sunk in lakes, put out to sea, ritually cannibalized, or cremated. All of these practices, though some may seem strange today, were ways of venerating the dead. By contrast, the first known burials about 120,000 years ago were likely reserved for transgressors, excluding them from the usual rites intended to honor the dead. But the first burials revealed some advantages over other practices: they protected bodies from scavengers and the elements, while shielding loved ones from the sight of decay. These benefits may have shifted ancient people’s thinking toward graves designed to honor the dead, and burial became more common. Sometimes, these graves contained practical or ritual objects, suggesting belief in an afterlife Communal burials first appeared in North Africa and West Asia around 10 to 15,000 years ago, around the same time as the first permanent settlements in these areas. These burial grounds created permanent places to commemorate the dead. The nomadic Scythians littered the steppes with grave mounds known as kurgans. The Etruscans built expansive necropoles, their grid-patterned streets lined with tombs. In Rome, subterranean catacombs housed both cremation urns and intact remains. The word cemetery, or “sleeping chamber,” was first used by ancient Greeks, who built tombs in graveyards at the edges of their cities. In medieval European cities, Christian churchyards provided rare, open spaces that accommodated the dead, but also hosted markets, fairs, and other events. Farmers even grazed cattle in them, believing graveyard grass made for sweeter milk. As cities grew during the industrial revolution, large suburban cemeteries replaced smaller urban churchyards. Cemeteries like the 110-acre Père-Lachaise in Paris or the 72-acre Mt. Auburn in Cambridge, Massachusetts were lushly landscaped gardens filled with sculpted stones and ornate tombs. Once a luxury reserved for the rich and powerful, individually marked graves became available to the middle and working classes. People visited cemeteries for funerals, but also for anniversaries, holidays, or simply an afternoon outdoors. By the late 19th century, as more public parks and botanical gardens appeared, cemeteries began to lose visitors. Today, many old cemeteries are lonely places. Some are luring visitors back with tours, concerts, and other attractions. But even as we revive old cemeteries, we’re rethinking the future of burial. Cities like London, New York, and Hong Kong are running out of burial space. Even in places where space isn’t so tight, cemeteries permanently occupy land that can’t be otherwise cultivated or developed. Traditional burial consumes materials like metal, stone, and concrete, and can pollute soil and groundwater with toxic chemicals. With increasing awareness of the environmental costs, people are seeking alternatives. Many are turning to cremation and related practices. Along with these more conventional practices, people can now have their remains shot into space, used to fertilize a tree, or made into jewelry, fireworks, and even tattoo ink. In the future, options like these may replace burial completely. Cemeteries may be our most familiar monuments to the departed, but they’re just one step in our ever-evolving process of remembering and honoring the dead.

**P619 2018-07-31 The fascinating history of cemeteries - Keith Eggener**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=619)

翻译人员: Jenny Tian 校对人员: Carol Wang细长的树木，生锈的大门，摇摇欲坠的石头，孤独的哀悼者——当我们想到墓地时， 这些景象常常会浮现在脑海中但不久之前，许多墓地都是热闹的地方，百花盛开，攒动的人群漫步在墓碑之间。我们的墓地是如何 演变成今天的样子的？有些已经存在了几个世纪，比如世界上最大的 Wadi al-Salaam墓地，那里埋葬了五百万余人。但现今广为人知的大多数墓地 一般没有如此久远的历史。事实上，人类历史的大部分时间里，我们根本没有将死者埋葬。我们的古代祖先有许多其他方式 与死去的亲人分别。有的将死者留在洞穴里，有些留在树上，或是山顶上。还有一些沉入湖中，或者投入海中，或者举行仪式吃掉死者，或者火化。所有这些做法，虽然有些在今天看起来很奇怪，却是当时对死者表示尊重的方式。相比之下，最早为人所知的埋葬，在大约12万年前，很可能仅限于对违法违规者施用，旨在将他们排除在纪念死者的常规仪式之外。但最初的埋葬揭示了一些 优于其他做法的优势：即保护尸体免受食腐动物 和自然力量的侵害，同时免使亲人们目睹尸体腐烂。这些利处可能已经改变了古人对于旨在纪念死者的坟墓的想法，埋葬变得更加普遍。有时候，这些坟墓包含着 实用或祭祀的物件，暗示对死后世界的信仰，死者可能需要这样的工具。公共的埋葬首先出现在北非和西亚。大约1万年前或1万五千年前，和这些区域最早的永久定居点 出现时间大致相同，这些墓地建造了 纪念死者的永久性场所。游牧塞西亚人在草原上散落着坟墩，人们称之为墓穴。伊特鲁里亚人建造了广阔的墓地，他们网格图案的街道 两旁排列着墓穴。在罗马，地下墓穴安放着火葬瓮和完整的遗骸。“墓地”这个词，或者叫作“睡房”，是古希腊人最早使用的词，他们在位于城市边缘的墓地建造墓穴。在中世纪的欧洲城市，基督教教堂院内 提供很罕见的开放空间，用以容纳死者，但它也是集市、 集会和其它活动的场所。农民甚至在那里牧牛，认为墓地草产出的牛奶更甜。随着城市在工业革命期间的发展，大型郊区公墓取代了 较小的城市教堂院落墓地。比如巴黎110英亩的 Père-Lachaise墓地，还有马萨诸塞州剑桥市 72英亩的奥本山墓地，都是郁郁葱葱的园景花园，拥有无数雕刻的石头和华丽的墓穴。曾为权势阶层特权的奢侈墓地，后来中产阶层和工人阶级亦可享用。人们来墓地不仅为了参加葬礼，而且纪念日和假期也来，或者只是下午到墓地走走。到了19世纪末，随着更多的公共 公园和植物园的出现，公墓开始失去了光顾者。今天，许多古老的墓地成了 孤独的地方。有些墓地通过举办 游览、音乐会及其他盛会，吸引参观者们回来。但即使我们使以往的墓地复兴，也在重新思考今后埋葬的问题。伦敦、纽约和香港这样的城市，几乎没有再建墓地的土地了。即使在土地不那么紧缺的地方，公墓永久占用土地，一经占用，便不能 再进行耕种或开发。传统的墓葬消耗材料，比如金属、石头和混凝土，而且会使土壤和地下水受到有毒化学物质的污染。随着环境成本意识的增强，人们正在寻找其他选择，许多人更倾向于火葬和相关做法。除了这些较为传统的做法，人们现在可以 将他们的遗体射入太空，或者用来给树木施肥，或将其制成珠宝、烟花、甚至纹身墨汁。将来，诸如此类选择可能会 完全替换墓葬。墓地可能是我们对逝者 最熟悉的纪念地，然而，这只是我们缅怀祭奠死者的不断进化过程中向前迈出的一步。

**P620 2018-08-01 Everything you need to know to read “The Canterbury Tales” - Iseult G**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=620)

A portly Miller, barely sober enough to sit on his horse, rambles on about the flighty wife of a crotchety old carpenter and the scholar she takes as her lover. To get some time alone together, the scholar and the wife play various tricks that involve feigning madness, staging a biblical flood, and exposing themselves in public. But the parish clerk is also lusting after the wife, and comes by every night to sing outside her house. This becomes so tiresome that she tries to scare him away by hanging her rear end out the window for him to kiss. When this appears not to work, her scholar decides to try farting in the same position, but this time, the clerk is waiting with a red-hot poker. This might all sound like a bawdy joke, but it’s part of one of the most esteemed works of English literature ever created: The Canterbury Tales, which seamlessly blends the lofty and the lowly. The work consists of 24 stories, each told by one of Chaucer’s spirited characters. Narrators include familiar Medieval figures such as a Knight, a Clerk, and a Nun, and the less recognizable Reeve, and Mancible, and others. The Tales are written in Middle English, which often looks entirely different from the language spoken today. It was used between the 12th and 15th centuries, and evolved from Old English due to increased contact with European romantic languages after the Norman Conquest of 1066. Most of the Middle English alphabet is still familiar today, with the inclusion of a few archaic symbols, such as yogh, which denotes the y, j, or gh sound. The loquacious cast of the Tales first meet at the Tabard Inn in Southwark. They have a journey in common: a pilgrimage to Canterbury to visit the shrine of St. Thomas Beckett, a martyred archbishop who was murdered in his own Cathedral. Eager and nosy for some personal details, the host of the Inn proposes a competition: whoever tells the best tale will be treated to dinner. If not for their pilgrimage, many of these figures would never have had the chance to interact. This is because Medieval society followed a feudal system that divided the clergy and nobility from the working classes, made up of peasants and serfs. By Chaucer’s time, a professional class of merchants and intellectuals had also emerged. Chaucer spent most of his life as a government official during the Hundred Years' War, traveling throughout Italy and France, as well as his native England. This may have influenced the panoramic vision of his work, and in the Tales, no level of society is above mockery. Chaucer uses the quirks of the characters’ language – the ribald humor of the Cook, the solemn prose of the Parson, and the lofty notions of the Squire – to satirize their worldviews. The varied dialects, genres, and literary tropes also make the work a vivid record of the different ways Medieval audiences entertained themselves. For instance, the Knight’s tale of courtly love, chivalry, and destiny riffs on romance, while the tales of working-class narrators are generally comedies filled with scatological language, sexual deviance, and slapstick. This variation includes something for everyone, and that’s one reason why readers continue to delight in the work in both Middle English and translation. While the narrative runs to over 17,000 lines, it's apparently unfinished, as the prologue ambitiously introduces 29 pilgrims and promises four stories apiece, and the innkeeper never crowns a victor. It’s possible that Chaucer was so caught up in his sumptuous creations that he delayed picking a winner - or perhaps he was so fond of each character that he just couldn’t choose. Whatever the reason, this means that every reader is free to judge; the question of who wins is up to you.

**P620 2018-08-01 Everything you need to know to read “The Canterbury Tales” - Iseult G**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=620)

翻译人员: Yifan L 校对人员: Liu Qi一位发福的磨坊主, 勉强清醒地坐在他的马上，唠叨着一位坏脾气老木匠的 轻浮妻子和她的学者情人。为了获得独处的时间，这位学者和木匠的妻子 耍了各种花招,比如假装发疯，上演圣经中洪水的场景，和在公共场合赤身裸体。但是一位牧师 也垂涎这名妻子，并且每晚都来她家门外唱歌。当她忍无可忍时， 她试图吓走他，于是她把屁股伸出窗外让他亲吻，但是这并不管用。她的学者情人决定 用同样的姿势放屁，但是这次，牧师准备了 烧红的拔火棍。这故事听起来 像是个低俗笑话，但它其实是来自英国文学史上 最令人尊敬的作品之一：《坎特伯雷故事集》,它完美融合了高雅与低俗。这部作品包含了24个故事，每个故事都由乔叟笔下 生动的角色讲述。讲述者包括了 我们所熟悉的中世纪形象，比如骑士，牧师，和修女，还有少为人知的城镇长官，伙食管理员，和其他一些角色等。这些故事是用中古英语所写，和我们今天所讲的英语 看起来完全不同。它在12至15世纪期间使用，由古英语演变而来。主要是由于在1066年 诺曼人征服英格兰后，古英语与欧洲罗曼语族的 接触增多而导致的演变。大部分的中古英语字母 和现代英语很相似，包括一些古老的符号，比如yogh中这些符号， 分别代表了y，j,或是gh的发音。这些健谈的讲述者们第一次会面是在 在萨瑟克的塔巴德旅馆。他们来这里的目的相同：那就是去坎特伯雷朝圣， 拜访圣托马斯·贝克特的神庙。这位大主教是一位 在自己教堂里被谋杀的殉道者。好管闲事的旅馆主人， 为了探听这些人的私事，提议举办一场比赛：谁能讲出最棒的故事， 他就请谁吃晚餐。如果不是因为这次朝圣之旅，这之中的大多数人 都不会有交集。因为中世纪社会采用封建制度，神职和贵族， 与工人阶层是严格分开的，工人阶层由农民和奴隶组成。在乔叟生活的年代，商人和知识分子阶层也已经产生了。乔叟生在百年战争期间，一生任职政府官员，游历于意大利和法国， 还有他的祖国英格兰，这使得他的作品具有全景性。在《坎特伯雷故事集》中， 他讽刺所有社会阶层。乔叟利用人物语言的特点——厨子的粗鄙幽默，牧师的严肃乏味，还有乡绅的高尚信念，来嘲讽他们的世界观。乔叟作品中丰富的方言、 体裁和文学比喻生动地展现了中世纪读者们各种娱乐方式。比如，骑士所讲的宫廷爱情，骑士精神，和命运曲折的爱情故事。而工人阶层讲述者们的故事 大多是喜剧，充斥着粗俗语言，出轨的性趣，和滑稽的表演。这些故事的多样化 满足了不同的读者群体，这就是该作品中古英语 和翻译版都广受读者赞誉的原因。虽然乔叟的叙述超过一万七千行，但很明显这部作品没有完结。他在序章里曾野心勃勃地 介绍了29位朝圣者，并保证每人都有4个故事，不仅如此，旅馆主人 最终也没宣布比赛的赢家。也许，乔叟因过于沉浸于 他的创作盛宴才迟迟无法为这场比赛 选一个赢家，也许是因为他喜欢每一个角色，所以才难以抉择。不论是何原因，对读者而言意味着我们能自由决定心中的赢家。

**P621 2018-08-06 Why should you read 'One Hundred Years of Solitude' - Francisco Díez-**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=621)

One day in 1965, while driving to Acapulco for a vacation with his family, Colombian journalist Gabriel García Márquez abruptly turned his car around, asked his wife to take care of the family’s finances for the coming months, and returned home. The beginning of a new book had suddenly come to him: “Many years later, as he faced the firing squad, Colonel Aureliano Buendía was to remember that distant afternoon when his father took him to discover ice.” Over the next eighteen months, those words would blossom into One Hundred Years of Solitude. A novel that would go on to bring Latin American literature to the forefront of the global imagination, earning García Márquez the 1982 Nobel Prize for Literature. What makes One Hundred Years of Solitude so remarkable? The novel chronicles the fortunes and misfortunes of the Buendía family over seven generations. With its lush, detailed sentences, large cast of characters, and tangled narrative, One Hundred Years of Solitude is not an easy book to read. But it’s a deeply rewarding one, with an epic assortment of intense romances, civil war, political intrigue, globe-trotting adventurers, and more characters named Aureliano than you’d think possible. Yet this is no mere historical drama. One Hundred Years of Solitude is one of the most famous examples of a literary genre known as magical realism. Here, supernatural events or abilities are described in a realistic and matter-of-fact tone, while the real events of human life and history reveal themselves to be full of fantastical absurdity. Surreal phenomena within the fictional village of Macondo intertwine seamlessly with events taking place in the real country of Colombia. The settlement begins in a mythical state of isolation, but is gradually exposed to the outside world, facing multiple calamities along the way. As years pass, characters grow old and die, only to return as ghosts, or to be seemingly reincarnated in the next generation. When the American fruit company comes to town, so does a romantic mechanic who is always followed by yellow butterflies. A young woman up and floats away. Although the novel moves forward through subsequent generations, time moves in an almost cyclical manner. Many characters have similar names and features to their forebears, whose mistakes they often repeat. Strange prophecies and visits from mysterious gypsies give way to the skirmishes and firing squads of repeated civil wars. An American fruit company opens a plantation near the village and ends up massacring thousands of striking workers, mirroring the real-life ‘Banana Massacre’ of 1928. Combined with the novel’s magical realism, this produces a sense of history as a downward spiral the characters seem powerless to escape. Beneath the magic is a story about the pattern of Colombian and Latin American history from colonial times onward. This is a history that the author experienced firsthand. Gabriel García Márquez grew up in a Colombia torn apart by civil conflict between its Conservative and Liberal political parties. He also lived in an autocratic Mexico and covered the 1958 Venezuelan coup d’état as a journalist. But perhaps his biggest influences were his maternal grandparents. Nicolás Ricardo Márquez was a decorated veteran of the Thousand Days War whose accounts of the rebellion against Colombia's conservative government led Gabriel García Márquez to a socialist outlook. Meanwhile, Doña Tranquilina Iguarán Cotes’ omnipresent superstition became the foundation of One Hundred Years of Solitude’s style. Their small house in Aracataca where the author spent his childhood formed the main inspiration for Macondo. With One Hundred Years of Solitude, Gabriel García Márquez found a unique way to capture the unique history of Latin America. He was able to depict the strange reality of living in a post-colonial society, forced to relive the tragedies of the past. In spite of all this fatalism, the novel still holds hope. At his Nobel Lecture, García Marquez reflected on Latin America’s long history of civil strife and rampant iniquity. Yet he ended the speech by affirming the possibility of building a better world, to quote, “where no one will be able to decide for others how they die, where love will prove true and happiness be possible, and where the races condemned to one hundred years of solitude will have, at last and forever, a second chance on earth."

**P621 2018-08-06 Why should you read 'One Hundred Years of Solitude' - Francisco Díez-**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=621)

翻译人员: Joanna Liu 校对人员: Cissy Yun在1965年的一天， 当和家人开车去阿卡普尔科旅行时，哥伦比亚记者加夫列尔·加西亚·马尔克斯 突然掉转车头让他的妻子打理好家里下几个月的资金，然后回家了。这是因为他突然想到了 一本新书的开头：“许多年以后，面对行刑队，奥雷良诺·布恩地亚上校将会回想起他父亲带他去见识冰块的 那个遥远的下午。”在接下来的18个月里这些文字开花结果成为了《百年孤独》。这部小说将会推动拉丁美洲文学进入全球性的想象力的最前沿。加西亚·马尔克斯也因此获得了 1982年诺贝尔文学奖。是什么让《百年孤独》如此卓越？这部小说记录了布恩地亚一家 超过七代的盛衰，凭借其丰富细节的语句、庞大的人物网络、以及复杂的叙事，《百年孤独》并不是一本容易读的书。但是这是一个非常有益的书，书中有各种激情的爱情故事、内战、政治阴谋、环球冒险，还有一大堆叫做奥雷良诺的角色， 多到你无法想象。然而，它不仅仅是历史剧，《百年孤独》是魔幻现实主义 这一文学体裁最著名的例子。在这里，超自然事物或能力以现实和实事求是的语气被描述，人类生活和历史的真实事件则充满了各种奇幻的荒诞。虚构的马孔多村庄内的超现实现象与在哥伦比亚的真实发生的事件 无缝地交织在一起。这块殖民地一开始处于 神秘的孤立状态，逐渐暴露于外界，面临多重灾难。时间流逝，角色们也老去死去，并以鬼魂的形式回来，或者转世到下一代。当美国水果公司来到镇上时，一个浪漫的机械师也来了 他一直被黄色的蝴蝶包围着。一个年轻的女子漂浮着离开了村庄。虽然小说中的人物一代代向前发展，时间的移动却几乎是循环的许多角色的名字和特征与 他们的祖先相似，也总是重复祖先曾犯的错误。奇怪的预言和神秘的吉普赛人的来访导致了一场场小冲突和 行刑队中的再一次内战。一家美国水果公司 在村庄附近开了一家种植园并最终屠杀成千上万的罢工工人，这映射了现实生活中 1928年的“香蕉大屠杀”。结合小说的魔幻现实主义，书中的历史感像是 一种恶性的循环，人物角色都似乎无力逃脱。魔法背后是关于哥伦比亚的生活模式以及从殖民时代开始的拉丁美洲历史。这是作者亲身经历的历史。加夫列尔·加西亚·马尔克斯长大于哥伦比亚因在保守党和自由党 之间的内战四分五裂。他也在独裁统治的墨西哥生活过，并作为一名记者报道了 1958年的委内瑞拉政变。但也许给他最大影响的 应该是他的外祖父母。尼古拉斯·里卡多·马尔克斯 是千日战争的授勋老兵。他对哥伦比亚保守党政府的反坑使加夫列尔·加西亚·马尔克斯 持有社会主义观点。而外婆朵妮雅·特朗齐丽娜·伊挂朗 无所不在的迷信也成为了《百年孤独》风格的基础。作者童年居住在阿拉卡塔卡小房子，成为了书中马孔多小镇的主要灵感。通过《百年孤独》，加夫列尔·加西亚·马尔克斯 找到了一个独一无二的方法捕捉了拉丁美洲独一无二的历史。他能够描绘生活在 后殖民社会中的奇怪现实，被迫重温过去的悲剧。尽管存在这种宿命论， 但这部小说仍存希望。在他的诺贝尔文学奖 获奖演说中，加西亚·马尔克斯反思了 拉丁美洲的漫长历史，包括内乱和猖獗的罪孽。但在结束演讲时， 他肯定了建立更好世界的可能性。他说到：“到那时，谁的命运也不能 由别人来决定，包括死亡的方式，到那时，爱千真万确存在，幸福将成为可能，那些命中注定处于百年孤独的家族，也终于永远地享有了 在大地上重生的机会。”

**P623 2018-08-10 What is the universe expanding into - Sajan Saini**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=623)

The universe began its cosmic life in a big bang nearly fourteen billion years ago, and has been expanding ever since. But what is it expanding into? That's a complicated question. Here's why: Einstein's equations of general relativity describe space and time as a kind of inter-connected fabric for the universe. This means that what we know of as space and time exist only as part of the universe and not beyond it. Now, when everyday objects expand, they move out into more space. But if there is no such thing as space to expand into, what does expanding even mean? In 1929 Edwin Hubble's astronomy observations gave us a definitive answer. His survey of the night sky found all faraway galaxies recede, or move away, from the Earth. Moreover, the further the galaxy, the faster it recedes. How can we interpret this? Consider a loaf of raisin bread rising in the oven. The batter rises by the same amount in between each and every raisin. If we think of raisins as a stand-in for galaxies, and batter as the space between them, we can imagine that the stretching or expansion of intergalactic space will make the galaxies recede from each other, and for any galaxy, its faraway neighbors will recede a larger distance than the nearby ones in the same amount of time. Sure enough, the equations of general relativity predict a cosmic tug-of-war between gravity and expansion. It's only in the dark void between galaxies where expansion wins out, and space stretches. So there's our answer. The universe is expanding unto itself. That said, cosmologists are pushing the limits of mathematical models to speculate on what, if anything, exists beyond our spacetime. These aren't wild guesses, but hypotheses that tackle kinks in the scientific theory of the Big Bang. The Big Bang predicts matter to be distributed evenly across the universe, as a sparse gas --but then, how did galaxies and stars come to be? The inflationary model describes a brief era of incredibly rapid expansion that relates quantum fluctuations in the energy of the early universe, to the formation of clumps of gas that eventually led to galaxies. If we accept this paradigm, it may also imply our universe represents one region in a greater cosmic reality that undergoes endless, eternal inflation. We know nothing of this speculative inflating reality, save for the mathematical prediction that its endless expansion may be driven by an unstable quantum energy state. In many local regions, however, the energy may settle by random chance into a stable state, stopping inflation and forming bubble universes. Each bubble universe —ours being one of them —would be described by its own Big Bang and laws of physics. Our universe would be part of a greater multiverse, in which the fantastic rate of eternal inflation makes it impossible for us to encounter a neighbor universe. The Big Bang also predicts that in the early, hot universe, our fundamental forces may unify into one super-force. Mathematical string theories suggest descriptions of this unification, in addition to a fundamental structure for sub-atomic quarks and electrons. In these proposed models, vibrating strings are the building blocks of the universe. Competing models for strings have now been consolidated into a unified description, and suggest these structures may interact with massive, higher dimensional surfaces called branes. Our universe may be contained within one such brane, floating in an unknown higher dimensional place, playfully named “the bulk,” or hyperspace. Other branes—containing other types of universes—may co-exist in hyperspace, and neighboring branes may even share certain fundamental forces like gravity. Both eternal inflation and branes describe a multiverse, but while universes in eternal inflation are isolated, brane universes could bump into each other. An echo of such a collision may appear in the cosmic microwave background —a soup of radiation throughout our universe, that’s a relic from an early Big Bang era. So far, though, we’ve found no such cosmic echo. Some suspect these differing multiverse hypotheses may eventually coalesce into a common description, or be replaced by something else. As it stands now, they’re speculative explorations of mathematical models. While these models are inspired and guided by many scientific experiments, there are very few objective experiments to directly test them, yet. Until the next Edwin Hubble comes along, scientists will likely be left to argue about the elegance of their competing models… and continue to dream about what, if anything, lies beyond our universe.

**P623 2018-08-10 What is the universe expanding into - Sajan Saini**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=623)

翻译人员: Christina Wang 校对人员: Lipeng Chen宇宙的生命从大爆炸开始，将近140亿年前，一直膨胀扩大至今日。但它是在膨胀成为什么呢？这是一个复杂的问题。以下是原因：爱因斯坦的广义相对论方程把空间和时间描述为一种相互连结的宇宙的构造。这意味着我们所知道的空间和时间只作为宇宙的一部分而存在， 并不存在于宇宙之外。当日常生活中的物体膨胀，它们会占据更多空间。但如果并不存在额外的空间去膨胀，那膨胀到底意味什么？1929年， 爱德文·哈勃的天文观测给了我们明确的答案。他对夜空的调查发现了所有遥远的星系会朝着远离地球的方向移动。此外，越遥远的星系， 后退移动的就越快。这该怎么理解？想象一块葡萄干面包在烤箱中膨胀。每颗葡萄干之间的面糊 膨胀的量是相同的。如果我们想象葡萄干是星系，面糊是它们之间的空间我们可以想象星际空间的拉伸或膨胀会让星系远离彼此。而且对于任何一个星系， 它远处的邻居会比更近的邻居移动更长的距离，在相同时长里。果不其然，广义相对论的公式预测会有一场重力和扩张的较量。只有在星系之间黑暗空虚的空间中 扩张才会胜出，于是这些空间会膨胀。这就是我们的答案。宇宙正在扩张到自己上。即便如此，宇宙学家正在探索 数学模型的极限来推测什么（如果有的话） 存在于我们的时空之外。这不是胡猜乱想，而是科学假设针对宇宙大爆炸科学理论的漏洞。大爆炸理论预测物质会 均匀的分布在宇宙中，以一种稀薄的气体存在—— 那么，星系和星体是怎么形成的呢？暴胀理论描述了一段短暂的快速扩张的时期把早期宇宙中能量的量子波动联系到了气体团的形成， 最终形成星系。如果我们接受这个理论， 它也可能意味我们的宇宙代表了一个永远在膨胀的 更大的宇宙现实中的一个区域。关于这个推测的在膨胀的现实， 我们什么也不了解，除了数学上预测了 这无尽的膨胀可能是由一种 不稳定的量子能级所导致。不过，在很多局部的区域中， 这种能量可能会随机的安定下来进入稳定的状态，停止膨胀 并形成多个泡泡宇宙。每一个泡泡宇宙—— 我们的宇宙也是其中一个——会有自己的大爆炸和物理定律。我们的宇宙会是一个 更大的多重宇宙的一部分，它极速的膨胀使得我们不可能与其他宇宙相遇。大爆炸理论还预测了 在高温的早期宇宙中，我们的4种基本力可能统一成一股超级力。数学的弦理论 描述了这个统一的过程，还有亚原子的夸克和电子的基本结构。在这些被提出的模型中，振动的弦 是组成宇宙的基本单元。曾经相互竞争的弦理论模型 现在已经巩固成了一个统一的描述，并指出这些结构可能与 叫做膜的高维度平面相互影响。我们的宇宙可能存在于 一个这样的膜之中，漂浮在一个未知的高纬度空间， 叫做 “体宇宙”，或超空间。其他膜——包含其他类别的宇宙 ——可能会共同存在于超空间，相邻的膜甚至可能会 共有一些基本力，比如重力。永恒膨胀和膜 都描述了一个多重宇宙，但永恒膨胀中的宇宙是孤立的， 而膜宇宙可能会相撞。这样的碰撞产生的回声 会出现在宇宙微波背景辐射——早期大爆炸遗留下来的 遍及我们宇宙的辐射。不过，至今为止， 我们没有找到这样的宇宙回声。有些人怀疑这些不同的多重宇宙假设 可能最终会聚合成一个共同的描述，或者被其他理论所替代。目前来说，它们仅是对数学模型的 推测性的探索。虽然很多科学实验 启发或引导了这些模型，目前只有很少的客观实验 可以直接测试这些模型。在下一个爱德文·哈勃到来之前，科学家们很可能会继续争论 相互竞争的模型的美妙简洁性……并继续梦想着，什么（如果有的话） 存在于我们的宇宙之外。

**P624 2018-08-13 Can you solve the rebel supplies riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=624)

You’re overseeing the delivery of crucial supplies to a rebel base deep in the heart of enemy territory. To get past Imperial customs, all packages must follow a strict protocol: if a box is marked with an even number on the bottom, it must be sealed with a red top. The boxes are already being loaded onto the transport when you receive an urgent message. One of the four boxes was sealed incorrectly, but they lost track of which one. All the boxes are still on the conveyor belt. Two are facing down: one marked with a four, and one with a seven. The other two are facing up: one with a black top, another with a red one. You know that any violation of the protocol will get the entire shipment confiscated and put your allies in grave danger. But any boxes you pull off for inspection won’t make it onto this delivery run, depriving the rebels of critically needed supplies. The transport leaves in a few moments, with or without its cargo. Which box or boxes should you grab off the conveyor belt? Pause the video now if you want to figure it out for yourself! Answer in: 3 Answer in: 2 Answer in: 1 It may seem like you need to inspect all four boxes to see what’s on the other side of each. But in fact, only two of them matter. Let’s look at the protocol again. All it says is that even-numbered boxes must have a red top. It doesn’t say anything about odd-numbered boxes, so we can just ignore the box marked with a seven. What about the box with a red top? Don’t we need to check that the number on the bottom is even? As it turns out, we don’t. The protocol says that if a box has an even number, then it should have a red top. It doesn’t say that only boxes with even numbers can have red tops, or that a box with a red top must have an even number. The requirement only goes in one direction. So we don’t need to check the box with the red lid. We do, however, need to check the one with the black lid, to make sure it wasn’t incorrectly placed on an even-numbered box. If you initially assumed the rules imply a symmetrical match between the number on the box and the type of lid, you’re not alone. That error is so common, we even have a name for it: affirming the consequent, or the fallacy of the converse. This fallacy wrongly assumes that just because a certain condition is necessary for a given result, it must also be sufficient for it. For instance, having an atmosphere is a necessary condition for being a habitable planet. But this doesn’t mean that it’s a sufficient condition – planets like Venus have atmospheres but lack other criteria for habitability. If that still seems hard to wrap your head around, let’s look at a slightly different problem. Imagine the boxes contain groceries. You see one marked for shipment to a steakhouse and one to a vegetarian restaurant. Then you see two more boxes turned upside down: one labeled as containing meat, and another as containing onions. Which ones do you need to check? Well, it’s easy – make sure the meat isn’t being shipped to the vegetarian restaurant, and that the box going there doesn’t contain meat. The onions can go to either place, and the box bound for the steakhouse can contain either product. Why does this scenario seem easier? Formally, it’s the same problem – two possible conditions for the top of the box, and two for the bottom. But in this case, they’re based on familiar real-world needs, and we easily understand that while vegetarians only eat vegetables, they’re not the only ones who do so. In the original problem, the rules seemed more arbitrary, and when they’re abstracted that way, the logical connections become harder to see. In your case, you’ve managed to get enough supplies through to enable the resistance to fight another day. And you did it by thinking outside the box – both sides of it.

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翻译人员: Christina Wang 校对人员: Lipeng Chen你正在监管关键物资 到反叛基地的运送，基地位于敌军营地的深处。若要通过帝国海关，所有包裹 必须严格遵循一条规定：如果一个箱子的底部标有一个偶数，那么它的顶部必须是红色的封口。正当箱子在被放到运输工具上时，你收到了一条紧急消息。四个箱子中的一个 封装是不正确的，但他们不知道是哪一个。所有的箱子都还在传送带上。两个是朝下放的：一个标着 4，一个标着 7.另外两个是朝上放置的：一个的顶部是黑色的，另一个是红色的。你知道任何规定违反会导致整皮货物被没收， 让盟友陷入危险。但任何你拿下来检查的箱子 就赶不上这次运输了，致使反叛军无法得到急需的物资。运输工具马上就要离开了， 无论是否有货物。那你应该从传送带取下来 哪个或哪几个箱子？如果你想自己搞清答案 就在这里暂停视频！答案即将公布：3答案即将公布：2答案即将公布：1你可能觉得你需要拿走全部4个箱子以检查另外一面的内容。但其实，你只需要看两个箱子。让我们回顾一下规定。它只说了偶数箱子 必须要有红色封顶。它并没有对奇数箱子 做出任何规定，所以我们可以忽略 标着 7 的那个箱子。那么，那个红箱子呢？我们难道不需要检查 它的底部是偶数吗？事实证明，确实不需要。规定说的是如果一个箱子标着偶数，那么它的封顶应该为红色。它并没有规定 只有偶数箱子可以有红色封顶，或者一个红色封顶的箱子 必须有偶数标记。规定只要求了单方向的。所以我们不需要检查 红色封顶的那个箱子。不过我们确实需要检查 黑色封顶的箱子来确保没有不小心把黑色封顶 放到了偶数箱子上。如果你一开始假定了 规定意味着箱子上的数字和封顶颜色 是一个对称的对应关系，你不是一个人这个错误常见到 我们甚至有一个名词来形容它：肯定后件或逆命题谬误。这种谬误错误的假设了只因为一个条件 是一个后果的必要条件那它一定是充分的。举例来说，大气层是一个可居住的星球的必要条件。但这不意味着它是一个充分条件——水星或其它星球也有大气层， 但是缺少其它居住的条件。如果这还是有点难理解，让我们看一个不太一样的问题。想象一些装着杂货的袋子。你看到一个标着运往牛排店还有一个运往素食餐厅。然后你看到另外两个反着放的箱子：一个标着含有肉，另一个标着含有洋葱。你需要检查哪个呢？这很容易——确保肉不会被运到素食餐厅，以及运到素食餐厅的箱子里没有肉。洋葱去哪里都可以，而运往牛排店的箱子 可以含有任意一种食材。为什么这个情况感觉更容易？本质上，它是同一个问题——箱子上面有两种可能底下也有两种。但这个问题是基于 我们现实生活中熟悉的需求所以我们很容易可以理解 虽然素食主义者只吃蔬菜，但是他们不是唯一吃蔬菜的人。在原来的问题中， 规定看起来更随便一些，而当它们被抽象成这样时，就更难看出隐含的逻辑关系。在你的情况中，你成功的 让足量的物资运送过去以支撑反叛军继续战斗。而你能解决这个问题，就是因为 你的思考“跳出了箱子”——它的两面。

**P625 2018-08-17 Is fire a solid, a liquid, or a gas - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=625)

Sitting around a campfire, you can feel its heat, smell the woody smoke, and hear it crackle. If you get too close, it burns your eyes and stings your nostrils. You could stare at the bright flames forever as they twist and flicker in endless incarnations. But what exactly are you looking at? The flames are obviously not solid, nor are they liquid. Mingling with the air, they’re more like a gas, but more visible--and more fleeting. And on a scientific level, fire differs from gas because gases can exist in the same state indefinitely while fires always burn out eventually. One misconception is that fire is a plasma, the fourth state of matter in which atoms are stripped of their electrons. Like fire and unlike the other kinds of matter, plasmas don’t exist in a stable state on earth. They only form when gas is exposed to an electric field or superheated to temperatures of thousands or tens of thousands of degrees. By contrast, fuels like wood and paper burn at a few hundred degrees —far below the threshold of what's usually considered a plasma. So if fire isn’t a solid, liquid, gas, or a plasma, what does that leave? It turns out fire isn’t actually matter at all. Instead, it’s our sensory experience of a chemical reaction called combustion. In a way, fire is like the leaves changing color in fall, the smell of fruit as it ripens, or a firefly’s blinking light. All of these are sensory clues that a chemical reaction is taking place. What differs about fire is that it engages a lot of our senses at the same time, creating the kind of vivid experience we expect to come from a physical thing. Combustion creates that sensory experience using fuel, heat, and oxygen. In a campfire, when the logs are heated to their ignition temperature, the walls of their cells decompose, releasing sugars and other molecules into the air. These molecules then react with airborne oxygen to create carbon dioxide and water. At the same time, any trapped water in the logs vaporizes, expands, ruptures the wood around it, and escapes with a satisfying crackle. As the fire heats up, the carbon dioxide and water vapor created by combustion expand. Now that they’re less dense, they rise in a thinning column. Gravity causes this expansion and rising, which gives flames their characteristic taper. Without gravity, molecules don’t separate by density and the flames have a totally different shape. We can see all of this because combustion also generates light. Molecules emit light when heated, and the color of the light depends on the temperature of the molecules. The hottest flames are white or blue. The type of molecules in a fire can also influence flame color. For instance, any unreacted carbon atoms from the logs form little clumps of soot that rise into the flames and emit the yellow-orange light we associate with a campfire. Substances like copper, calcium chloride, and potassium chloride can add their own characteristic hues to the mix. Besides colorful flames, fire also continues to generate heat as it burns. This heat sustains the flames by keeping the fuel at or above ignition temperature. Eventually, though, even the hottest fires run out of fuel or oxygen. Then, those twisting flames give a final hiss and disappear with a wisp of smoke as if they were never there at all.

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翻译人员: Yifan L 校对人员: janice zhu坐在篝火旁， 你能感受到它的热度，闻到木头冒烟的味道， 还能听到它劈啪作响。要是离得太近，火会烧到你的眼睛， 熏疼你的鼻子。你毫不厌倦的盯着这明亮的火焰，看它闪烁摇曳， 不断变换身姿。但是， 你在看的到底是什么？火焰显然不是固体，也不是液体。当与空气混合， 它们更像一种气体，但更显眼—也更短暂。从科学的角度来说， 火不同于气体，因为气体能以一种恒定的状态存在，而火最终总会熄灭。有一种错误认识， 认为火是一种等离子体，后者是原子被剥夺电子后产生的第四种物质形态。与其他物质形态不一样， 等离子体更像火，它们不是以一种稳定的状态 存在于地球上。它们只在气体暴露于电场，或者被过度加热到 成千上万度时才会产生。相比之下， 类似木柴和纸张之类的燃料几百度时就能燃烧—远低于通常认为的 等离子体存在的临界温度。如果火不是固体、液体、气体，也不是等离子体， 那它到底是什么呢？事实上， 火都称不上是一种物质。相反，它是我们对一种 名为燃烧的化学反应所产生的感官体验。某种程度上， 火就像叶子在秋天的颜色变化、果实成熟时散发的气息，或是萤火虫发出的亮光。这些都是感官上的提示，表明一种化学反应正在发生。火的不同之处在于它同时调动人体的多项感官，创造出一种我们希望从实体中获得的 生动的体验。燃烧能创造那样的感官体验，只需要燃料、温度、氧气。当篝火中的木材被加热到燃点，其内部的细胞壁分解开来，向空气中释放糖类和其他分子。这些分子随后与空气中的氧气反应，生成二氧化碳和水。同时， 被困在木材中的水分蒸发、扩散、 撑破周围的木质，最终伴着满意的噼啪声逃脱。随着火温度升高，燃烧所产生的 二氧化碳和水开始扩散。现在它们没那么拥挤， 它们从一条细长的圆柱体中上升。重力导致了这种扩散和上升，形成了特有的锥形火焰。如果没有重力， 分子就不会因密度不同而分离，火焰也会是全然不同的形状。我们能观察到这些，是因为燃烧也会产生光。分子被加热时会发光，而光的颜色取决于分子的温度。温度最高的火焰是白色或蓝色的。火中分子的种类也会影响火焰颜色。例如， 木料中未发生反应的碳原子会生成小簇煤烟，从火焰中蹿升，发出我们在篝火中常看到的 橙黄色光芒。而像铜、氯化钙、氯化钾一类的化学物质，能把它们特有的颜色混合进去。除了多彩的火焰，火还会在燃烧中持续产生热量。这种热量能将燃料温度 保持在燃点以上,从而维持火焰不灭。然而，即使是温度最高的烈火，最终也会耗尽燃料或者氧气。接着，这些摇曳的火焰 发出最后的咝咝声，消失在一缕轻烟中，仿佛它们从没来过。

**P626 2018-08-21 Does stress affect your memory - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=626)

You spend weeks studying for an important test. On the big day, you wait nervously as your teacher hands it out. You’re working your way through, when you’re asked to define ‘ataraxia.’ You know you’ve seen it before, but your mind goes blank. What just happened? The answer lies in the complex relationship between stress and memory. There are many types and degrees of stress and different kinds of memory, but we’re going to focus on how short-term stress impacts your memory for facts. To start, it helps to understand how this kind of memory works. Facts you read, hear, or study become memories through a process with three main steps. First comes acquisition: the moment you encounter a new piece of information. Each sensory experience activates a unique set of brain areas. In order to become lasting memories, these sensory experiences have to be consolidated by the hippocampus, influenced by the amygdala, which emphasizes experiences associated with strong emotions. The hippocampus then encodes memories, probably by strengthening the synaptic connections stimulated during the original sensory experience. Once a memory has been encoded, it can be remembered, or retrieved, later. Memories are stored all over the brain, and it’s likely the prefrontal cortex that signals for their retrieval. So how does stress affect each of these stages? In the first two stages, moderate stress can actually help experiences enter your memory. Your brain responds to stressful stimuli by releasing hormones known as corticosteroids, which activate a process of threat-detection and threat-response in the amygdala. The amygdala prompts your hippocampus to consolidate the stress-inducing experience into a memory. Meanwhile, the flood of corticosteroids from stress stimulates your hippocampus, also prompting memory consolidation. But even though some stress can be helpful, extreme and chronic stress can have the opposite effect. Researchers have tested this by injecting rats directly with stress hormones. As they gradually increased the dose of corticosteroids, the rats’ performance on memory tests increased at first, but dropped off at higher doses. In humans, we see a similar positive effect with moderate stress. But that only appears when the stress is related to the memory task— so while time pressure might help you memorize a list, having a friend scare you will not. And the weeks, months, or even years of sustained corticosteroids that result from chronic stress can damage the hippocampus and decrease your ability to form new memories. It would be nice if some stress also helped us remember facts, but unfortunately, the opposite is true. The act of remembering relies on the prefrontal cortex, which governs thought, attention, and reasoning. When corticosteroids stimulate the amygdala, the amygdala inhibits, or lessens the activity of, the prefrontal cortex. The reason for this inhibition is so the fight/flight/freeze response can overrule slower, more reasoned thought in a dangerous situation. But that can also have the unfortunate effect of making your mind go blank during a test. And then the act of trying to remember can itself be a stressor, leading to a vicious cycle of more corticosteroid release and an even smaller chance of remembering. So what can you do to turn stress to your advantage and stay calm and collected when it matters the most? First, if you know a stressful situation like a test is coming, try preparing in conditions similar to the stressful environment. Novelty can be a stressor. Completing practice questions under time pressure, or seated at a desk rather than on a couch, can make your stress response to these circumstances less sensitive during the test itself. Exercise is another useful tool. Increasing your heart and breathing rate is linked to chemical changes in your brain that help reduce anxiety and increase your sense of well-being. Regular exercise is also widely thought to improve sleeping patterns, which comes in handy the night before a test. And on the actual test day, try taking deep breaths to counteract your body’s flight/fight/freeze response. Deep breathing exercises have shown measurable reduction in test anxiety in groups ranging from third graders to nursing students. So the next time you find your mind going blank at a critical moment, take a few deep breaths until you remember ataraxia: a state of calmness, free from anxiety.

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翻译人员: Riley WANG 校对人员: Lipeng Chen你花了好几周时间 准备一场重要的考试。考试当天， 你紧张地等待老师分发试题。你努力作答， 看到一道题目要求解释“ataraxia”。你记得自己曾见过这个词， 但是大脑却一片空白。这是怎么回事？答案在于压力与记忆之间存在复杂的联系。压力的类型和程度多种多样。记忆也是如此，但我们将集中探讨短期压力如何影响内容记忆。首先，我们先来理解 这类记忆是如何工作的。你读到、听到或学到的事实会经过三个主要步骤成为记忆。首先是信息获取，即获得新的信息。每种感官体验都会 激活大脑特定的区域，为了形成长期记忆，这些感官体验会经海马体进行增强，并受到杏仁核的影响。杏仁核能够强化 带有强烈情感的经验。在这之后， 海马体对记忆进行编码方法可能是通过加强感官体验发生时建立的突触连接。一旦记忆被编码，它能够在之后被记住和提取。记忆存储区遍布大脑，很可能是由前额叶 负责发出提取记忆的信号。那么压力是如何 影响这个过程的呢？在前两个阶段，适度的压力实际上 可以帮助感官体验进入记忆。你的大脑会对压力刺激做出反应，释放出皮质类固醇激素，这会激活杏仁核中的威胁感知和威胁应对程序。杏仁核会促使海马体加强压力引发的经验进入记忆。同时压力导致 皮质类固醇大量分泌，进一步刺激海马体，有助于记忆巩固。即便有些压力是有用的，压力过大或长期压力 都会适得其反。研究者向老鼠 直接注射压力激素进行了实验。随着皮质类固醇的剂量不断增加，老鼠在记忆方面的表现先是增高，之后便随剂量继续增加而下降。对于人类而言，适度压力起到了 相似的积极作用。但是这只表现在 与记忆相关的压力上，因此时间压力 虽然能帮你提高记忆，但来自朋友的惊吓 则没有这种效果。慢性压力会带来的 长达数周、数月甚至数年的皮质类固醇的持续分泌，会对海马体造成伤害，并且削弱形成新记忆的能力。如果压力能帮助记忆就好了，遗憾的是，事实恰恰相反。记忆行为依赖前额叶，它控制着思考，注意力 和推理能力。当皮质类固醇刺激杏仁核，杏仁核会抑制或是减少 前额叶的活动。杏仁核会抑制或是减少 前额叶的活动。原因在于：在危险环境下， 逃跑/战斗的应激反应优于速度更慢， 需要推理的思考过程。但这也带来了不好的影响，它会让你的大脑 在考试时一片空白。尝试回忆会进一步产生压力，从而导致分泌更多皮质类固醇， 形成恶性循环，这让想起答案的几率变得更小。那么该如何让压力为你所用？如何在最重要的时刻 保持镇定和冷静？首先，如果你了解压力情境， 例如即将到来的考试，你可以模拟相似的压力环境 做好准备，因为新鲜体验可能是一项压力来源。在时间限制下完成练习题目，或是坐在桌旁学习而不是沙发上都可以让你在考试时对这些压力的敏感性降低。体育锻炼也很有用。提高心跳和呼吸频率会改变大脑中的化学物质，这能帮助你减少焦虑， 提高幸福感。规律的锻炼 也被广泛认为能改善睡眠，好的睡眠在考前一晚非常重要。到了考试当天，试着做深呼吸 来平衡身体的应激反应。一项实验证实深呼吸能有效减少考试焦虑，实验对象从三年级学生 到护理专业学生所以在下一次重要时刻 大脑一片空白时，做几次深呼吸 直到你想起来ataraxia是什么意思——一种平静的，没有焦虑情绪的状态。

**P627 2018-08-21 What is imposter syndrome and how can you combat it - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=627)

Even after writing eleven books and winning several prestigious awards, Maya Angelou couldn’t escape the nagging doubt that she hadn’t really earned her accomplishments. Albert Einstein experienced something similar: he described himself as an “involuntary swindler” whose work didn’t deserve as much attention as it had received. Accomplishments at the level of Angelou’s or Einstein’s are rare, but their feeling of fraudulence is extremely common. Why can’t so many of us shake feelings that we haven’t earned our accomplishments, or that our ideas and skills aren’t worthy of others’ attention? Psychologist Pauline Rose Clance was the first to study this unwarranted sense of insecurity. In her work as a therapist, she noticed many of her undergraduate patients shared a concern: though they had high grades, they didn’t believe they deserved their spots at the university. Some even believed their acceptance had been an admissions error. While Clance knew these fears were unfounded, she could also remember feeling the exact same way in graduate school. She and her patients experienced something that goes by a number of names-- imposter phenomenon, imposter experience, and imposter syndrome. Together with colleague Suzanne Imes, Clance first studied imposterism in female college students and faculty. Their work established pervasive feelings of fraudulence in this group. Since that first study, the same thing has been established across gender, race, age, and a huge range of occupations, though it may be more prevalent and disproportionately affect the experiences of underrepresented or disadvantaged groups. To call it a syndrome is to downplay how universal it is. It's not a disease or an abnormality, and it isn’t necessarily tied to depression, anxiety, or self-esteem. Where do these feelings of fraudulence come from? People who are highly skilled or accomplished tend to think others are just as skilled. This can spiral into feelings that they don’t deserve accolades and opportunities over other people. And as Angelou and Einstein experienced, there’s often no threshold of accomplishment that puts these feelings to rest. Feelings of imposterism aren’t restricted to highly skilled individuals, either. Everyone is susceptible to a phenomenon known as pluralistic ignorance, where we each doubt ourselves privately, but believe we’re alone in thinking that way because no one else voices their doubts. Since it’s tough to really know how hard our peers work, how difficult they find certain tasks, or how much they doubt themselves, there’s no easy way to dismiss feelings that we’re less capable than the people around us. Intense feelings of imposterism can prevent people from sharing their great ideas or applying for jobs and programs where they’d excel. At least so far, the most surefire way to combat imposter syndrome is to talk about it. Many people suffering from imposter syndrome are afraid that if they ask about their performance, their fears will be confirmed. And even when they receive positive feedback, it often fails to ease feelings of fraudulence. But on the other hand, hearing that an advisor or mentor has experienced feelings of imposterism can help relieve those feelings. The same goes for peers. Even simply finding out there’s a term for these feelings can be an incredible relief. Once you’re aware of the phenomenon, you can combat your own imposter syndrome by collecting and revisiting positive feedback. One scientist who kept blaming herself for problems in her lab started to document the causes every time something went wrong. Eventually, she realized most of the problems came from equipment failure, and came to recognize her own competence. We may never be able to banish these feelings entirely, but we can have open conversations about academic or professional challenges. With increasing awareness of how common these experiences are, perhaps we can feel freer to be frank about our feelings and build confidence in some simple truths: you have talent, you are capable, and you belong.

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翻译人员: Riley WANG 校对人员: Zitong Wang即便写出了11本书， 获得了数个著名奖项，马娅·安杰卢仍被疑虑困扰。面对这些成就， 她当之有愧。爱因斯坦也有相似经历：他把自己成为“无意的骗子”，认为自己的工作 不值得获得如此多的关注。少有人能像安杰卢和爱因斯坦一样 取得如此高的成就，但是认为自己欺骗了别人 的感受却相当普遍。为什么有如此多的人认为自己配不上取得的成就，或是觉得自己的想法和技能 并不值得他人关注。心理学家保琳·萝丝·克兰斯率先开始研究这种 没头绪的不安感。在做心理咨询师期间，她发现许多大学生咨询者 都有这样的担心：即便他们都取得很高的分数，但他们认为自己达不到 这所大学的录取资格。有些人甚至认为接受自己入学 是招生管理的失误。虽然克兰斯知道 这些担忧都是毫无根据的，但她记得自己在深造时 也有同样的感受。她和她的父母都经历过这种冒名顶替现象，或冒名顶替经历，以及冒名顶替综合征。克兰斯与同事苏珊·因墨斯一起首先对女性大学生和教职员的 冒名顶替现象进行了研究。研究发现这部分人群中 广泛存在欺骗他人心理。自第一项研究以来，同样的研究也在跨性别、种族、年龄、和跨职业领域进行。但在弱势群体和贫穷人群中这种症状更为普遍，也影响更大。若要将其称为一种综合征， 则需要淡化其广泛性。它并非一种疾病或是异常特征，它也未必与抑郁、焦虑、或自尊有关。这种欺骗他人的感觉 来自于何处？能力杰出或成就非凡的人倾向于认为他人 与自己拥有同样的技能水平。这会进一步让他们认为自己不应得到 其他人所没有的荣誉与机会。安杰卢和爱因斯坦都有此经历，说明即便成就再高也无法使这种感觉停止。并非只有能力杰出者才有此感受。每个人都会受到 名为“多数无知”现象的影响，即人们私下怀疑自己的能力，但因为没有人会说出这种疑虑，所以会认为只有自己有这样的想法。由于不知道其他人有多努力，也不清楚他们觉得某些任务难以完成，或是他们有多么质疑自己，因此，并没有简单的方法能够消除这种我不如人的感觉。严重的冒名顶替感受会妨碍人们分享自己的好主意，或让他们不敢申请 自己擅长的工作和项目。至少在目前，对抗冒名顶替综合征 最保险的方法就是将它说出来。许多受到冒名顶替综合征的人担心一旦询问他人自己表现如何，就会证实他们的担忧。即便他们得到积极反馈，通常也无法消除欺骗感觉。但另一方面，听到提供意见的人或导师 也曾经历这种情绪有助于缓解冒名顶替感受。对于同龄人来说也是如此。发现其他人都有这种感受可以是一种有效的缓解。一旦意识到这个现象，你便可以通过收集回顾积极反馈对抗自己的冒名顶替综合征。一名科学家认为 实验室出现的问题都是自己的错，她开始记录每次出错的原因。最终，她意识到大多数问题都是设备问题，并开始认识到自己的优秀能力。我们可能永远无法 彻底消除这类情绪，但是我们可以 对学术或专业难题进行公开讨论，随着不断认识到 这种情绪的普遍性，也许我们能够 更自由地表露我们的感受，并且通过以下几个 简单的事实建立信心：你有才华，你很能干，你不是一个人。

**P628 2018-08-22 Is there any truth to the King Arthur legends - Alan Lupack**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=628)

“Here lies Arthur, king who was, and king who will be.” So reads the inscription on King Arthur’s gravestone in Thomas Malory’s Le Morte d’Arthur. Writing in the 15th century, Malory couldn’t have known how prophetic this inscription would turn out to be. King Arthur has risen again and again in our collective imagination, along with his retinue of knights, Guinevere, the Round Table, Camelot, and of course, Excalibur. But where do these stories come from, and is there any truth to them? King Arthur as we know him is a creation of the later Middle Ages, but his legend actually has its roots in Celtic poetry from an earlier time: the Saxon invasions of Britain. After the Romans left Britain in 410 CE, Saxon invaders from what’s now Germany and Denmark quickly capitalized on the vulnerability of the abandoned territory. The inhabitants of Britain fought fiercely against the invaders through several centuries of turmoil. There are hardly any written records from this time, so it’s difficult to reconstruct an accurate history. However, surviving poetry from the era gives us some clues. One of the poems, The Gododdin, contains the very first reference to Arthur, though Arthur himself doesn’t actually appear in it. It says a different warrior, named Gwawrddur, was skilled at slaying his enemies, but was no Arthur. That’s not much to go on, but whoever this Arthur was, he must’ve been the gold standard of warriors. Whether he ruled anyone, or even lived at all is, unfortunately, less clear. Despite this uncertainty, references to Arthur caught the attention of an aspiring historian hundreds of years later. In 1130, Geoffrey of Monmouth was a lowly cleric with grand ambitions. Using Celtic and Latin sources, he spent years creating a lengthy chronicle titled, "The History of the Kings of Britain." The centerpiece of this tome was King Arthur. History is a generous term for Geoffrey’s account. Writing six hundred years after the Saxon invasions, he cobbled together fragments of myth and poetry to compensate for the almost complete lack of official records. A few of his sources contained mentions of Arthur, and some others were realistic accounts of battles and places. But many featured mythic heroes fighting long odds with the help of magical swords and sorcery. Geoffrey blended them all: A magical sword called Caledfwlch and a Roman fortress called Caerleon appeared in his source material, so Geoffrey’s Arthur ruled from Caerleon and wielded Caliburnus, the Latin translation of Caledfwlch. Geoffrey even added a wise counselor named Merlin, based on the Celtic bard Myrrdin, to Arthur’s story. If Arthur did live, he would likely have been a military leader, but a castle-bound king better fit Geoffrey’s regal history. Geoffrey’s chronicle got the attention he’d hoped for, and was soon translated from Latin into French by the poet Wace around 1155 CE. Wace added another centerpiece of Arthurian lore to Geoffrey’s sword, castle, and wizard: the Round Table. He wrote that Arthur had the table constructed so that all guests in his court would be equally placed, and none could boast that he had the highest position at the table. After reading Wace’s translation, another French poet, Chrétien de Troyes, wrote a series of romances that catapulted Arthur’s story to fame. He introduced tales of individual knights like Lancelot and Gawain, and mixed elements of romance in with the adventures. He conceived Arthur, Lancelot, and Guinevere’s love triangle. In addition to interpersonal intrigue, he also introduced the Holy Grail. Chrétien probably based his Grail’s powers on magical objects in Celtic mythology. He lived in the middle of the Crusades, and others imposed the preoccupations of the time on the Grail, casting it as a powerful relic from the crucifixion. Numerous adaptations in French and other languages followed from Chrétien’s work. In the course of these retellings, Caerleon became Camelot, and Caliburnus was rechristened Excalibur. In the 15th century, Sir Thomas Malory synthesized these stories in Le Morte D’arthur, the basis of many modern accounts of King Arthur. In the thousand years since Arthur first appeared in a Celtic poem, his story has transformed over and over to reflect the concerns of his chroniclers and their audiences. And we’re still rewriting and adapting the legend today. Whether or not the man ever lived, loved, reigned, or adventured, it’s undeniable that the character has achieved immortality.

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翻译人员: Zitong Wang 校对人员: Yifan L“亚瑟葬于此处， 他曾是，也将一直是王。”读一下托马斯 · 马洛里 写于 15 世纪的《亚瑟王之死》一书中，亚瑟王墓碑上的铭文，马洛里应该不会想到 这份铭文最终竟如此的有预见性。亚瑟王在我们的集体想象中 一次次崛起，还有他的骑士随从、妻子桂妮薇儿圆桌会议、宫殿卡米洛特，当然，还有王者之剑。但是，这些故事从哪来， 又有多少可信度呢？我们所知的亚瑟王是 中世纪后期创造出的人物，但是他的传奇实际上 起源于更早期的凯尔特诗歌：撒克逊人入侵不列颠王朝。在公元 410 年，罗马人离开不列颠后来自于现在的德国和丹麦的撒克逊入侵者迅速的占领了这片的废弃领地。不列颠人激烈抵抗入侵者，混乱持续了几个世纪。现今已很少有书面记载这个了，所以很难去重塑最准确的历史。然而，还是可以在当今现存的 诗歌中找到一些头绪其中一首叫《高多汀》的诗 就第一次提到亚瑟，但亚瑟这个角色并没有出现在里面。诗中说的是另一个战士，格瓦多尔他善于屠杀敌人，但他并不是亚瑟。对于亚瑟没有更多的描述了，但是不管这个亚瑟是谁，他肯定是战士的黄金典范。他统治过谁，或是否真的存在， 很不幸，我们都无从得知。尽管亚瑟的事情扑朔迷离，几百年后，一位有抱负的历史学家却对亚瑟的文献颇有兴趣。1130 年，这位野心勃勃的牧师—— 蒙莫斯郡的杰弗里，他借鉴了凯尔特和拉丁文献，历时数年创造了一长篇编年史册名字叫《不列颠国王的历史》。这本书的中心就是亚瑟王。历史在杰弗里眼里是个很大的词汇，写于撒克逊人侵略六百年后，他把神话和诗歌的段落拼凑起来，来填补几乎空白的官方记载。他所借鉴的书中有几本提及亚瑟，其他的真实地描述了战役和地方。还有更多的提及了神话英雄在魔法剑和巫术的帮助下以寡敌众。杰弗里综合了所有的记录：一把叫王者之剑的魔剑和一个叫卡利恩的罗马要塞出现在原著中，杰佛里描述的亚瑟王 统治了从卡利恩到辽阔的卡里布恩斯，卡里布恩斯是王者之剑的拉丁语版。杰佛里还给亚瑟故事 加了一个叫梅林的智者，原型是凯尔特吟游诗人梅尔丁。如果亚瑟确实存在， 他可能是一位军队统帅但是城堡般的国王领袖 更适用于杰弗里德的史诗。他的编史带来了他想要的关注，这本书很快就被诗人韦斯在 1155 年由拉丁语翻译成法语。韦斯给杰弗里的剑加了其他传说。城堡、男巫、和圆桌会议。他写道，亚瑟之所以用这个桌子是为了给所有客人平等的坐席，没有任何一人能吹嘘自己地位最高。在读过韦斯翻译后， 另一位法国诗人克雷蒂安 · 德 · 特鲁瓦写了许多传奇， 把亚瑟故事的名声推到顶峰他讲述了很多骑士的故事， 比如兰斯洛特和高文。他还在历险中加了许多浪漫元素，他构造了亚瑟，兰斯洛特和桂妮薇儿的三角恋。除了宫廷中的阴谋， 他也写入了圣杯。克雷蒂安写圣杯力量可能是 借鉴了凯尔特神话的魔法物件。他生活在十字军东征的时代，其他人把当时的事情和圣杯联系起来，把它当做耶稣殉难留下的圣遗物。克雷蒂安的作品在之后被翻译成法语和很多其他语言。重诉这些故事时， 卡利恩被说成了卡米洛特，卡里布恩斯改名为王者之剑。在 15 世纪，托马斯 · 马洛里爵士把这些故事 合成为亚瑟王之死，也就是很多现代亚瑟王故事的前身。从凯尔特诗歌第一次出现亚瑟的几千年来，他的故事被一次次改写，反映着编年史家和观众他们想看的东西。我们现今仍旧在重写和改编他的传奇，不管他到底存不存在，爱没爱过，统治过哪，有过哪些历险，不可否认的是，他的角色达到了永生。

**P629 2018-08-28 What’s a smartphone made of - Kim Preshoff**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=629)

As of 2018, there are around 2.5 billion smartphone users in the world. If we broke open all their newest phones, which are just a fraction of the total that’ve been built, and split them into their component parts, that would produce around 85,000 kilograms of gold, 875,000 of silver, and 40 million kilograms of copper. How did this precious cache get into our phones, and can we reclaim it? Gold, silver, and copper are actually just a few of the 70 or so chemical elements that make up the average smartphone. These can be divided into different groups, two of the most critical being rare earth elements and precious metals. Rare earths are a selection of 17 elements that are actually common in Earth’s crust and are found in many areas across the world in low concentrations. These elements have a huge range of magnetic, phosphorescent, and conductive properties that make them crucial to modern technologies. In fact, of the 17 types of rare earth metals, phones and other electronics may contain up to 16. In smartphones, these create the screen and color display, aid conductivity, and produce the signature vibrations, amongst other things. And yet, crucial as they are, extracting these elements from the earth is linked to some disturbing environmental impacts. Rare earth elements can often be found, but in many areas, it’s not economically feasible to extract them due to low concentrations. Much of the time, extracting them requires a method called open pit mining that exposes vast areas of land. This form of mining destroys huge swaths of natural habitats, and causes air and water pollution, threatening the health of nearby communities. Another group of ingredients in smartphones comes with similar environmental risks: these are metals such as copper, silver, palladium, aluminum, platinum, tungsten, tin, lead, and gold. We also mine magnesium, lithium, silica, and potassium to make phones, and all of it is associated with vast habitat destruction, as well as air and water pollution. Mining comes with worrying social problems, too, like large-scale human and animal displacement to make way for industrial operations, and frequently, poor working conditions for laborers. Lastly, phone production also requires petroleum, one of the main drivers of climate change. That entwines our smartphones inextricably with this growing planetary conundrum. And, what’s more, the ingredients we mine to make our phones aren’t infinite. One day, they’ll simply run out, and we haven’t yet discovered effective replacements for some. Despite this, the number of smartphones is on a steady increase; by 2019 it’s predicted that there’ll be close to 3 billion in use. This means that reclaiming the bounty within our phones is swiftly becoming a necessity. So, if you have an old phone, you might want to consider your options before throwing it away. To minimize waste, you could donate it to a charity for reuse, take it to an e-waste recycling facility, or look for a company that refurbishes old models. However, even recycling companies need our scrutiny. Just as the production of smartphones comes with social and environmental problems, dismantling them does too. E-waste is sometimes intentionally exported to countries where labor is cheap but working conditions are poor. Vast workforces, often made up of women and children, may be underpaid, lack the training to safely disassemble phones, and be exposed to elements like lead and mercury, which can permanently damage their nervous systems. Phone waste can also end up in huge dump sites, leaching toxic chemicals into the soil and water, mirroring the problems of the mines where the elements originated. A phone is much more than it appears to be on the surface. It’s an assemblage of elements from multiple countries, linked to impacts that are unfolding on a global scale. So, until someone invents a completely sustainable smartphone, we’ll need to come to terms with how this technology affects widespread places and people.

**P629 2018-08-28 What’s a smartphone made of - Kim Preshoff**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=629)

翻译人员: Riley WANG 校对人员: Lipeng Chen截止到2018年， 世界上有大约有25亿手机用户。最新款的手机 只占手机总量的一小部分，若我们将这些手机拆开，分解成组装手机的零部件，这将产生大约85000千克的金，875000千克银，以及4千万千克铜。这些珍贵的矿藏 是如何进入我们的手机的？我们能否对其进行回收？金、银、铜只是其中一小部分，构成一只手机的化学元素 平均可达70多种。这些元素可以分成不同的类别，其中最为重要的两种是稀土元素和贵金属。稀土元素是17种元素， 普遍存在地壳中，在世界上许多地区都有少量富集。这些元素具有很强的磁性，可以发出磷光，并且具有传导性，这些特性使得它们 对现代科技发展十分重要。事实上，在17种稀土金属元素中，手机及其他电子产品包含多达16种。在手机中，这些稀土元素 被用来制作屏幕和显色，帮助传导电路，产生来电震动，以及实现其他功能。虽然他们十分重要，但是从土壤中开采稀土会造成一些令人担心的环境问题。我们经常能发现稀土元素，但是在很多地区，由于数量量太少， 开采稀土在经济上并不可行。大多数情况下，开采稀土元素需要用露天采矿的方法，这会暴露大片土地。这种开采方式会严重破坏自然栖息地，造成空气和水污染，危害附近居民的身体健康。用来生产手机的另一组原料也会带来相似的环境问题：这些金属包括铜、银、钯、铝、铂、钨、锡、铅、以及金。为了生产手机， 我们同样也会开采镁、锂、二氧化硅、钾，这些都与栖息地大面积破坏、空气以及水污染相关。开采这些金属也会带来 令人担忧的社会问题，例如人类和动物需要大规模迁徙从而为工业生产让路，劳动者也经常面临的较差工作环境。最后，生产手机也需要石油，这是造成气候变化的主要成因之一。我们的手机与 这个日益明显的全球性难题密不可分。此外，这些用以生产手机的原料 并不是无限量的。它们也会在未来某天被耗尽，我们尚未发现某些原料的有效替代品。尽管如此，手机的数量仍在稳步上升，预计到2019年， 在用手机将达到30亿部。这意味着 对手机中的宝贵金属进行回收很快将成为必须。因此，如果你有不用的手机，你或许可以在扔掉它之前考虑其他选择。为了最小化浪费， 你可以将它捐给慈善机构用于重复使用，或是将其拿到电子垃圾回收机构，再或者找一家可以翻新老机型的公司。但是，即便是对回收公司 我们也要保持警惕。正如同手机的生产过程会伴随社会及环境问题，拆解手机同样也会产生这些问题。电子垃圾有时会被刻意 运送到某些国家，这些国家的劳动力价格低廉， 但工人的工作环境却很糟糕。大量的劳动力，通常是妇女或儿童，仅能得到很少的薪水，并且未受过安全拆除手机的培训，她们会接触到铅和水银等元素，从而永久性地伤害神经系统。报废手机也可能会出现在大型垃圾场，有毒化学物质因此渗入土壤和水中，与开采这些元素时造成的问题互相映照。一部手机看上去远不止表面这样简单，它的组装集合了 来自于多个国家的零部件，可以在全球范围造成影响。因此，在发明完全可持续性的手机之前，我们需要开始了解这项科技如何 对广泛的地区和人群造成影响。

**P630 2018-09-04 What causes heartburn - Rusha Modi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=630)

Just between your chest and abdomen is where you’ll find one of the most important muscles you probably didn't know you had: the lower esophageal sphincter, or LES. When functioning properly, this ring of tissue plays a crucial role in helping us eat. But when the LES malfunctions, it becomes the main player in heartburn --a searing, sometimes sour-tasting chest-spasm that many people will experience at some point in their lives. We know that humans have been battling heartburn for hundreds, if not thousands of years. But recently the incidence has risen, making it a common stomach complaint worldwide. When the symptoms of heartburn become more more regular and intense —such as twice a week or more-- it’s diagnosed as Gastroesophageal Reflux Disease, or GERD. But what causes this problem, and how can it be stopped? Heartburn starts in an area called the gastroesophageal junction, where the LES resides. This smooth, muscular ring of the LES is moderated by an intricate tree of nerve roots that connect to the brain, the heart, and the lungs. After food enters the stomach from the esophagus, the muscle’s task is to stop it from surging back up again. The LES contracts, squeezing the stomach entrance and creating a high pressure zone that prevents digestive acids from seeping out. But if the LES relaxes at the wrong moment or gradually weakens, it becomes like a faulty, ill-fitting lid, causing the area to depressurize. That allows burning stomach acid-- and even chunks of food--to spurt into the esophagus, sometimes going as far up as the mouth. The cause of all this internal drama has long been put down to diet. Foods like caffeine and peppermint contain ingredients that may have a relaxing affect on the LES, which makes it incapable of doing its job. Other acidic foods, like citrus and tomatoes, can worsen irritation of the esophagus when they leach out with stomach acid. Carbonated beverages can similarly bubble up in the stomach, forcing open the valve. But researchers have discovered that food isn’t the only trigger. Smoking poses a risk, because the nicotine in cigarettes relaxes the LES. Consuming excessive amounts of alcohol may have a similar effect. Pregnant women often experience more heartburn due to the pressure of a growing baby on their stomachs. and the levels of certain hormones in their bodies. Obesity can cause hernias that disrupt the anti-reflux barrier of the gastroesophageal junction that normally protects against heartburn. Numerous medications, including those for asthma, high blood pressure, birth control, and depression can also have unintended effects on the LES. An occasional bout of heartburn isn't necessarily something to worry about. But, if heartburn starts happening regularly, it can weaken the LES muscle over time, letting more and more acid escape. And if it goes untreated, this can cause bigger problems. Over time, constant acid leakage from heartburn may form scar tissue which narrows the esophageal tube, making it harder to swallow food. Ongoing reflux can also damage the cells lining the esophagus--a rare condition called Barrett’s esophagus, which can elevate the risk of esophageal cancer. Luckily, heartburn is often treatable with a range of medicines that can help neutralize or reduce stomach acid. In extreme cases, some people have surgery to tighten the LES to minimize their distress. But we can often stop heartburn before it reaches that point. Reducing the consumption of certain foods, not smoking, and maintaining a healthy weight can all dramatically reduce reflux. With proper care we can help our LES’s keep the chemical fountain of our stomachs in proper order and avoid having to feel the burn.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=630)

翻译人员: Yifan L 校对人员: Yu Xie就在你的胸部和腹部之间，有一个你所不知的非常重要的肌肉组织：那就是食管下括约肌，简称 LES。当 LES 正常运作时，这个组织环对我们的进食功能 有很重要的促进作用。而当 LES 不能正常运作时，它就成了导致胃灼热的罪魁祸首——这是一种灼热的， 有时带有酸味的胃部痉挛，许多人在一生中或多或少 都会有这样的经历。我们知道人们千百年来都在试图战胜胃灼热。但近年来，胃灼热 的发病率反而不断增高，成为了令人困扰的世界性胃病问题。当胃灼热的症状的发作变得 更加频繁和剧烈时，比如说一个星期两次或者更多，就会被诊断为胃食管反流， 又称 GERD。那么，是什么造成了胃灼热？用什么办法才可以消除这些症状呢？胃灼热由 LES 所在的胃食管交界处产生，LES 这一圈平滑肌是由错综复杂的神经根调节，这些神经与大脑， 心脏和肺部相连。当食物从食管中进入胃部，这一圈肌肉的功能就是阻止食物返流。LES 收缩，挤压胃上口产生一个高压力区，防止胃酸流入食道。但如果 LES 没有及时收紧， 或者功能逐渐失调时，密封性就会变差，这个部位的压力就会减弱，导致灼烧的胃酸甚至食物返流，进入食管，甚至口中。长久以来，人们认为日常饮食习惯是造成这一内部闹剧的罪魁祸首。比如说，咖啡因和薄荷中的成分可能有松弛 LES 的作用，让它无法正常运作。其他的酸性食物， 比如柑橘和西红柿和胃酸一起滤出时，会刺激食管。而碳酸饮料在胃里产生气泡时，也会使 LES 强制打开。但研究者们发现， 食物并不是导致发病的唯一因素。吸烟也构成了威胁， 因为香烟中的尼古丁会使 LES 松弛。饮酒过量也会产生这种效果。孕妇常常经历胃灼热，不仅因为她们肚中成长的胎儿 对其胃部施加压力，还与她们孕时 的荷尔蒙水平变化有关。肥胖症所造成的疝气会损坏胃食道交界处的抗逆流屏障，使其失去对抗胃灼热的功能。很多针对哮喘，高血压，避孕和抑郁症的药物也会对 LES 产生副作用。偶尔的胃灼烧无须担心，但如果胃灼热发生频繁，则会使 LES 的功能衰退，导致更多的胃酸返流入食道。如果不及时治疗的话，会引发更大的问题。久而久之，因胃灼热 而不断渗出的胃酸可能会灼伤食道， 从而产生瘢痕组织，使得食道变窄，吞咽食物困难。持续的胃酸逆流也会损伤 食道粘膜的细胞，导致一种罕见的疾病，叫做巴洛氏食道症，从而提高患食道癌的风险。幸运的是，当前有很多的药物都能通过中和或者减少胃酸的方式来治疗胃灼热。在极少数的情况下， 患者需要通过手术治疗来缩紧 LES，从而缓解他们的病症。其实，我们能在胃灼热变得严重前预防它。比如说，改善我们的饮食习惯，不抽烟，保持健康的体重，这些都能大大地减少胃食管返流。只要我们采取对的措施，维护好我们胃部的“化学喷泉” LES，就能避免体验胃灼热感。

**P631 2018-09-12 Can you solve the alien probe riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=631)

The discovery of an alien monolith on planet RH-1729 has scientists across the world racing to unlock its mysteries. Your engineering team has developed an elegant probe to study it. The probe is a collection of 27 cube modules capable of running all the scientific tests necessary to analyze the monolith. The modules can self-assemble into a large 3x3x3 cube, with each individual module placed anywhere in the cube, and at any orientation. It can also break itself apart and reassemble into any other orientation. Now comes your job. The probe will need a special protective coating for each of the extreme environments it passes through. The red coating will seal it against the cold of deep space, the purple coating will protect it from the intense heat as it enters the atmosphere of RH-1729, and the green coating will shield it from the alien planet’s electric storms. You can apply the coatings to each of the faces of all 27 of the cubic modules in any way you like, but each face can only take a single color coating. You need to figure out how you can apply the colors so the cubes can re-assemble themselves to show only red, then purple, then green. How can you apply the colored coatings to the 27 cubes so the probe will be able to make the trip? Pause here if you want to figure it out yourself. You can start by painting the outside of the complete cube red, since you’ll need that regardless. Then you can break it into 27 pieces, and look at what you have. There are 8 corner cubes, which each have three red faces, 12 edge cubes, which have two red faces, 6 face cubes, which have 1 red face, and a single center cube, which has no red faces. You’ve painted a total of 54 faces red at this point, so you’ll need the same number of faces for the green and purple cubes, too. When you’re done, you’ll have painted 54 faces red, 54 faces green, and 54 faces purple. That’s 162 faces, which is precisely how many the cubes have in total. So there’s no margin for waste. If there’s any way to do this, it’ll probably be highly symmetrical. Maybe you can use that to help you. You look at the center cube. You’d better paint it half green and half purple, so you can use it as a corner for each of those cubes, and not waste a single face. There’ll need to be center cubes with no green and no purple too. So you take 2 corner cubes from the red cube and paint the 3 blank faces of 1 purple, and the 3 blank faces of the other green. Now you’ve got the 6 face cubes that each have 1 face painted red. That leaves 5 empty faces on each. You can split them in half. In the first group, you paint 3 faces green and 2 faces purple; In the second group, paint 3 faces purple and 2 green. Counting on symmetry, you replicate these piles again with the colors rearranged. That gives you 6 with 1 green face, 6 with 1 red face, and 6 with 1 purple face. Counting up what you’ve completely painted, you see 8 corner cubes in each color, 6 edge cubes in each color, 6 face cubes in each color, and 1 center cube. That means you just need 6 more edge cubes in green and purple. And there are exactly 6 cubes left, each with 4 empty faces. You paint 2 faces of each green and 2 faces of each purple. And now you have a cube that’s perfectly painted to make an incredible trip. It rearranges itself to be red in deep space, purple as it enters RH-1729’s atmosphere, and green when it flies through the electric storms. As it reaches the monolith, you realize you’ve achieved something humans have dreamt of for eons: alien contact.

**P631 2018-09-12 Can you solve the alien probe riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=631)

翻译人员: Candace Hwang 校对人员: Carol Wang在 RH-1729 星球发现的 外星巨石碑使全世界的科学家们 竞相致力于解开它的秘密。你的工程团队研发了一种 精良的探测器来研究它，该探测器由 27 个 立方体模块组合而成，能够运行所有分析 巨石所需的科学检测。这些模块可以自行组装成 一个的 3x3x3 大立方体，其中每个独立模块可任意方向放置在立方体的任意位置。它还能自行解体， 以任意方向重新组合。现在是需要你做的工作：探测器需要特殊的保护性涂层，使它能顺利通过各种极端环境。红色涂层可使它密封， 不受深空低温的影响，紫色涂层将在探测器 进入 RH-1729 星球时，保护它免受高温影响，而绿色涂层则将帮助它 抵御外星球上的电子风暴。你可以按你喜欢的方式，给 27 个立方体模块的 所有面都覆上涂层，但每个面只能涂一种颜色。你需要计算出如何涂色，才能使立体模块重新组合后， 大立方体能呈现全红、然后全紫、最后全绿的模样。如何给 27 个小方块涂色，才能使探测器顺利完成这次旅程呢？[若想自己解题，请暂停播放]你可以先将整个立方体的 外部涂成红色，因为无论如何你都需要它。接着，拆成 27 个小块， 看看它们是什么样子。有 8 个角上的方块， 每块都有三面涂成了红色；12 个边上的方块， 每块有二面是红色的；6 个表面的方块，只有一面红色；以及 1 个没有红色面的中心方块。此时你共计涂了 54 面红色，因此绿色和紫色立方体 也需要相同数量的面。完成后，你将有 54 个面涂红色，54 个面涂绿色，还有 54 个面涂紫色。这 162 个面正是此立方体 拥有表面数的总和。因此，也并没有浪费的余地。如果有任何方法做到这一点， 它可能是高度对称的，也许你可以利用这点。先看看中心的方块，最好涂成三面绿、三面蓝，这样你可以把它作为立方体的角，同时一个面也没浪费。还需要各有 1 个无绿色 或者紫色的中心方块，所以，从红色大立方体上 取 2 个角的小方块，然后把剩余三个面涂成紫色，再把另一块的剩余三面涂成绿色。你有 6 个正面方块只有一面涂红，每个留有五个空面。你可以把它们均分成两组，把第一组 3 个方块的三个面涂绿、两面涂紫；第二组中，则是三面紫和两面绿。基于对称性，你更换颜色并复制上述 6 个正面方块的规律进行涂色，最后得到 6 个一面绿色的方块、6 个一面红色的方块、和 6 个一面紫色的方块。数一数已经涂完的方块，会看到每个颜色有 8 个角落方块、6 个边缘方块、6 个表面方块、和 1 个中心方块。即你只需要另外 6 个绿色 和 6 个 紫色的边缘方块。正好还剩 6 个方块未涂完色， 每个方块有 4 个空面。把方块的两面涂成绿色， 另两面涂成紫色。你会得到一个完美涂层的立方体， 去完成不可思议的旅行了。它在深空中可把自己变成为红色，当进入 RH-1729 星球的大气层时变成紫色，飞行穿梭在电子风暴中时变成绿色。当它到达巨石碑时，你意识到你们实现了 人类长久以来的梦想：接触外星人。

**P632 2018-09-14 Could the Earth be swallowed by a black hole - Fabio Pacucci**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=632)

From asteroids capable of destroying entire species, to gamma-ray bursts and supernovae that could exterminate life on Earth, outer space has no shortage of forces that could wreak havoc on our tiny planet. But there’s something in space that seems more terrifying than any of these – something that wipes out everything it comes near. Could the Earth be swallowed by a black hole? A black hole is an object so dense that space and time around it are inescapably modified, warped into an infinite sink. Nothing, not even light, can move fast enough to escape a black hole’s gravitational pull once it passes a certain boundary, known as the event horizon. Thus, a black hole is like a cosmic vacuum cleaner with infinite capacity, gobbling up everything in its path, and letting nothing out. To determine whether a black hole could swallow the Earth, we first have to figure out where they are. But since they don’t emit light, how’s that possible? Fortunately, we’re able to observe their effect on the space around them. When matter approaches a black hole, the immense gravitational field accelerates it to high speed. This emits an enormous amount of light. And for objects too far away to be sucked in, the massive gravitational force still affects their orbits. If we observe several stars orbiting around an apparently empty point, a black hole could be leading the dance. Similarly, light that passes close enough to an event horizon will be deflected in a phenomenon known as gravitational lensing. Most of the black holes that we’ve found can be thought of as two main types. The smaller ones, called stellar mass black holes, have a mass up to 100 times larger than that of our sun. They’re formed when a massive star consumes all its nuclear fuel and its core collapses. We’ve observed several of these objects as close as 3000 light-years away, and there could be up to 100 million small black holes just in the Milky Way galaxy. So should we be worried? Probably not. Despite their large mass, stellar black holes only have a radius of around 300 kilometers or less, making the chances of a direct hit with us miniscule. Although because their gravitational fields can affect a planet from a large distance, they could be dangerous even without a direct collision. If a typical stellar-mass black hole were to pass in the region of Neptune, the orbit of the Earth would be considerably modified, with dire results. Still, the combination of how small they are and how vast the galaxy is means that stellar black holes don’t give us much to worry about. But we still have to meet the second type: supermassive black holes. These have masses millions or billions times greater than that of our sun and have event horizons that could span billions of kilometers. These giants have grown to immense proportions by swallowing matter and merging with other black holes. Unlike their stellar cousins, supermassive black holes aren’t wandering through space. Instead, they lie at the center of galaxies, including our own. Our solar system is in a stable orbit around a supermassive black hole that resides at the center of the Milky Way, at a safe distance of 25,000 light-years. But that could change. If our galaxy collides with another, the Earth could be thrown towards the galactic center, close enough to the supermassive black hole to be eventually swallowed up. In fact, a collision with the Andromeda Galaxy is predicted to happen 4 billion years from now, which may not be great news for our home planet. But before we judge them too harshly, black holes aren’t simply agents of destruction. They played a crucial role in the formation of galaxies, the building blocks of our universe. Far from being shadowy characters in the cosmic play, black holes have fundamentally contributed in making the universe a bright and astonishing place.

**P632 2018-09-14 Could the Earth be swallowed by a black hole - Fabio Pacucci**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=632)

翻译人员: Li Linjun 校对人员: Lipeng Chen从能够毁灭整个物种的小行星，到能够毁灭地球上所有生灵的 伽马射线暴和超新星，外太空从来不缺可能对我们 这颗小小的星球造成巨大灾难的力量。但是太空中似乎还有比这些力量更加恐怖的存在——任何东西一旦靠近它就会彻底消失。地球会被黑洞吞噬吗？黑洞是一个密度如此之大的物体，以至于它周围的空间和时间 都不可避免地发生改变，弯曲成一个无尽的槽型深渊。任何东西一旦越过某个边界——这被称为视界， 即使是光也不能以足够快的速度逃脱黑洞的引力。因此，黑洞就像一个 容量无限的宇宙吸尘器，吞噬它所经之处的一切， 不让任何东西出去。为了断定黑洞是否会吞噬地球，我们首先要弄清楚它们在哪。但它们本身不发光， 怎么找得到？幸运的是，我们能够观察到 它们对周围空间的影响。当物质接近黑洞时，巨大的引力场使它加速到很高的速度，这就产生了大量的光。对于太远而无法被吸入的物体，巨大的引力仍然会影响其轨道。如果我们观察到几颗恒星 围绕着一个明显的空点翩翩起舞，那么黑洞可能是领舞者。同理，足够接近视界的光会因为引力透镜效应而发生偏转。我们发现的黑洞大多数 可以归为下面两种主要类型。其中较小的黑洞被称为 恒星质量黑洞，其质量比我们的太阳大100倍。它们是由核燃料耗尽后核心坍缩的 大质量恒星演变而来的。我们已经在3000光年外的地方 观察到了若干个这样的天体，而且单是银河系中 就有将近一亿个小型黑洞。要不要为此担忧？很可能不用。尽管它们质量很大，但恒星黑洞的半径 只有大约300公里或更小，因此我们被直接击中的可能性微乎其微。然而它们的引力场能从很远的距离影响行星，所以即使没有直接碰撞， 也可能存在危险。假如一个典型的恒星质量黑洞 经过海王星区域，那么地球的轨道 将会发生相当大的改变，后果不堪设想。不过，它们是如此之小， 星系又是如此之广阔，两者结合起来看，恒星黑洞 没什么令人担忧的地方。但我们仍会遇到第二种类型：超大质量黑洞。它们的质量比我们太阳的质量大 数百万或数十亿倍，其视界可跨越数十亿公里。这些庞然大物通过吞噬物质 以及与其他黑洞合并而变得巨大。和它们的恒星表亲不同，超大质量黑洞不会在太空中游移，相反，它们位于星系的中心。 我们自己的星系也是如此。我们太阳系以稳定轨道和25000光年的安全距离 围绕着一个处在银河系中心的超大质量黑洞旋转。但这种情况可能会改变。如果我们的星系与另一个星系相撞，地球可能会被抛向银河系中心，距离超大质量黑洞足够近，导致最终被吞噬。事实上，据预测，与仙女座星系的碰撞 将会在40亿年后发生，这对于我们赖以生存的星球来说 可能不是什么好消息。但我们不要急着对它们作出严厉的评判，黑洞并不仅仅是毁灭凶手，它们在宇宙的基石——星系的形成过程中 扮演了至关重要的角色。黑洞与宇宙中阴暗神秘的角色相去甚远，它们在打造一个光明而令人惊叹的宇宙这方面 作出了基础的贡献。

**P633 2018-09-14 Why should you read 'Waiting For Godot' - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=633)

A shabby man named Estragon, sits near a tree at dusk and struggles to remove his boot. He’s soon joined by his friend Vladimir, who reminds his anxious companion that they must wait here for someone called Godot. So begins a vexing cycle in which the two debate when Godot will come, why they’re waiting, and whether they’re even at the right tree. From here, Waiting for Godot only gets stranger - but it’s considered a play that changed the face of modern drama. Written by Samuel Beckett between 1949 and 1955, it offers a simple but stirring question - what should the characters do? Estragon: Don’t let's do anything. It's safer. Vladimir: Let’s wait and see what he says. Estragon: Who? Vladimir: Godot. Estragon: Good idea. Such cryptic dialogue and circular reasoning are key features of the Theatre of the Absurd, a movement which emerged after the Second World War and found artists struggling to find meaning in devastation. The absurdists deconstructed plot, character and language to question their meaning and share their profound uncertainty on stage. While this may sound grim, the absurd blends its hopelessness with humor. This is reflected in Beckett’s unique approach to genre in Waiting for Godot, which he branded “a tragicomedy in two acts." Tragically, the characters are locked in an existential conundrum: they wait in vain for an unknown figure to give them a sense of purpose, but their only sense of purpose comes from the act of waiting, While they wait, they sink into boredom, express religious dread and contemplate suicide. But comically, there is a jagged humor to their predicament, which comes across in their language and movements. Their interactions are filled with bizarre wordplay, repetition and double entendres, as well as physical clowning, singing and dancing, and frantically swapping their hats. It’s often unclear whether the audience is supposed to laugh or cry - or whether Beckett saw any difference between the two. Born in Dublin, Beckett studied English, French and Italian before moving to Paris, where he spent most of his life writing theatre, poetry and prose. While Beckett had a lifelong love of language, he also made space for silence by incorporating gaps, pauses and moments of emptiness into his work. This was a key feature of his trademark uneven tempo and black humor, which became popular throughout the Theatre of the Absurd. He also cultivated a mysterious persona, and refused to confirm or deny any speculations about the meaning of his work. This kept audiences guessing, increasing their fascination with his surreal worlds and enigmatic characters. The lack of any clear meaning makes Godot endlessly open to interpretation. Critics have offered countless readings of the play, resulting in a cycle of ambiguity and speculation that mirrors the plot of the drama itself. It's been read as an allegory of the Cold War, the French Resistance, and Britain’s colonization of Ireland. The dynamic of the two protagonists has also sparked intense debate. They’ve been read as survivors of the apocalypse, an aging couple, two impotent friends, and even as personifications of Freud’s ego and id. Famously, Beckett said the only thing he could be sure of was that Vladimir and Estragon were "wearing bowler hats." Like the critical speculation and maddening plot, their language often goes in circles as the two bicker and banter, lose their train of thought, and pick up right where they left off: Vladimir: We could start all over again perhaps Estragon: That should be easy Vladimir: It’s the start that’s difficult Estragon: You can start from anything Vladimir: Yes, but you have to decide. Beckett reminds us that just like our daily lives, the world onstage doesn’t always make sense. It can explore both reality and illusion, the familiar and the strange. And although a tidy narrative still appeals, the best theatre keeps us thinking – and waiting.

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翻译人员: Sam Bao 校对人员: Lipeng Chen一个叫做爱斯特拉冈的人衣衫褴褛，他在傍晚时分坐在树边， 奋力脱掉他的靴子。很快朋友弗拉季米尔也来了，爱斯特拉冈提醒他焦虑的朋友，他们必须等待一个叫做戈多的人。两人于是陷入了无休止的激烈论战：戈多什么时候来， 他们为什么要等戈多。甚至于他们是否在对的树下。自此，《等待戈多》变得越来越奇怪。但这样一出戏，改变了现代戏剧的面貌。本剧作者塞缪尔·贝克特， 写于1949至1955年。它提出了一个简单但令人迷惑的问题：剧中人物应该做些什么？爱斯特拉冈：什么也不要做，这样更安全。弗拉季米尔：让我们等等，看看他怎么说。爱斯特拉冈：谁？弗拉季米尔：戈多。爱斯特拉冈：好主意。这些晦涩的对话和圆环式的逻辑是荒诞派戏剧的主要特点。荒诞派运动诞生于二战后，艺人们奋力地找寻毁灭行为的意义。荒诞派解构了剧情、人物和语言，质疑这些东西的意义，在舞台上呈现它们深深的不确定性。虽然这些听上去很悲观，不过荒诞派在其无助之感中融入了幽默。这一点也反映在《等待戈多》中。贝克特将该剧划为独特的门类，将其称为“两幕悲喜剧“。悲剧在于，两个人物陷入了一个存在难题：他们徒劳地等待，等待未知的人给他们一个目的。但他们唯一的目的，却是来自于这场等待。在等待的过程中，他们陷入了困倦，流露出对宗教的恐惧，考虑过自杀。而喜剧在于，他们的困境 有一种生冷的幽默，从他们的语言和动作中表达出来。他们间的互动充满着 奇怪的文字游戏，重复、双关。他们还扮丑、歌唱、舞蹈。发狂似的换帽子。观众常常搞不清是该笑还是该哭，而贝克特自己又是否真的区别了二者。贝克特生于都柏林， 曾学习英语、法语及意大利语，后来移居巴黎。余生大部分时光编写戏剧、诗歌及散文。贝克特毕生虽喜欢运用语言，他亦给沉默留下了空间，将间隔、停顿及空白的片段， 插入其作品之中。这一重要特点属于他标志性的不均衡节奏和黑色幽默，这种风格席卷荒诞派戏剧。他还有着一种捉摸不透的个性，他拒绝证实或否认关于他作品意义的猜测。这使得观众不断猜测，使得他们更加着迷于他的怪诞世界和令人费解的人物。由于缺乏明确的意义，使得“戈多"可以任意解读。评论家们对本剧做出了无数种解释。形成了无止境的模糊与猜测。这与《等待戈多》的情节如出一辙。有人称它影射的是冷战、或法国抵抗运动、或英国对爱尔兰的殖民统治。二位主角间的关系也引起了激烈的辩论。有人认为他们是世界末日的幸存者，或是一对年迈夫妇，或两个无助的朋友，甚至是弗洛伊德“本我”和“自我”的化身。广为人知的是，贝克特称他唯一确定的是弗拉季米尔与爱斯特拉冈”戴着礼帽“。同评论家的猜测及令人抓狂的情节一样，两个人物的语言常常像绕圈子，他们时而斗嘴时而打趣，迷失了思考的方向，又在他们停顿的地方开始。弗拉季米尔：或许我们可以重新开始，爱斯特拉冈: 应该不难。弗拉季米尔：难的是开头。爱斯特拉冈：你可以从任何地方开始。弗拉季米尔：是的，但你得决定一个地方。贝克特提醒我们，就像日常生活一样，舞台上的世界并不总是说得通。它既可以探索现实，也可以探索虚幻，既可以探索熟悉的，也可以探索陌生的。虽然人们仍喜欢有条有理的情节，但最好的戏剧让我们不断思考，不断等待。

**P634 2018-09-17 History through the eyes of a chicken - Chris A. Kniesly**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=634)

The annals of Ancient Egyptian king Thutmose III described a marvelous foreign bird that “gives birth daily.” Zoroastrians viewed them as spirits whose cries told of the cosmic struggle between darkness and light. Romans brought them on their military campaigns to foretell the success of future battles. And today, this bird still occupies an important, though much less honorable position – on our dinner plates. The modern chicken is descended primarily from the Red Junglefowl, and partially from three other closely related species, all native to India and Southeast Asia. The region’s bamboo plants produce massive amounts of fruit just once every few decades. Junglefowls’ ability to lay eggs daily may have evolved to take advantage of these rare feasts, increasing their population when food was abundant. This was something humans could exploit on a consistent basis, and the birds’ weak flight capabilities and limited need for space made them easy to capture and contain. The earliest domesticated chickens, dating at least back to 7,000 years ago, weren’t bred for food, but for something considered less savory today. The aggressiveness of breeding males, armed with natural leg spurs, made cockfighting a popular entertainment. By the second millennium BCE, chickens had spread from the Indus Valley to China and the Middle East to occupy royal menageries and to be used in religious rituals. But it was in Egypt where the next chapter in the bird’s history began. When a hen naturally incubates eggs, she will stop laying new ones and sit on a “clutch” of 6 or more eggs for 21 days. By the middle of the 1st millennium BCE, the Egyptians had learned to artificially incubate chicken eggs by placing them in baskets over hot ashes. That freed up hens to continue laying daily, and what had been a royal delicacy or religious offering became a common meal. Around the same time as Egyptians were incubating eggs, Phoenician merchants introduced chickens to Europe, where they quickly became an essential part of European livestock. However, for a long time, the chicken’s revered status continued to exist alongside its culinary one. The Ancient Greeks used fighting roosters as inspirational examples for young soldiers. The Romans consulted chickens as oracles. And as late as the 7th Century, the chicken was considered a symbol for Christianity. Over the next few centuries, chickens accompanied humans wherever they went, spreading throughout the world through trade, conquest, and colonization. After the Opium Wars, Chinese breeds were brought to England and crossed with local chickens. This gave rise to a phenomenon called “Hen Fever” or “The Fancy”, with farmers all over Europe striving to breed new varieties with particular combinations of traits. This trend also caught the attention of a certain Charles Darwin, who wondered if a similar selective breeding process occurred in nature. Darwin would observe hundreds of chickens while finalizing his historic work introducing the theory of Evolution. But the chicken’s greatest contribution to science was yet to come. In the early 20th century, a trio of British scientists conducted extensive crossbreeding of chickens, building on Gregor Mendel’s studies of genetic inheritance. With their high genetic diversity, many distinct traits, and only 7 months between generations, chickens were the perfect subject. This work resulted in the famous Punnett Square, used to show the genotypes that would result from breeding a given pairing. Since then, numerous breeding initiatives have made chickens bigger and meatier, and allowed them to lay more eggs than ever. Meanwhile, chicken production has shifted to an industrial, factory-like model, with birds raised in spaces with a footprint no larger than a sheet of paper. And while there’s been a shift towards free-range farming due to animal rights and environmental concerns, most of the world’s more than 22 billion chickens today are factory farmed. From gladiators and gifts to the gods, to traveling companions and research subjects, chickens have played many roles over the centuries. And though they may not have come before the proverbial egg, chickens’ fascinating history tells us a great deal about our own.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=634)

翻译人员: Ruilin Yao 校对人员: Lipeng Chen古埃及国王图特摩斯三世的纪录里记载着一只“每天都生育”的奇妙的外来鸟。祆教视它们为呐喊着宇宙在黑暗与光明之间的困扰的灵魂。罗马人在战场上用它们来预测未来战事的胜算。而如今，这类鸟依然非常重要，虽然不再那么光彩地，出现在我们的餐桌上。现代的鸡主要源自于红原鸡，部分源自于3个有密切关联的种类，它们全都源于印度和东南亚。这个地带的竹子每十几年才生产大量的果实。红原鸡每天都能下蛋的本领可能已经演变为利用这些罕见的盛宴，在食物充足时增加它们的数量。这是人们一贯会利用的一点，鸟儿衰弱的飞行能力和对空间有限的需求使它们很容易被捉到。最早的养的鸡，要追溯到至少7000年前，它们并不是养来吃的而是被用在非食用的其他方面。饲养的公鸡与生俱来的腿部力量，这种攻击性，使斗鸡变成一种很流行的娱乐。但是公元前二世纪，鸡从印度河流域遍布到中国和中东，占据了皇家动物园，也被在宗教仪式上使用。但是在埃及，鸟的历史的下一篇章拉开了序幕。当一个母鸡自然的孵蛋时，她会暂停生一个新蛋而是在六个或多个蛋上坐21天。等到了公元前一世纪中期，埃及人学会了通过把他们放在热灰上的篮子里来人工孵蛋。这让母鸡开始有自由每天下蛋，这才让以前的皇家专供食物或者宗教供品，成为了日常食物。差不多在埃及人孵蛋的同个时间，腓尼基商人把鸡引入到欧洲，在那里，鸡很快成为了欧洲家畜的重要组成部分。然而，长时间以来，鸡被尊敬的地位即使变成烹饪食物，也一直存在着。古希腊人用斗鸡当成对年轻士兵的精神榜样。罗马人把鸡当作神谕。到了七世纪，鸡被认作是基督教的象征。之后的几个世纪，有人的地方，就有鸡，鸡通过贸易，战争，殖民统治遍布了世界。鸦片战争之后，中国鸡被带到了英国和当地的鸡进行了杂交。这引起了一个现象被称作“鸡热潮”，或“幻想”，欧洲的农民们全都开始养这个有着特别结合特征的新品种。这个趋势也带来了达尔文的一些关注，他好奇这种类似的选择性繁殖过程 在大自然中是否存在。达尔文观察了上百只鸡，同时也写完了他史诗级的作品，介绍了进化的理论。但是鸡对科学最大的贡献还没到来。20世纪初期，三个英国科学家操作了大量的鸡的杂交，完善了孟德尔的基因遗传学说。鸡有着高遗传多样性，很多不同的特性，每两代中间只有七个月间隔，这些特点让鸡成为了完美的研究对象。这个研究带来了著名的旁氏表，是一种用来展示杂交给定组合的基因类型的表。从那以后，很多饲养鸡变得又大又肥，能让它们生更多的鸡蛋。同时，鸡的生产转变为工业化、 工厂式的模型，禽类在不超过一张纸大小的地方长大。同时，也有向散养农场的转变，这是出于对动物权利和环境的考虑，世界上绝大多数，超过220亿的鸡是工厂养的。从公开表演的决斗者和给上帝的礼物，到旅行伴侣和研究对象，鸡在历史中扮演了重要的角色。尽管它可能比众所周知的蛋出现的更早，但鸡的迷人的历史也告诉了 我们关于我们自己的历史。

**P635 2018-09-17 The fascinating science behind phantom limbs - Joshua W. Pate**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=635)

The vast majority of people who’ve lost a limb can still feel it— not as a memory or vague shape, but in complete lifelike detail. They can flex their phantom fingers and sometimes even feel the chafe of a watchband or the throb of an ingrown toenail. And astonishingly enough, occasionally even people born without a limb can feel a phantom. So what causes phantom limb sensations? The accuracy of these apparitions suggests that we have a map of the body in our brains. And the fact that it’s possible for someone who’s never had a limb to feel one implies we are born with at least the beginnings of this map. But one thing sets the phantoms that appear after amputation apart from their flesh and blood predecessors: the vast majority of them are painful. To fully understand phantom limbs and phantom pain, we have to consider the entire pathway from limb to brain. Our limbs are full of sensory neurons responsible for everything from the textures we feel with our fingertips to our understanding of where our bodies are in space. Neural pathways carry this sensory input through the spinal cord and up to the brain. Since so much of this path lies outside the limb itself, most of it remains behind after an amputation. But the loss of a limb alters the way signals travel at every step of the pathway. At the site of an amputation, severed nerve endings can thicken and become more sensitive, transmitting distress signals even in response to mild pressure. Under normal circumstances, these signals would be curtailed in the dorsal horn of the spinal cord. For reasons we don’t fully understand, after an amputation, there is a loss of this inhibitory control in the dorsal horn, and signals can intensify. Once they pass through the spinal cord, sensory signals reach the brain. There, the somatosensory cortex processes them. The entire body is mapped in this cortex. Sensitive body parts with many nerve endings, like the lips and hands, are represented by the largest areas. The cortical homunculus is a model of the human body with proportions based on the size of each body part’s representation in the cortex, The amount of cortex devoted to a specific body part can grow or shrink based on how much sensory input the brain receives from that body part. For example, representation of the left hand is larger in violinists than in non-violinists. The brain also increases cortical representation when a body part is injured in order to heighten sensations that alert us to danger. This increased representation can lead to phantom pain. The cortical map is also most likely responsible for the feeling of body parts that are no longer there, because they still have representation in the brain. Over time, this representation may shrink and the phantom limb may shrink with it. But phantom limb sensations don’t necessarily disappear on their own. Treatment for phantom pain usually requires a combination of physical therapy, medications for pain management, prosthetics, and time. A technique called mirror box therapy can be very helpful in developing the range of motion and reducing pain in the phantom limb. The patient places the phantom limb into a box behind a mirror and the intact limb in front of the mirror. This tricks the brain into seeing the phantom rather than just feeling it. Scientists are developing virtual reality treatments that make the experience of mirror box therapy even more lifelike. Prosthetics can also create a similar effect— many patients report pain primarily when they remove their prosthetics at night. And phantom limbs may in turn help patients conceptualize prosthetics as extensions of their bodies and manipulate them intuitively. There are still many questions about phantom limbs. We don’t know why some amputees escape the pain typically associated with these apparitions, or why some don’t have phantoms at all. And further research into phantom limbs isn’t just applicable to the people who experience them. A deeper understanding of these apparitions will give us insight into the work our brains do every day to build the world as we perceive it. They’re an important reminder that the realities we experience are, in fact, subjective.

**P635 2018-09-17 The fascinating science behind phantom limbs - Joshua W. Pate**

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翻译人员: Yifan L 校对人员: Hanlin Wang大多数失去肢体的人们 仍能感受到它们的存在—其形式并非记忆或者模糊的形状， 而是人能感受到的种种逼真细节。他们能弯曲幻肢中的手指有时甚至可以感受到手表表带的摩擦或者嵌甲的刺痛。更惊人的是，有时那些生来就肢体残疾的人 也能感受到这种幻觉。所以是什么造成了 幻肢的感知呢？这些幻觉感知的精确度暗示着我们的大脑里有一张身体地图。而生来便肢体残疾的人有可能感受到幻肢的这个事实，说明了我们从出生以来 就拥有地图的起点。但是在截肢后出现的这种幻肢与原有肢体之间的区别在于:大部分幻肢都带有疼痛感。为了全面了解幻肢和幻肢痛，我们必须研究从肢体到大脑的整条通道。我们的肢体上布满了感觉神经元 来对外界做出反应，包括我们指尖感受到的质感和对自己身体所处空间位置的理解。神经通道把这个感官输入从脊髓运输到大脑。由于通道的大部分都独立于肢体之外，它们都会在截肢后继续存在。但是失去肢体会改变信号穿过通道中的每一步过程。在截肢的部位，切断的神经末梢会变厚 并且变得更为敏感，它即使在温和的刺激下 也会传递痛觉信号。在正常情况下，这些信号会在脊髓背角神经元处被截断。出于一些我们还未知的原因，在截肢后脊髓背角处的抑制作用有一定的减弱，所以痛觉信号就会被放大。一旦通过了脊髓这一关， 信号就会被传递至大脑。在那里，躯体感觉皮层会处理这些信号。人的整个身体的知觉都被 这个皮层分区处理。布满神经末梢的敏感部位，比如说嘴唇和手，占据了最大面积。”皮质小人“ 是一种人体模型他的身材比例代表了身体 各个部位在皮层中所占比重，与身体部分所关联的皮层量 受大脑所接受的感官输入影响会增多或者减少。打个比方，小提琴家的左手比非小提琴家占据更大面积的皮层。当身体的一部分受伤时，大脑也会增加这一块皮层的比例，从而放大这种感官并警告我们远离危险。增大的皮层量会造成幻肢痛。皮层地图很有可能让我们不复存在的身体部分有了感知，因为这些身体部分 还存在于大脑的地图中。久而久之，幻肢也许会因为 皮层减少而消失，但幻肢痛却不会自己消失。想要治疗幻肢痛通常需要结合物理治疗、止痛药，义肢和时间。有一种治疗方法叫做镜箱治疗，它能帮助幻肢运动并减少疼痛感。患者把自己的幻肢放入镜子背后的箱子，把完好的手放在镜子前，这便让患者的大脑误以为 看见了真正的肢体，而不只是感觉到它。科学家们正在研发虚拟现实治疗，从而使镜箱治疗更加真实。义肢也能产生同样的效果：许多患者称他们在晚上卸掉义肢时感到了疼痛。也许幻肢会帮助这些患者，让他们将义肢视作身体的一部分，并更轻松地使用自己的义肢。围绕着幻肢的疑问还有很多，我们不知道为什么有些被截肢者并没有感觉到幻肢的痛，而有些人甚至完全感受不到幻肢。我们深入研究幻肢，不仅仅是为了帮助有幻肢感的人。对幻肢的深入了解还能使我们更深入理解大脑的运行方式，以及大脑怎样建立我们所认知的世界。这些认识提醒着我们，我们所经历的现实，一直都是主观上的。

**P636 2018-09-20 What if cracks in concrete could fix themselves - Congrui Jin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=636)

Concrete is the most widely used construction material in the world. It can be found in swathes of city pavements, bridges that span vast rivers, and the tallest skyscrapers on earth. But this sturdy substance does have a weakness: it’s prone to catastrophic cracking that costs tens of billions of dollars to repair each year. But what if we could avoid that problem, by creating concrete that heals itself? This idea isn’t as far-fetched as it may seem. It boils down to an understanding of how concrete forms, and how to exploit that process to our benefit. Concrete is a combination of coarse stone and sand particles, called aggregates, that mix with cement, a powdered blend of clay and limestone. When water gets added to this mix, the cement forms a paste and coats the aggregates, quickly hardening through a chemical reaction called hydration. Eventually, the resulting material grows strong enough to prop up buildings that climb hundreds of meters into the sky. While people have been using a variety of recipes to produce cement for over 4,000 years, concrete itself has a surprisingly short lifespan. After 20 to 30 years, natural processes like concrete shrinkage, excessive freezing and thawing, and heavy loads can trigger cracking. And it’s not just big breaks that count: tiny cracks can be just as dangerous. Concrete is often used as a secondary support around steel reinforcements. In this concrete, even small cracks can channel water, oxygen, and carbon dioxide that corrode the steel and lead to disastrous collapse. On structures like bridges and highways that are constantly in use, detecting these problems before they lead to catastrophe becomes a huge and costly challenge. But not doing so would also endanger thousands of lives. Fortunately, we’re already experimenting with ways this material could start fixing itself. And some of these solutions are inspired by concrete’s natural self-healing mechanism. When water enters these tiny cracks, it hydrates the concrete’s calcium oxide. The resulting calcium hydroxide reacts with carbon dioxide in the air, starting a process called autogenous healing, where microscopic calcium carbonate crystals form and gradually fill the gap. Unfortunately, these crystals can only do so much, healing cracks that are less than 0.3mm wide. Material scientists have figured out how to heal cracks up to twice that size by adding hidden glue into the concrete mix. If we put adhesive-filled fibers and tubes into the mixture, they’ll snap open when a crack forms, releasing their sticky contents and sealing the gap. But adhesive chemicals often behave very differently from concrete, and over time, these adhesives can lead to even worse cracks. So perhaps the best way to heal large cracks is to give concrete the tools to help itself. Scientists have discovered that some bacteria and fungi can produce minerals, including the calcium carbonate found in autogenous healing. Experimental blends of concrete include these bacterial or fungal spores alongside nutrients in their concrete mix, where they could lie dormant for hundreds of years. When cracks finally appear and water trickles into the concrete, the spores germinate, grow, and consume the nutrient soup that surrounds them, modifying their local environment to create the perfect conditions for calcium carbonate to grow. These crystals gradually fill the gaps, and after roughly three weeks, the hard-working microbes can completely repair cracks up to almost 1mm wide. When the cracks seal, the bacteria or fungi will make spores and go dormant once more— ready to start a new cycle of self-healing when cracks form again. Although this technique has been studied extensively, we still have a ways to go before incorporating it in the global production of concrete. But, these spores have huge potential to make concrete more resilient and long-lasting— which could drastically reduce the financial and environmental cost of concrete production. Eventually, these microorganisms may force us to reconsider the way we think about our cities, bringing our inanimate concrete jungles to life.

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翻译人员: Wanna Shi 校对人员: Liu Qi混凝土是世界上 使用最广泛的建筑材料。常见于一条条城市道路，跨江大桥，和高耸入云的摩天大楼。但是这种坚固的物质有一个弱点：容易出现毁灭性的裂缝，每年要花费数百亿美元 来修补这些裂缝。如果我们能发明自我修复的混凝土 来避免这个问题呢？这个想法并不像 看上去那么遥不可及。简单来说是要明白混凝土是怎么形成的，并且要知道怎样才能 利用这一过程。混凝土是一种混合物，由粗石料和沙砾，称为集料，与水泥混合，水泥是黏土和石灰岩 构成的粉状混合物。在混合物中加入水后，水泥变成糊状物，包裹住集料，通过化学反应迅速硬化，这一过程即水合反应。最终形成的材料十分强固，足以用来建设百米高楼，高耸入云。虽然人们尝试了各种方法生产水泥，已经有 4000 多年的历史了，但混凝土本身的寿命 却出人意料地短暂。混凝土浇筑二三十年后，自然过程，例如混凝土收缩、过度融冻，及负荷过重都会引发裂缝。危险的不仅仅是大裂缝，小裂缝也同样危险。混凝土一般用作 钢结构周围的二级支撑。混凝土中的小裂缝会成为水、氧气和二氧化碳的通道，而这些物质会腐蚀钢结构，导致灾难性坍塌。针对桥梁、道路这类频繁使用的结构物，在灾难形成前，进行问题排查，是一项巨大而昂贵的挑战。但不这么做的话，又会危及数千条生命。幸运的是，我们正在试验各种方法，让混凝土进行自我修复。其中一些方法，灵感来自于混凝土天然的 自我修复机制。水进入小裂缝之后，会与混凝土的氧化钙发生水合作用，产生的氢氧化钙与空气中的二氧化碳反应，于是，混凝土开始了自我修复，也就是微小的额碳酸钙晶体形成，逐渐填补裂缝的过程。不幸的是，碳酸钙晶体“能力有限”，只能填补宽度小于 0.3 mm的裂缝。材料科学家已经找到了让修复宽度翻一倍的方法，即在混凝土混合物中加入胶粘剂。如果我们将纤维胶液管，加入到混凝土混合物中，那么在出现裂缝时，纤维胶液管就会破裂，释放出胶粘剂修复裂缝。但是胶粘剂化学物质的运动与混凝土截然不同，所以时间一长，胶粘剂反而会造成更大的裂缝。或许大裂缝最好的修复方式是给混凝土提供自我愈合的工具。科学家已经发现一些细菌和真菌 能够生成矿物质，还有可以自我愈合的碳酸钙。混凝土试配中，在混凝土混合物中 加入细菌和真菌孢子以及养分，这些孢子可以在此休眠， 时间长达数百年。最终当裂缝出现， 水渗入混凝土裂缝时，孢子就会开始发芽生长，消耗周围养分，改变周围环境，为碳酸钙的形成创造完美条件。碳酸钙晶体会慢慢填补裂缝，大约三周后，这些勤勤恳恳的微生物就能完全修复宽达 1mm 的裂缝。当裂缝修复后，这些细菌和真菌会 重新回到孢子状态，重新进入休眠状态。等待裂缝再次出现时，开始新一轮的自我修复。虽然这项技术已经被广泛研究，但是将这种办法用于全球混凝土生产，还有很长的路要走。不过这些孢子拥有巨大的潜力，能使混凝土更加持久耐用——这能大大降低混凝土生产的 资金和环境成本。最后，或许这些微生物会促使我们重新审视 我们看待城市的方式，让毫无生气的混凝土丛林 焕发勃勃生机。

**P637 2018-09-26 The princess who rewrote history - Leonora Neville**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=637)

Alexios Komnenos, Byzantine emperor, led his army to meet the Scythian hordes in battle. For good luck, he carried one of the holiest relics in Christendom: the veil that had belonged to the Virgin Mary. Unfortunately, it didn’t help. Not only was his army defeated, but as they fled, the Emperor was stabbed in the buttocks. To make matters worse, a strong wind made the relic too heavy to carry, so he stashed it in some bushes as he escaped. But even as he fled, he managed to slay some Scythians and rescue a few comrades. At least, this is how Alexios' daughter Anna recounted the story, writing nearly 60 years later. She spent the last decade of her long life creating a 500-page history of her father’s reign called The Alexiad. Written in Greek, the book was modeled after ancient Greek epics and historical writings. But Anna had a different, trickier task than the writers in these traditions: as a princess writing about her own family, she had to balance her loyalty to her kin with her obligation to portray events accurately, navigating issues like Alexios’s embarrassing stab to the buttocks. A lifetime of study and participation in her father’s government prepared Anna for this undertaking. Anna was born in 1083, shortly after her father seized control of the Roman Empire following a decade of brutal civil wars and revolts. The empire was deep in decline when he came to power, and threatened from all sides: by the Seljuk Turks in the East, the Normans in the West, and Scythian raiders to the north. Over the course of Anna’s childhood and adolescence, Alexios fought constant military campaigns to secure the frontiers of his empire, even striking up an uneasy alliance with the Crusaders. Meanwhile in Constantinople, Anna fought her own battle. She was expected to study subjects considered proper for a Byzantine princess, like courtly etiquette and the Bible, but preferred classical myth and philosophy. To access this material, she had to learn to read and speak Ancient Greek, by studying secretly at night. Eventually her parents realized how serious she was, and provided her with tutors. Anna expanded her studies to classical literature, rhetoric, history, philosophy, mathematics, astronomy, and medicine. One scholar even complained that her constant requests for more Aristotle commentaries were wearing out his eyes. At age fifteen, Anna married Nikephoros Bryennios to quell old conflicts between their families and strengthen Alexios’s reign. Fortunately, Anna and Nikephoros ended up sharing many intellectual interests, hosting and debating the leading scholars of the day. Meanwhile, Alexios’s military excursions began to pay off, restoring many of the empire’s former territories. As her father aged, Anna and her husband helped her parents with their imperial duties. During this time, Anna reportedly advocated for just treatment of the people in their disputes with the government. After Alexios’s death, Anna’s brother John ascended to the throne and Anna turned back to philosophy and scholarship. Her husband had written a history arguing that his grandfather would have made a better emperor than Alexios, but Anna disagreed. She began working on the Alexiad, which made the case for her father's merits as emperor. Spanning the late 11th and early 12th centuries of Byzantine history, the Alexiad recounts the tumultuous events of Alexios’s reign, and Anna’s own reactions to those events, like bursting into tears at the thought of the deaths of her parents and husband. She may have included these emotional passages in hopes that they would make her writing more palatable to a society that believed women shouldn't write about battles and empires. While her loyalty to her father was evident in her favorable account of his reign, she also included criticism and her opinions of events. In the centuries after her death, Anna’s Alexiad was copied over and over, and remains an invaluable eyewitness account of Alexios’s reign today. And through her epic historical narrative, Anna Komnene secured her own place in history.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=637)

翻译人员: Ming Liu 校对人员: dai shijie拜占庭皇帝，约翰二世·科穆宁，带领他的军队，去迎战斯基泰人。为了得到好运，他带着一件在基督教世界中最神圣的遗物之一：属于圣母玛利亚的面纱。然而这对他并没有帮助，他的军队不仅被击败了，并且当他们逃跑时，皇帝的臀部被刺伤了。更糟糕的是，强风使得遗物太重而无法携带。所以当他逃跑时，把它藏在了灌木丛中。但是即使他逃跑了，他设法杀死了一些斯基泰人，并且解救了几名队友。至少这是约翰二世的女儿安娜在将近60年后所回忆的故事。她花费了她漫长生命中的最后十年，创作了五百页的历史书，这本历史书讲述关于她父亲的统治， 书名为《约翰二世》。这本书是用希腊语书写的，仿照了古希腊史诗和历史书的写法。然而与传统的作家相比，安娜有一个不同的且更棘手的任务，作为一名撰写有关于她自己家庭事迹的公主，她不得不平衡她对家族的忠诚，与准确描述事实的义务，例如描述类似刺伤约翰二世的臀部这样尴尬的事情。她在她父亲的政府学习和工作了一生，这使得安娜可以承担这项任务。安娜出生于1083年，她是在她父亲控制罗马帝国不久以后出生的。接下来的十年是残酷的内战，以及起义。在皇帝掌权的时候，帝国快速衰落，并受到各方的威胁；被东方的土耳其人、西方的诺曼人、以及北方的斯基泰人入侵者所威胁。在安娜的童年和青春期，约翰二世一直在进行军事行动以保护他的帝国的边境，甚至打破了与十字军之间不稳定的联盟。与此同时，在君士坦丁堡，安娜为自己而战。人们期待她去学习那些适合拜占庭公主的课程，比如宫廷礼仪和圣经。但是她自己喜欢古典神话以及哲学。为了获得这类资料，她不得不晚上偷偷地学习古希腊语的阅读和口语。最终她的父母意识到，她是认真的，并为她提供了老师。安娜将她的学习扩展到了古典文学、修辞学、历史、哲学、数学、天文学和医学。一位学者甚至抱怨她一直在要求更多亚里士多德的评论，并且从未停止过。十五岁的时候，安娜与尼基弗鲁斯·布林尼乌斯结婚，以平息他们家族之间的旧曾经的冲突，并加强约翰二世的统治。幸运的是，安娜和尼基弗鲁斯最终有着许多知识方面的共同兴趣，比如讨论当时的一些主要学者的观点。与此同时，约翰二世的军事行动开始有了起色，收复了许多帝国曾经的领土。随着她父亲的老去，安娜和她的丈夫帮助她的父母管理国家。在这期间，安娜主张合理对待人民与政府的纠纷。在约翰二世死后，安娜的兄弟约翰登上了王位，安娜转身投入到哲学的研究中。她的丈夫写了一本历史书评论他的祖父，他说他的祖父与约翰二世相比会成为一个更好的皇帝。但安娜不同意，她开始撰写《约翰二世》，研究她的父亲作为一名君主的优点。《约翰二世》叙述了在拜占庭历史拜占庭历史中，11世纪末和12世纪初之际，约翰二世统治时期的动荡事件，以及安娜自己对这些事件的反应。例如一想起她父母和丈夫的死去就流出的泪水。她也许在这些情感性充满感情的文章中，加入了希望，希望社会可以接受女性也可以记录战争和帝国统治。尽管她对她父亲的忠诚在她对他统治的描述中很明显，她同时也加入了她自己的批评和看法。在她去世后的几个世纪中，安娜的著作《约翰二世》被 一遍又一遍地重新印刷，并且在当今仍然是有关约翰二世的统治的无价的资料。通过她对历史的史诗般的描述，安娜·科穆宁得以保证她在历史中独一无二的地位。

**P638 2018-09-27 Can you solve the killer robo-ants riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=638)

The good news is that your experimental robo-ants are a success! The bad news is that you accidentally just gave them the ability to shoot deadly lasers …and you can’t turn it off. You have five minutes to stop them before the lasers go online. Until then, all of your robo-ants will walk inside their habitat at a speed of exactly 1 meter per minute. If they bump into each other or hit a dead end, they’ll instantly turn around and walk back the way they came. When five minutes are up, they’ll turn on their lasers, break free, and stream out into the world, carving a path of destruction as they go. Your one chance to stop them is to insert the two emergency vacuum nozzles into the habitat and suck the ants up before they break free. The nozzles can press into any one location in the habitat through a membrane covering its front side, and any ants that walk past will be sucked up and deactivated. You can’t move the nozzles once they’re placed without leaving a hole that the robo-ants would pour out of, so choosing the right spots will be key. The habitat is made out of meter-long tubes. When the robots reach an intersection, they will pick randomly whether to go left, right, or forward. They only go backward if they hit hit another robo-ant or a dead end. Unfortunately, there are hundreds of them inside the habitat, and if even one escapes, it’ll do a lot of damage. With just less than five minutes remaining, where should you place the 2 vacuum nozzles to suck up all the robo-ants? Pause the video now if you want to figure it out for yourself. Answer in: 3 Answer in: 2 Answer in: 1 With robo-ants ricocheting all over the habitat, it might seem impossible to stop them before they break free. But this situation is simpler than it seems. Here's why. Imagine just two robo-ants crawling toward each other. When they collide, they immediately reverse directions. And what would that sequence of events look like if they crawled past each other instead? It would look exactly the same before and after their collision, but with their positions swapped. This is true every time a pair of robo-ants meet. Because the identities of individual ants don’t matter, you just need to figure out where you should put the nozzles to capture any single ant walking without interruption for less than 5 minutes, starting from any point in the habitat. That’s much easier to conceptualize and solve. Placing the nozzles at intersections where three or four tubes meet seems like your best bet since that’s where the robo-ants might otherwise change directions and miss your nozzles. There are only four intersections… which two should you pick? The top right intersection has to be one of them. If it isn’t, an ant crawling down from this intersection toward the dead end would crawl for four minutes to get back to the intersection, and then go in any of three directions, walking for at least another minute. Once you’ve placed a nozzle in the top right, the only other choice that has a chance to work is the bottom left. To see that this works, imagine an ant anywhere else in the habitat. Worst case scenario, the ant would start right next to the vacuum nozzle, marching away from it. But in all those worst cases, the ant would march for at most 4 meters before being sucked up into the vacuum. No other choice of two intersection points is guaranteed to get all the robo-ants within five minutes. Having vacuumed them all up, you’ve averted a major crisis. Before you mess with robo-ants again, you’ll want to have a robo-anteater ready. And wouldn’t it be cool if it could fly and breathe fire? There’s no way that could go wrong!

**P638 2018-09-27 Can you solve the killer robo-ants riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=638)

翻译人员: Leonard Au 校对人员: Lipeng Chen好消息是，你的机器蚁实验成功了。坏消息是，你不小心赋予了它们发射致命激光的能力，却又无法把它关掉。你有五分钟的时间在激光系统启动之前制止它们。在此之前，所有机器蚁会在窝里行走，速度为每分钟一米。要是迎面碰上，或者走到了死胡同，它们立刻就会转身，往原来的方向走回去。五分钟一到，它们就会启动激光，逃出蚁窝，往外流窜，走到哪里，摧毁哪里。制止它们的唯一机会，就是将两条紧急真空吸嘴插进蚁窝，在蚂蚁逃脱之前把它们吸走。吸嘴可以插进蚁窝的任何位置，只需穿破前面的膜就可，蚂蚁只要经过吸嘴，就会被吸走并且被解除。吸嘴插入蚁窝后就不能再移动，不然会留下洞口，让机器蚁大量涌出。所以，选择正确的位置非常重要。蚁窝由一米长的管制作而成。蚂蚁一走到交叉口，就会随机选择往左、往右或往前走。他们只有在碰到另一只机器蚁或者走到死胡同时才转头。不幸的是，蚁窝里有数百只蚂蚁，就算只有一只蚂蚁逃脱，它也会造成很大的破坏。现在只剩下少过五分钟，两个真空吸嘴应该插在哪里，才能把所有机器蚂蚁吸掉？（如果要自己想答案，请现在暂停视频！）机器蚁在蚁窝里到处流窜，趁它们逃脱之前制止它们，好像是不可能的事情。但是这个状况比想象中更简单。为什么呢？想象两只机器蚁相向而行。它们一碰撞，就会立刻转身。如果它们只是经过彼此的话， 情况会怎样呢？不管是在碰撞前后都一样，只是两只蚂蚁的位置对调了。只要有两只机器蚁相遇，情况都一样。个体蚂蚁的身份不重要，所以你只需要找出正确的插吸嘴位置，在少于5分钟的时间内，捕捉到每一只不停行走的蚂蚁，不管它从蚁窝里的什么位置开始行走。有了这个概念，问题就更容易解决了。把吸嘴放在三、四条管的交叉口，可能就是最佳选择，因为机器蚁可能会在这里换方向，从而躲避了你的吸嘴。交叉口只有四个，你该选择哪两个呢?右上方交叉口必须是其中一个，要不然，如果蚂蚁从这里走向死胡同，它爬行四分钟后将会回到交叉口，然后从三个方向中选择一个，继续行走至少一分钟。一旦在右上方插入了吸嘴，就只剩下一个有效的选择，就是左下方交叉口。为了证明这样有效，想象一下蚁窝内任何位置的一只蚂蚁。最糟的情况下，蚂蚁从吸嘴旁边开始，背对着吸嘴行走。但是就算在这些情况下，蚂蚁爬行最多四米后，就会被真空吸走。除这两个交叉口的组合之外，其它组合都无法保证 能在五分钟内吸走所有蚂蚁。吸掉了所有蚂蚁，就化解了一次重大危机。下次再玩机器蚂蚁之前，最好先准备一只机器食蚁兽。要是它能飞、能喷火，那该有多酷！这样就不会出问题了！

**P639 2018-10-01 Why can't some birds fly - Gillian Gibb**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=639)

In the lush rainforests of Australia, birds roost in the low branches and amble across the forest floor, enjoying the shade and tropical fruits. But the jungle isn’t theirs alone. A dingo is prowling in the shadows, and fruit won’t satisfy his appetite. The birds flee to safety all but the cassowary, who can’t clear the ground on her puny wings. Instead, she attacks, sending the dingo running for cover with one swipe of her razor-sharp toe claws. The cassowary is one of approximately 60 living species of flightless birds. These earthbound avians live all over the world, from the Australian outback to the African savanna to Antarctic shores. They include some species of duck and all species of penguin, secretive swamp dwellers and speedy ostriches, giant emus, and tiny kiwis. Though the common ancestor of all modern birds could fly, many different bird species have independently lost their flight. Flight can have incredible benefits, especially for escaping predators, hunting, and traveling long distances. But it also has high costs: it consumes huge amounts of energy and limits body size and weight. A bird that doesn’t fly conserves energy, so it may be able to survive on a scarcer or less nutrient-rich food source than one that flies. The Takahe of New Zealand, for example, lives almost entirely on the soft base of alpine grasses. For birds that nest or feed on the ground, this predisposition to flightlessness can be even stronger. When a bird species doesn’t face specific pressures to fly, it can stop flying in as quickly as a few generations. Then, over thousands or millions of years, the birds’ bodies change to match this new behavior. Their bones, once hollow to minimize weight, become dense. Their sturdy feathers turn to fluff. Their wings shrink, and in some cases disappear entirely. And the keel-like protrusion on their sternums, where the flight muscles attach, shrinks or disappears, except in penguins, who repurpose their flight muscles and keels for swimming. Most often, flightlessness evolves after a bird species flies to an island where there are no predators. As long as these predator-free circumstances last, the birds thrive, but they are vulnerable to changes in their environment. For instance, human settlers bring dogs, cats, and stowaway rodents to islands. These animals often prey on flightless birds and can drive them to extinction. In New Zealand, stoats introduced by European settlers have threatened many native species of flightless bird. Some have gone extinct while others are endangered. So in spite of the energy-saving advantages of flightlessness, many flightless bird species have only a short run before going the way of the dodo. But a few flightless birds have survived on mainlands alongside predators aplenty. Unlike most small flightless species that come and go quickly, these giants have been flightless for tens of millions of years. Their ancestors appeared around the same time as the first small mammals, and they were probably able to survive because they were evolving— and growing—at the same time as their mammalian predators. Most of these birds, like emus and ostriches, ballooned in size, weighing hundreds of pounds more than wings can lift. Their legs grew thick, their feet sturdy, and newly developed thigh muscles turned them into formidable runners. Though they no longer use them to fly, many of these birds repurpose their wings for other means. They can be spotted tucking their heads beneath them for warmth, flashing them at prospective mates, sheltering eggs with them, or even using them to steer as they charge across the plains. They may be flightless, but they’re still winging it.

**P639 2018-10-01 Why can't some birds fly - Gillian Gibb**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=639)

翻译人员: Rui Tang 校对人员: Congmei Han在澳大利亚茂盛的雨林里，鸟类们栖息在低矮的树杈上， 从森林的地面上漫步走过，尽情享受树荫和热带水果。但丛林里并不只有它们。一只澳洲野狗正在隐蔽处悄然潜行，水果显然无法满足它的胃口。鸟儿们还是顺利的逃走了，但是食火鸡，却无法用它孱弱的翅膀飞离地面。然而，它选择攻击澳洲野狗，用它锋利的脚趾给了 它的对手猛烈一击以把它赶跑。食火鸡就是现存的大约 60 种无法飞行的鸟类之一。这种只在陆地上活动的鸟类 在全世界都存在，从澳洲的腹地到非洲的热带草原、再到南极海岸， 都能见到它们。这些鸟类包含了一些种群的鸭子和全种类的企鹅， 以及秘密栖息在沼泽的鸟类、快速移动的鸵鸟、 巨大的鸸鹋、小小的鹬鸵。虽然，所有现代鸟类的共同祖先 都能够飞翔，但唯独一些个别种类的鸟却丧失了飞翔的能力。飞行有着许多好处，尤其是能够从逃脱被捕食、捕猎，并且到达很远的地方。但是，这也有很高代价：飞行需要消耗巨大的能量，并且在体积和体重上也会很受限制。一只鸟如果不飞就能节省体能，这可能会帮助它在面对食物匮乏或食物短缺的情况时，相比于 会飞的鸟，更容易生存下来。例如，新西兰的南秧鸟，一生几乎只生活在高山柔软的草地上。对于那些在陆地上 筑巢和进食的鸟类来说，这种不会飞的特质会令身体更强壮。当一种鸟的种群不需要面对明确的需要飞行的压力时，它们在经历过几代更迭后 很快就停止飞翔了。接着，千百万年后，这种鸟类的体型就会改变 以适应这种新的习性。它们的骨头， 一旦缩小到更小的重量，就会变得密度更高。它们坚固的羽毛变得蓬松。它们的翅膀变小，甚至在有些个例，完全消失了。同时，它们胸骨上如同船的龙骨一般 突起的地方，即飞行所需要的肌肉连接处， 逐渐缩小、消失，然而企鹅却是一种例外，它们 改变了用途，将飞行所依靠的肌肉和骨头用于游泳。通常来说，向不会飞的方向进化是当一种鸟的种群飞到一个没有捕食者的岛上，才逐渐开始的。只要这种无捕食者的环境还存在，这里的鸟类就会兴盛繁衍，但是它们在环境发生改变时也容易受重创。例如，人类移民把狗、猫还有其他的啮齿动物带到岛上。这些动物就会捕食 这些没有飞行能力的鸟，并逐渐把它们赶向灭绝。在新西兰，欧洲移民带来了白鼬对许多无法飞行的鸟类造成了威胁。一些种类已经灭绝， 而其他的也处于危险之中。所以，尽管不会飞的鸟类 有着体能储存的优点，但许多不会飞的鸟类难逃像渡渡鸟一样被灭绝的厄运。然而仍有些不具有飞行能力的鸟类在充满捕食者的大陆上生存着。与众多小型的、能够快速移动的 无飞行能力的鸟类不同，这些体积巨大的鸟类在过去的千百万年里都无法飞行。它们的祖先与最初的小型哺乳动物出现在同一时期，并且它们能幸存下来，可能是因为它们与这些哺乳动物一起进化并且变得巨大。这些鸟类中的大多数， 如鸸鹋和鸵鸟，体型激增，多达数百磅重以至于翅膀无法带动它们飞翔。它们的腿变细，脚变得坚硬，新生的大腿肌肉群使它们成为优秀的奔跑者。虽然它们不再用翅膀飞翔，但是许多这样的鸟类把翅膀用在了其他用途上。它们可以把头埋在翅膀下面以保暖，向它们喜欢的伴侣炫耀，保护自己的蛋，甚至用于在平原上冲刺时控制方向。它们可能无法飞翔，但它们仍然扇动着翅膀。

**P640 2018-10-06 Why should you read 'Don Quixote' - Ilan Stavans**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=640)

Mounting his skinny steed, the protagonist of Don Quixote charges an army of giants. In his eyes, it is his duty to vanquish these behemoths in the name of his beloved lady, Dulcinea. However, this act of valor is ill conceived. As his squire Sancho Panza explains to him time and again, these aren’t giants; they are merely windmills. Don Quixote is undeterred, but his piercing lance is soon caught in their sails. Never discouraged, the knight stands proudly, and becomes even more convinced of his mission. This sequence encapsulates much of what is loved about Don Quixote, the epic, illogical, and soulful tale of Alonso Quijano, who becomes the clumsy but valiant Don Quixote of la Mancha, known as the Knight of the Sorrowful Countenance. Originally published in two volumes, the narrative follows Don Quixote as he travels through central and northern Spain fighting the forces of evil. Despite Don Quixote’s lofty imagination, his creator, Miguel de Cervantes, could never have imagined his book would become the best-selling novel of all time. Barring 5 years as a soldier, and 5 more enslaved by pirates, Cervantes spent most of his life as a struggling poet and playwright. It wasn’t until his late 50’s that he published his greatest creation: an epic satire of chivalry novels. At this time, medieval books chronicling the adventures of knights and their moral code dominated European culture. While Cervantes was a fan, he was weary of these repetitive tomes, which focused more on listing heroic feats than character development. To challenge them, he wrote Don Quixote, the story of a hidalgo, or idle nobleman, who spends his days and nights reading chivalry novels. Driven mad by these stories, he fashions himself a champion for the downtrodden. Everyone in his village tries to convince him to give up his lunacy, going so far as to burn some of the lurid books in his personal library. But Don Quixote is unstoppable. He dresses up in old shining armor, mounts his skinny horse, and leaves his village in search of glory. Cervantes’ novel unfolds as a collection of episodes detailing the mishaps of the valiant knight. Yet unlike the chivalry books and perhaps all other prior fiction, Cervantes’ story deeply investigates the protagonist’s inner life. Don Quixote matures as the narrative develops, undergoing a noticeable transformation. This literary revelation has led many scholars to call Don Quixote the first modern novel. And this character development doesn’t happen in isolation. Early on, Don Quixote is joined by a villager-turned-squire named Sancho Panza. Sancho and Don Quixote are a study in opposites: with one as the grounded realist to the other’s idealism. Their lively, evolving friendship is often credited as the original hero and sidekick duo, inspiring centuries of fictional partnerships. Don Quixote was a huge success. Numerous editions were published across Europe in the seventeenth century. Even in the Americas, where the Church banned all novels for being sinful distractions, audiences were known to enjoy pirated editions. The book was so well received that readers clamored for more. After a rival author attempted to cash in on a fake follow-up, Cervantes released the official sequel in response. Now published alongside the first volume as a completed text, this second volume picks up where the original left off, only now Don Quixote and Sancho have become folk heroes. Just as in real-life, Cervantes included his novel’s success in the world of his characters. This unconventional meta-awareness created philosophical complexity, as the knight and his squire ponder the meaning of their story. Unfortunately, Cervantes had sold the book’s publishing rights for very little. He died rich in fame alone. But his treatise on the power of creativity and individualism has inspired art, literature, popular culture, and even political revolution. Don Quixote argues that our imagination greatly informs our actions, making us capable of change, and, indeed, making us human.

**P640 2018-10-06 Why should you read 'Don Quixote' - Ilan Stavans**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=640)

翻译人员: Riley WANG 校对人员: Lipeng Chen骑上瘦马，主人公堂吉诃德向一队巨人发起进攻。在他的眼中，以心爱的女人达辛妮亚之名，将这些庞然大物彻底击败 是他的职责所在，然而，这个英勇举动却欠缺考虑。他的随从桑秋·潘沙又一次向他解释，这些并非巨人；它们不过是风车而已。堂吉诃德仍不气馁，但是他刺出的长矛立刻就被风车的风帆卡住了。这位骑士永不泄气，他骄傲地挺直胸膛，更加确信自己的使命。这组景象反映了人们为何喜爱堂吉诃德，这个经典的、没有逻辑却真挚的，关于阿隆索·吉哈诺的故事。这位笨拙而又勇敢的主人公——拉曼却地区的堂吉诃德也被称为愁颜骑士。这本书最初分两卷出版，故事跟随堂吉诃德的脚步遍及西班牙中部和北部，记叙了他与邪恶势力的斗争。尽管堂吉诃德有出色的想象力，他的创作者米格尔·德·塞万提斯从未想到他的书竟能成为最畅销的小说。在做了五年士兵之后，塞万提斯被海盗奴役了五年，他在人生大部分的时间中都是一个痛苦的诗人和剧作家。直到50多岁时，他发布了自己最杰出的作品，一部经典的讽刺骑士小说。在当时，中世纪时期有很多书籍记述骑士历险故事和骑士道德准则，它们在欧洲文化中占据主导地位。虽然塞万提斯也是拥趸之一，但他对这些陈词滥调也感到厌倦，这些书的内容都旨在列举英雄事迹，而并非人物的成长发展。塞万提斯写下了堂吉诃德， 向这些骑士小说发起了挑战。这是关于一个游手好闲贵族的故事，这位西班牙绅士日日夜夜都在读骑士小说。他被这些小说搞疯了，把自己当成受压迫人民的捍卫者。同村庄的每个人都试图劝说他放弃这些愚蠢行为，村民甚至不惜烧掉堂吉诃德书房中的部分骑士小说。但是没有什么能阻止堂吉诃德，他穿起古老闪亮的铠甲，骑上他的瘦马，离开了村庄，前去寻找荣耀。塞万提斯的小说详细地展开了一组故事，描述了这位勇敢骑士的不幸遭遇。和其他骑士书籍不同，或者说和所有之前的虚构小说不同，塞万提斯的故事深刻探讨了主人公的内心世界。随着叙事的发展 堂吉诃德不断成熟，他经历了显而易见的改变。这种文学展开方式让许多学者将堂吉诃德称为第一本现代小说。这种人物性格的发展并不是割裂独立的，一开始，堂吉诃德的伙伴是同村的村民桑丘·潘沙，他后来成为了一名乡绅。桑丘和堂吉诃德是截然相反的两类人：一个是脚踏实地的现实主义者，另一个则是理想主义者。他们生动的，不断演化的友谊经常被认为是 主人公和助手组合的最早原型，这也启发了后续几个世纪 小说中的伙伴关系。堂吉诃德获得了巨大的成功。在17世纪，不计其数的版本在全欧洲发行，甚至传到了美国，而当时美国的教会禁止各类小说，认为它分散人们的精力，是有罪的存在，但读者们则享受着读盗版书的快乐。这本书好评如潮，读者们强烈要求看后续情节。某个作家写出一个假的后续作品以此赚钱，在这一事件后，塞万提斯写出了正统的后续故事。现在，第二卷随第一卷共同出版，共同构成一部完整的作品，第二卷增加了原来版本中遗漏的部分，只有在现在的版本中， 堂吉诃德和桑丘才成为民间英雄。塞万提斯把现实生活中小说的成功写进了他笔下角色的世界。这种一反常规的超越式的思考意识创造出哲学层面的复杂性，骑士和随从开始思考他们的故事带来了何种意义。不幸的是，塞万提斯当时以低价将书的版权卖出。他去世时仅是名声显赫，却并无多少财富。但是他的出色想象力和个人主义精神影响了艺术、文学、流行文化、甚至是政治革命。堂吉诃德认为我们的想象力极大地影响我们的行动，使我们能够改变，也使我们为人。

**P641 2018-10-09 Does time exist - Andrew Zimmerman Jones**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=641)

The earliest time measurements were observations of cycles of the natural world, using patterns of changes from day to night and season to season to build calendars. More precise time-keeping, like sundials and mechanical clocks, eventually came along to put time in more convenient boxes. But what exactly is it that we’re measuring? Is time something that physically exists, or is it just in our heads? At first the answer seems obvious— of course time exists; it constantly unfolds all around us, and it’s hard to imagine the universe without it. But our understanding of time started getting complicated thanks to Einstein. His theory of relativity tells us that time passes for everyone, but doesn’t always pass at the same rate for people in different situations, like those travelling close to the speed of light or orbiting a supermassive black hole. Einstein resolved the malleability of time by combining it with space to define space-time, which can bend, but behaves in consistent, predictable ways. Einstein’s theory seemed to confirm that time is woven into the very fabric of the universe. But there’s a big question it didn’t fully resolve: why is it we can move through space in any direction, but through time in only one? No matter what we do, the past is always, stubbornly, behind us. This is called the arrow of time. When a drop of food coloring is dropped into a glass of water, we instinctively know that the coloring will drift out from the drop, eventually filling the glass. Imagine watching the opposite happen. Here, we’d recognize time as unfolding backwards. We live in a universe where the food coloring spreads out in the water, not a universe where it collects together. In physics, this is described by the Second Law of Thermodynamics, which says that systems will gain disorder, or entropy, over time. Systems in our universe move from order to disorder, and it is that property of the universe that defines the direction of time’s arrow. So if time is such a fundamental property, it should be in our most fundamental equations describing the universe, right? We currently have two sets of equations that govern physics. General relativity describes the behavior of very large things, while quantum physics explains the very small. One of the biggest goals in theoretical physics over the last half century has been reconciling the two into one fundamental “theory of everything." There have been many attempts —none yet proven— and they treat time in different ways. Oddly enough, one contender called the Wheeler-DeWitt equation, doesn’t include time at all. Like all current theories of everything, that equation is speculative. But as a thought experiment, if it or a similarly time-starved equation turned out to be true, would that mean that time doesn’t exist, at the most fundamental level? Could time just be some sort of illusion generated by the limitations of the way we perceive the universe? We don’t yet know, but maybe that’s the wrong way of thinking about it. Instead of asking if time exists as a fundamental property, maybe it could exist as an emergent one. Emergent properties are things that don’t exist in individual pieces of a system, but do exist for the system as a whole. Each individual water molecule doesn’t have a tide, but the whole ocean does. A movie creates change through time by using a series of still images that appear to have a fluid, continuous change between them. Flipping through the images fast enough, our brains perceive the passage of time from the sequence of still images. No individual frame of the movie changes or contains the passage of time, but it’s a property that comes out of how the pieces are strung together. The movement is real, yet also an illusion. Could the physics of time somehow be a similar illusion? Physicists are still exploring these and other questions, so we’re far from a complete explanation. At least for the moment.

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翻译人员: Leonard Au 校对人员: Adam Lee（时间是什么？）人类最初衡量时间的方法，就是观察自然世界的周期。他们用朝暮之间和季节之间 的变化模式来制作日历。后来出现了更精确的计时方法， 比如日晷、机械钟，让计时变得更方便。但是，我们衡量的到底是什么呢？时间究竟是真正存在的一个物体，还是一个只在我们大脑中存在的概念？乍看之下，答案似乎很明显：时间当然是存在的；它时时刻刻在我们周围流逝着，很难想象宇宙没了时间 会变成什么样子。但是，我们对时间的理解 因为爱因斯坦而变得复杂了。根据他的相对论， 每个人都会经历时间的流逝，但是时间流逝的速度 随着场合的不同而变化。比如，速度将近光速的人，或者绕着巨大黑洞打转的人。爱因斯坦解决了时间可塑性的问题，他把时间和空间结合起来， 定义了时空的概念。时空可以转弯，但它表现得一致且可预测。爱因斯坦的理论似乎证实，时间是贯穿在宇宙的结构中的。但是有一个重要问题 是它没能完全解决的：为什么我们在空间里 可以往任何方向移动，在时间里却只能往一个方向移动呢？不管我们做什么， 过去永远都已经成了过去。这个现象叫做“时间之箭”。如果把一滴食用色素滴进一杯水，我们本能地就知道 色素会从那一滴里渗透出来，最终把整杯水染色。想象一下相反的情况发生。我们会意识到，时间正在往反方向进行。在我们这个宇宙中， 食用色素会在水中扩散，而不会聚集在一起。这个原理在物理学中 叫做热力学第二定律：每个系统会随时间失去秩序，或者说，系统的熵会增加。我们宇宙中的系统 会从有秩序变得无秩序。正是宇宙的这个属性，定义了时间之箭的方向。那么，既然时间是个如此基本的属性，它就应该出现在形容宇宙的 最基础方程式中，不是吗？目前，物理学有两套方程式控制着。广义相对论形容的是巨大物体的行为，量子物理学解释的是微小物体的行为。理论物理学这半个世纪以来的最大目标之一，就是把两者协调起来， 形成一个根本的“万物理论”。已经有许多人尝试这么做，却没有一个理论已被证实，而且它们处理时间的方法都不一样。奇怪的是，有一个叫做 惠勒-德维特方程式的理论，居然不把时间包含在内。就像所有万物理论一样，这个方程式只是猜测而已。但是，作为思想实验，如果这类不包含时间的 方程式正确的话，是不是代表时间 在最根本层面上是不存在的呢？我们是不是因为对宇宙的感知受到限制， 才会产生时间的幻觉？我们目前仍不清楚， 但是这种想法可能是错误的。与其探讨时间是不是基本属性，倒不如探讨它是不是涌现性属性。涌现性属性不存在于一个系统的 个别部分，但是它存在于该系统的整体。个别水分子是不会产生潮汐的，但整个海洋会有潮汐。一部电影呈现时间流逝的方法，就是利用一系列静止图像，而这些图像之间似乎 有着流通、持续的变化。如果图像的翻看速度够快的话，我们的大脑就会从静止图像的顺序感测出时间的流逝。电影中的个别画面都不会变化，而且也不包含时间的流逝。但是时间的属性来自于 一系列画面之间的串连。电影中的动作是真实的，但也是虚幻的。在物理学上， 时间是不是同样也是幻觉呢？物理学家还在探讨这类问题，要得到完整的解释，还要等上好久，至少以目前来看是这样。

**P642 2018-10-09 How rollercoasters affect your body - Brian D. Avery**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=642)

In the summer of 1895, crowds flooded the Coney Island boardwalk to see the latest marvel of roller coaster technology: the Flip Flap Railway. This was America’s first-ever looping coaster – but its thrilling flip came at a price. The ride caused numerous cases of severe whiplash, neck injury and even ejections, all due to its signature loop. Today, coasters can pull off far more exciting tricks, without resorting to the “thrill” of a hospital visit. But what exactly are roller coasters doing to your body, and how have they managed to get scarier and safer at the same time? At the center of every roller coaster design is gravity. Unlike cars or transit trains, most coasters are propelled around their tracks almost entirely by gravitational energy. After the coaster crests the initial lift hill, it begins an expertly engineered cycle – building potential energy on ascents and expending kinetic energy on descents. This rhythm repeats throughout the ride, acting out the coaster engineer’s choreographed dance of gravitational energy. But there’s a key variable in this cycle that wasn’t always so carefully considered: you. In the days of the Flip-Flap, ride designers were most concerned with coasters getting stuck somewhere along the track. This led early builders to overcompensate, hurling trains down hills and pulling on the brakes when they reached the station. But as gravity affects the cars, it also affects the passengers. And under the intense conditions of a coaster, gravity’s effects are multiplied. There’s a common unit used by jet pilots, astronauts, and coaster designers called “g force”. One G force is the familiar tug of gravity you feel when standing on Earth – this is the force of Earth’s gravitational pull on our bodies. But as riders accelerate and decelerate, they experience more or less gravitational force. Modern ride designers know that the body can handle up to roughly 5 Gs, but the Flip-Flap and its contemporaries routinely reached up to 12 Gs. At those levels of gravitational pressure, blood is sent flying from your brain to your feet, leading to light-headedness or blackouts as the brain struggles to stay conscious. And oxygen deprivation in the retinal cells impairs their ability to process light, causing greyed out vision or temporary blindness. If the riders are upside down, blood can flood the skull, causing a bout of crimson vision called a “redout”. Conversely, negative G’s create weightlessness. Within the body, short-term weightlessness is mostly harmless. It can contribute to a rider’s motion sickness by suspending the fluid in their inner ears which coordinates balance. But the bigger potential danger – and thrill – comes from what ride designers call airtime. This is when riders typically experience seat separation, and, without the proper precautions, ejection. The numerous belts and harnesses of modern coasters have largely solved this issue, but the passenger’s ever-changing position can make it difficult to determine what needs to be strapped down. Fortunately, modern ride designers are well aware of what your body, and the coaster, can handle. Coaster engineers play these competing forces against each other, to relieve periods of intense pressure with periods of no pressure at all. And since a quick transition from positive to negative G-force can result in whiplash, headaches, and back and neck pain, they avoid the extreme changes in speed and direction so common in thrill rides of old. Modern rides are also much sturdier, closely considering the amount of gravity they need to withstand. At 5 G’s, your body feels 5 times heavier; so if you weigh 100lbs, you’d exert the weight of 500 lbs on the coaster. Engineers have to account for the multiplied weight of every passenger when designing a coaster’s supports. Still, these rides aren’t for everyone. The floods of adrenaline, light-headedness, and motion sickness aren’t going anywhere soon. But today’s redundant restraints, 3D modeling and simulation software have made roller coasters safer and more thrilling than ever. Our precise knowledge about the limits of the human body have helped us build coasters that are faster, taller, and loopier – and all without going off the rails.

**P642 2018-10-09 How rollercoasters affect your body - Brian D. Avery**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=642)

翻译人员: Riley WANG 校对人员: Zhenlan Yao1895年夏天，人群涌向康尼岛栈道大家都来观看最新最神奇的过山车技术：翻转火车。这是美国首个拥有环状结构的过山车，但是它带来的惊险刺激是有代价的。乘坐过山车造成了不计其数的严重鞭伤颈部受伤，甚至是更严重的弹射。而这都是环状结构造成的。如今，过山车有更多刺激的玩法，人们也不会因此受伤就医。但是过山车会对身体造成什么影响呢？它如何在保证刺激的同时保障安全呢？每个过山车的设计核心都是重力。与汽车和火车不同，大多数过山车都沿着轨道几乎全部靠重力驱动。在过山车到达第一个顶峰时，它便开始了一个工程力学循环——在上升时积累势能， 在下降时释放转换为动能。这种循环在整个过程中重复，这是由过山车设计者编排的一组重力舞蹈演出。但是在这个循环中 有一个因素没有被考虑进来：那就是你。在翻转过山车的时代，过山车设计者们最担心的是过山车会在轨道的某处卡住。因此早期的过山车建造者们用力过猛，让车体在下坡时猛冲，在车体到达终点时使用刹车系统。但是重力既会作用于车体， 也会对乘客施加影响。在过山车激烈的运动下，重力的影响成倍放大。飞行员、宇航员以及过山车设计者经常使用的一个用来衡量力大小的单位G力（重力加速度）。一个G力等于人站在地球上 感受到的重力，这是地球作用在我们身上的引力。但是随着过山车乘客的加速和减速，他们实际感受到的重力会偏大或偏小。现代过山车设计者已知 人类身体大概可以承受5个G力，但是翻转火车和同时代其他过山车 通常可以达到12个G力。在这样的重力水平下，血液会从大脑飞速涌向双脚，大脑为了努力保持清醒。会出现轻微头晕或暂时性晕厥。同时，视网膜缺氧 也会让感光能力受损，导致视物变灰或短暂失明。如果乘客头朝下，大脑会出现充血，导致视觉变红，称为红视。相反，负重力会产生失重。对身体来说，短期失重通常无害。它会导致乘客的晕动症，原因在于 失重条件下内耳中负责协调平衡的液体流动受到限制但还有更大的刺激，或是说潜在危险过山车设计者们将其称为空中停留时间。这指的是乘客经常体会到的 身体与座椅相分离的状态，如果没有恰当的预防措施乘客会被座椅弹射出来。现代过山车上数量众多的安全带在很大程度上规避了这个风险但是乘客姿势的不断变化会使得确定身体位移的难度增大。幸运的是，现代过山车的设计者们都详细了解我们的身体和过山车能够承受什么样的影响。过山车工程师们把玩着 这些彼此相互作用的力，通过无重力的阶段来释放重力。超重与失重的快速转变会导致鞭打一样的疼痛、头痛、 后背和脖子的疼痛工程师们避免出现速度和 方向的极限变化而这些则在老式过山车中普遍存在。现代过山车也更加坚固，设计时仔细考虑了整体装置的承重。在5个重力水平下， 身体会感到原来的5倍重，如果你体重是100磅，你施加在过山车上的力会达到500磅。工程师在设计过山车时需要考虑每位乘客重量的数倍。但过山车并不适合所有人。肾上腺素的飙升，轻微的头痛 以及运动带来的恶心依然会继续存在。但是如今的完备的安全措施， 3D建模技术和模拟软件使得过山车更加安全，也更加刺激。我们对于人体极限的准确了解帮助我们将过山车设计得更快、 更高、更险，——当然都是在过山车体 不离开轨道的前提下实现的。

**P643 2018-10-17 Can you solve the stolen rubies riddle - Dennis Shasha**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=643)

One of the kingdom’s most prosperous merchants has been exposed for his corrupt dealings. Nearly all of his riches are invested in a collection of 30 exquisite Burmese rubies, and the crowd in the square is clamoring for their confiscation to reimburse his victims. But the scoundrel and his allies at court have made a convincing case that at least some of his wealth was obtained legitimately, and through good service to the crown. The king ponders for a minute and announces his judgment. Because there’s no way to know which portion of the rubies were bought with ill-gotten wealth, the fine will be determined through a game of wits between the merchant and the king’s most clever advisor – you. You’re both told the rules in advance. The merchant will be allowed to discreetly divide his rubies among three boxes, which will then be placed in front of you. You will be given three cards, and must write a number between 1 and 30 on each, before putting a card in front of each of the boxes. The boxes will then all be opened. For each box, you will receive exactly as many rubies as the number written on the corresponding card, if the box has that many. But if your number is greater than the number of rubies actually there, the scoundrel gets to keep the entire box. The king puts just two constraints on how the scoundrel distributes his rubies. Each box must contain at least two rubies and one of the boxes must contain exactly six more rubies than another— but you won’t know which boxes those are. After a few minutes of deliberation, the merchant hides the gems, and the boxes are brought in front of you. Which numbers should you choose in order to guarantee the largest possible fine for the scoundrel and the greatest compensation for his victims? Pause the video now if you want to figure it out for yourself. Answer in 3 Answer in 2 Answer in 1 You don’t want to overshoot by being too greedy. But there is a way you can guarantee to get more than half of the scoundrel’s stash. The situation resembles an adversarial game like chess – only here you can’t see the opponent’s position. To figure out the minimum number of rubies you’re guaranteed to win, you need to look for the worst case scenario, as if the merchant already knew your move and could arrange the rubies to minimize your winnings. Because you have no way of knowing which boxes will have more or fewer rubies, you should pick the same number for each. Suppose you write three 9’s. The scoundrel might have allocated the rubies as 8, 14 and 8. In that case, you’d receive 9 from the middle box and no others. On the other hand, you can be sure that at least two boxes have a minimum of 8 rubies. Here’s why. We’ll start by assuming the opposite, that two boxes have 7 or fewer. Those could not be the two that differ by 6, because every box must have at least 2 rubies. In that case, the third box would have at most 13 rubies—that’s 7 plus 6. Add up all three of those boxes, and the most that could equal is 27. Since that’s less than 30, this scenario isn’t possible. You now know, by what’s called a proof by contradiction, that two of the boxes have 8 or more rubies. If you ask for 8 from all three boxes you’ll receive at least 16— and that’s the best you can guarantee, as you can see by thinking again about the 8, 14, 8 scenario. You’ve recovered more than half the scoundrel’s fortune as restitution for the public. And though he’s managed to hold on to some of his rubies, his fortune has definitely lost some of its shine.

**P643 2018-10-17 Can you solve the stolen rubies riddle - Dennis Shasha**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=643)

翻译人员: Ch'ng Tsu Pang 校对人员: Carol Wang王国里有一位超级富商，被爆涉及不法交易。他将几乎全部身家都兑换成了收藏品，就是 30 颗价值连城的缅甸红宝石，广场上聚集了大量百姓，强烈要求没收宝石以赔偿受害者。奸商与法庭里的同谋串通，成功证明他至少有部分财富是通过合法手段、全心全意为国王服务所得。国王寻思片刻，作出裁决：因为无从得知哪些宝石是用不义之财买的，所以我决定通过斗智游戏 来决定该充公多少宝石，与商人斗智的对手是 国王最聪明的参谋——你。你和商人都事先知道了游戏规则，商人可以秘密地将宝石分别装进三个箱子里， 再把箱子搬到你面前。然后，给你三张卡片，你必须在三张卡片上 分别写出 1 到 30 中的数字，再将卡片分别放在三个箱子前，然后，打开箱子。如果你写的数字等于或者少过箱中宝石的数量，你就会拿到和该数字相同数量的宝石。但如果数字多过箱中宝石，则奸商得以留住整箱的宝石。国王要求奸商遵守两个分宝石原则：每个箱子必须至少有两颗宝石，且一个箱子的宝石数量必须 比另一个箱子多出六颗——但你不知道到底是哪个箱子。只见奸商沉思了几分钟，便将宝石分别藏好， 然后把箱子带到你眼前。你应该写下什么数字好让奸商得到最大的惩罚，也让受害者得到最多的补偿呢？[想尝试解题者，请暂停视频][答案 3 秒后揭晓][答案 2 秒后揭晓][答案 1 秒后揭晓]如果太贪心，可能会得不偿失，但有一个方法可以保证你至少获得奸商一半以上的赃物。这跟国际象棋类的对弈游戏很像——只不过这里你看不到对手的出招。想算出至少可以稳获多少宝石，你需要设想一下最糟的情况，假设奸商已知道你会怎么做，而且能事先排好宝石， 把你的胜算降至最低。因为你无从得知哪个箱子 宝石较多，哪个较少，你应该选择三个一样的号码。假设你写下三个 9，而奸商把宝石分成 8，14 和 8，那么，你就只能取得 中间箱子的 9 颗宝石。而另一方面，你可以 确定至少有两个箱子有至少 8 颗以上的宝石。原因如下：我们不妨从反面开始推想，若有两个箱子的宝石小于或等于 7 颗，则这它俩的宝石之差就不会是 6 颗，因为每个箱子至少会有 2 颗宝石。这么一来，第三个箱子至多 有 13 颗宝石——也就是 7 加 6。把这三个箱子的宝石数加起来最多只能得到 27，也就是少于 30，这是不可能发生的。通过这个反证法，你得出有两个箱子 装有 8 颗或以上的宝石。只要三个箱子都写上 8，那么你至少会得到 16 颗——这也是你稳操胜券的最好结果，再次检视8，14，8的情形， 你的选择也是最好结果。你已成功取回奸商半数以上的财产，并还之于民。奸商纵使设法保住了一些宝石，但其财富无疑已大不如前了。

**P644 2018-10-26 Can you solve the giant iron riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=644)

The family of giants you work for is throwing a fancy dinner party, and they all want to look their best. But there’s a problem – the elder giant’s favorite shirt is wrinkled! To fix it, you’ll need to power up… the Giant Iron. The iron needs two giant batteries to work. You just had 4 working ones and 4 dead ones in separate piles, but it looks like the baby giant mixed them all up. You need to get the iron working and press the giant shirt, fast – or you’ll end up being the main course tonight! How can you test the batteries so that you’re guaranteed to get a working pair in 7 tries or less? Pause the video now if you want to figure it out for yourself Answer in 3 Answer in 2 Answer in 1 You could, of course, take all eight batteries and begin testing the 28 possible combinations. You might get lucky within the first few tries. But if you don’t, moving the giant batteries that many times will take way too long. You can’t rely on luck – you need to assume the worst possibility and plan accordingly. However, you don’t actually need to test every possible combination. Remember – there are four good batteries in total, meaning that any pile of six you choose will have at least two good batteries in it. That doesn’t help you right away, since testing all six batteries could still take as many as 15 tries. But it does give you a clue to the solution – dividing the batteries into smaller subsets narrows down the possible results. So instead of six batteries, let’s take any three. This group has a total of three possible combinations. Since both batteries have to be working for the iron to power up, a single failure can’t tell you whether both batteries are dead, or just one. But if all three combinations fail, then you’ll know this group has either one good battery, or none at all. Now you can set those three aside and repeat the process for another three batteries. You might get a match, but if every combination fails again, you’ll know this set can have no more than one good battery. That would leave only two batteries untried. Since there are four good batteries in total and you’ve only accounted for two so far, both of these remaining ones must be good. Dividing the batteries into sets of 3, 3, and 2 is guaranteed to get a working result in 7 tries or less, no matter what order you test the piles in. With no time to spare, the iron comes to life, and you manage to get the shirt flawlessly ironed. The pleased elder and his family show up to the party dressed to the nines … well, almost.

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翻译人员: Meng Chew Keane Leow 校对人员: Tianji (Homer) Li你工作的巨人家庭打算开一个别开 生面的晚会派对，所以他们都希望凸显 自己最好的一面。但是，有个问题——比较年长的巨人 最喜欢的衣服皱了！为了解决它，你 需要启动……巨大的熨斗。这个巨大的熨斗需要 两个巨大的电池运作。你只有四个正常运作的电池，还有四个耗损了的电池 在不同的电池堆里，但是看来巨人宝宝把 它们给混在一起了。你需要让熨斗运作，然后 烫巨人的衣服，而且要很快——不然的话，你就是今晚的主菜！你能够如何测试电池，以确保你能够在七个或以下的 尝试内就找到一对可用的电池？若你想自己想想方法， 请暂停影片。答案在3秒后出现答案在2秒后出现答案在1秒后出现你当然可以拿全部八个电池，然后开始试试二十八 个可能的组合。你可能在初开始的 几个尝试就很幸运。但是若不然，移动 大电池这么多次会消耗太多时间。你不能靠运气——你需要作最坏的打算， 然后做好策划。但是，你其实不需要 尝试所有的可能组合。记得——总共有 四个好的电池。也就是说在任何六个电池的组合里，会有至少两个好的电池。那没有直接帮助到你，因为尝试所有六粒电池 还是需要十五次的尝试。但是，它给了你 解决方案的提示——把电池分成小组缩小可能的结果。所以，与其六个电池，让我们拿任何三个。这个小组有三个组合。因为要让熨斗运作需要 两个电池都正常运作，其中一个失败并不会告诉你是两个 电池都不能用，还是只是其中一个。但是若三个组合都失败，你就能够知道这个小组里是有 一个好的电池，或一个也没有。现在你可以把这 三个放在一边了然后重复同样的过程 在在另外三个电池。你有可能得到对的组合， 但是若每个组合都又失败，那你就知道这个组合不可能 有超过一个好的电池。那最后你剩下两个还未试过的电池。因为总共有四个好的电池而你只处理了两个，这剩下的两个必然是好的。把电池分成三、三、二，必然能够在七次尝试 找到可行的结果，无论你是用什么次序尝试。在没有剩余时间的情况下， 熨斗开始运作了，而你也成功地把衣服 没有瑕疵地烫好了。那个欢喜的年长巨人和他的 家人衣着隆重地参加了派对……嗯，差不多如此。

**P645 2018-10-29 How far would you have to go to escape gravity - Rene Laufer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=645)

More than six thousand light years from the surface of the earth, a rapidly spinning neutron star called the Black Widow pulsar blasts its companion brown dwarf star with radiation as the two orbit each other every 9 hours. Standing on our own planet, you might think you’re just an observer of this violent ballet. But in fact, both stars are pulling you towards them. And you’re pulling back, connected across trillions of kilometers by gravity. Gravity is the attractive force between two objects with mass— any two objects with mass. Which means that every object in the universe attracts every other object: every star, black hole, human being, smartphone, and atom are all constantly pulling on each other. So why don’t we feel pulled in billions of different directions? Two reasons: mass and distance. The original equation describing the gravitational force between two objects was written by Isaac Newton in 1687. Scientists’ understanding of gravity has evolved since then, but Newton’s Law of Universal Gravitation is still a good approximation in most situations. It goes like this: the gravitational force between two objects is equal to the mass of one times the mass of the other, multiplied by a very small number called the gravitational constant, and divided by the distance between them, squared. If you doubled the mass of one of the objects, the force between them would double, too. If the distance between them doubled, the force would be one-fourth as strong. The gravitational force between you and the Earth pulls you towards its center, a force you experience as your weight. Let’s say this force is about 800 Newtons when you’re standing at sea level. If you traveled to the Dead Sea, the force would increase by a tiny fraction of a percent. And if you climbed to the top of Mount Everest, the force would decrease— but again, by a minuscule amount. Traveling higher would make a bigger dent in gravity’s influence, but you won’t escape it. Gravity is generated by variations in the curvature of spacetime— the three dimensions of space plus time— which bend around any object that has mass. Gravity from Earth reaches the International Space Station, 400 kilometers above the earth, with almost its original intensity. If the space station was stationary on top of a giant column, you’d still experience ninety percent of the gravitational force there that you do on the ground. Astronauts just experience weightlessness because the space station is constantly falling towards earth. Fortunately, it’s orbiting the planet fast enough that it never hits the ground. By the time you made it to the surface of the moon, around 400,000 kilometers away, Earth’s gravitational pull would be less than 0.03 percent of what you feel on earth. The only gravity you’d be aware of would be the moon’s, which is about one sixth as strong as the earth’s. Travel farther still and Earth’s gravitational pull on you will continue to decrease, but never drop to zero. Even safely tethered to the Earth, we’re subject to the faint tug of distant celestial bodies and nearby earthly ones. The Sun exerts a force of about half a Newton on you. If you’re a few meters away from a smartphone, you'll experience a mutual force of a few piconewtons. That’s about the same as the gravitational pull between you and the Andromeda Galaxy, which is 2.5 million light years away but about a trillion times as massive as the sun. But when it comes to escaping gravity, there’s a loophole. If all the mass around us is pulling on us all the time, how would Earth’s gravity change if you tunneled deep below the surface, assuming you could do so without being cooked or crushed? If you hollowed out the center of a perfectly spherical Earth— which it isn’t, but let’s just say it were— you’d experience an identical pull from all sides. And you’d be suspended, weightless, only encountering the tiny pulls from other celestial bodies. So you could escape the Earth’s gravity in such a thought experiment— but only by heading straight into it.

**P645 2018-10-29 How far would you have to go to escape gravity - Rene Laufer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=645)

翻译人员: Yifan L 校对人员: Carol Wang距离地球表面六千光年的地方，有一个快速旋转的中子星，它名叫黑寡妇脉冲星，它向互绕彼此旋转的棕矮星每隔 9 个小时发出电波。当我们身处于地球时，你会觉得自己只是 星星狂放芭蕾舞的观测者，其实，这两颗星都向你施加引力，而你正在努力挣脱，相距几十万亿公里的你们被引力所联系起来。引力是两个有质量的 物体之间所产生的吸引力——任何两个有质量的物体间都存在。即宇宙任一物体都吸引其它物体：每一颗星星、黑洞、人类、智能手机和原子都在持续不断地吸引其他物体。为何我们觉察不到 自己被拉向几十亿个不同方向呢？有两个原因：质量和距离。最初描述两个物体之间引力的公式是由艾萨克·牛顿在 1687 年所写。此后，科学家们对引力的了解 又深刻了许多。但是牛顿的万有引力定律，在多数情况下 仍是有效的粗略衡量方法。这个公式这样的：两个物体间的万有引力等于一个物体的质量乘以另一个物体的质量，再乘以一个很小的数值叫做万有引力常数，再除以两个物体间距离的平方。若将其中一物体的质量变成两倍，那么它们之间的引力也会变成两倍。如果它们间的距离变成两倍，它们间的引力就只有 原来的四分之一强度了。你和地球间的万有引力 把你拉扯向它的中心，你所感知到的这种力量 就是你的体重。假设这个力量有 800 牛顿，这是当你站在海平面上的情况。如果你去死海旅游，重力会增加一点点百分比。如果你爬上了珠穆朗玛峰顶端，重力会减少微不足道的一点点。你爬得越高，重力影响会减弱一些，但它不可能消失。引力是由时空扭曲所产生，时空，即是 3 维空间加上时间——它在拥有质量的物体周围弯曲。地球的引力能延续到国际空间站，虽然空间站距地球 400 公里之外，但地球对其引力几乎是原本的强度。如果空间站被固定在一根 巨大的柱子上，你还是会感受到 与在地面上相比百分之九十的引力。宇航员之所以感受到失重，是因为空间站 被地球的引力持续拉扯。所幸它一直在快速旋转， 所以不至于撞向地球。当你去到月球表面，距离地球 40 万公里外，你所感受到的地球万有引力已经不足原来的百分之 0.03 了。你唯一能感觉到的引力来自于月球，而月球引力只有地球的六分之一。当你离得更远时，地球对你的引力会持续减少，但不会降为 0。虽然我们被安全地栓在地球上，但还是会被遥远天体 和我们周围的物体所吸引，太阳对你产生 0.5 牛顿的引力。如果你在距离你的手机几米之外，你会感受到相互间几皮牛顿的引力，相当于你与仙女座星座之间的引力，仙女星座距离我们 2.5 百万光年，但它却比太阳庞大一万亿倍。其实，想要逃避引力是有方法的。如果周围所有的质量都在拉我们，若我们挖洞进入地球深处，地心引力会如何变化呢，假设你在地下不被烤焦或被压垮的话？如果你在地球的中心挖一个，假定地球是一个完美球形， 虽然它不是——你会感受到来自各个方同等的引力，你会悬在空中，进入失重状态，其他天体对你产生的作用 则几乎可以忽略不计。所以只有在这样的思维实验当中——钻到地心，才能逃离地球万有引力。

**P646 2018-10-31 Can you solve the secret werewolf riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=646)

You’re on the trail of a werewolf that’s been terrorizing your town. After months of detective work, you’ve narrowed your suspects to one of five people: the mayor, the tailor, the baker, the grocer, or the carpenter. You’ve invited them to dinner with a simple plan: you’ll slip a square of a rare werewolf antidote into each of their dinners. Unfortunately, your pet goat just ate four of the squares, and you only have one left. Luckily, the remaining square is 50 grams, and the minimum effective dose is 10 grams. If you can precisely divide the square into fifths you’ll have just enough antidote for everyone. You’ll have to use a laser-cutting tool to cut up the square; every other means available to you isn’t precise enough. There are 8 points that can act as starting or ending points for each cut. To use the device, you’ll have to input pairs of points that tell the laser where to begin and end each cut, and then the laser executes all the cuts simultaneously. It’s okay to cut the square into as many pieces as you want, as long as you can group them into 10 gram portions. But you can’t fold the square or alter it otherwise, and you only get one shot at using the laser cutter. The full moon is rising, and in a moment someone will transform and tear you all apart unless you can cure them first. How can you divide the antidote into perfect fifths, cure the secret werewolf, and save everyone? Pause the video now if you want to figure it out for yourself. Answer in 3 Answer in 2 Answer in 1 When it comes to puzzles that involve cutting and rearranging, it’s often helpful to actually take a piece of paper and try cutting it up to see what you can get. If we cut BF and DH we’d get fourths, but we need fifths. Maybe there’s a way to shave a bit off of a quarter to get exactly one fifth. Cutting BE looks good at first, but that last cut takes a off a quarter of a quarter, leaving us with a portion of 3/16: just smaller than a fifth, and not enough to cure a werewolf. What if we started with BE instead? That would also give us a quarter. And is there a way to shave just a bit more off? Both DG and CH look promising. If we make one more cut, from A to F, we may start to notice something. With these four cuts—from B to E, D to G, F to A, and H to C—we’ve got four triangles and a square in the middle. But the pieces that make each triangle can also be rearranged to make a square identical to the middle one. This means that we’ve split the antidote into perfect fifths! What’s interesting about this sort of problem is that while it’s possible to solve it by starting from the geometry, it’s actually easier to start experimenting and see where that gets you. That wouldn’t be as viable if the square had, say, 24 cut points, but with just 8 there are only so many reasonable options. You secretly dose each of the townspeople as the full moon emerges in the sky. And just as you do, a terrible transformation begins. Then, just as suddenly, it reverses. Your measurements were perfect, and the people and animals of the town can rest a little easier.

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翻译人员: Sally Yang 校对人员: Fandi Yi你正在追踪着一只对你的小镇虎视眈眈的狼人。经过数个月的侦查，你锁定了五个嫌疑人：镇长、裁缝、面包师、杂货商或木匠。你邀请他们共进晚餐，计划很简单：你将会在每个人的晚餐中悄悄放入一片稀有的正方形狼人解药。不幸的是，你的宠物山羊 刚刚吃掉了四片解药，所以你只剩下了一片。幸运的是，剩下的这一片重 50 克，而最小有效剂量是 10 克。如果你能准确地 把这个正方形一分为五，那每个人都能得到一份解药。你必须使用一台激光切割机，其它所有方式都不够精确。有八个点可以充当 每次切割的起点或终点。每一道切割，你都必须输入两个点作为切割的起点和终点。仪器会一次性执行 你设置好的所有切割。无论切成多少块都没有关系，只要最后能把药片 凑成10克的份量即可。但你不能把正方形折起来， 或者用其它方式改变它而且你只有一次使用激光切割机的机会。满月正在升起，再过一会就会有人变身狼人 把你们撕成碎片，除非你预先治好那个人。你要如何将解药完美地平分成五份，治好藏在五人之中的狼人， 拯救大家呢？如果想要自己解开谜题， 请在此画面暂停。答案揭晓：3答案揭晓：2答案揭晓：1对于跟分割和重组有关的谜题，拿起一张纸尝试实际切割通常很有帮助。沿着 BF 和 DH 切割可将其一分为四， 但我们需要五份。或许有办法可以往四分之一上 再切一点，得到五分之一。BE 乍一看是个好选择，但这会切掉四分之一的四分之一，剩下十六分之三， 比五分之一略小了一点，不足以治愈狼人。那要是从 BE 开始切割呢？这也会使我们得到四分之一。还能再切掉一点吗？DG 和 CH 看起来都像是不错的选择。如果我们再沿着 AF 切一道，我们就会发现：若沿着这四条线切割—— B 至 E、D 至 G、F 至 A、H 至 C——我们就会得到四个三角形和中间的一个正方形。但组成每个三角形的切片都能被重新拼成一个 跟中间那个一模一样的正方形，由此，我们成功地将解药平分成了五份！关于这类问题，有趣的是尽管几何学计算也能帮你找出答案，但直接动手尝试反而比较容易。虽然如果正方形上有 24 个点之类的话 反复试验自然不太现实，但只有 8 个点的话 只有那么多选择供你尝试。随着满月在夜空中出现，你将解药偷偷放进每个人的饭菜里。你刚刚搞定一切， 可怕的变身就猛地开始，紧接着又同样迅速地被扭转了。你的剂量完美，小镇里的居民和动物又得以安心了。

**P647 2018-11-05 History vs. Henry VIII - Mark Robinson and Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=647)

He was a powerful king whose break with the church of Rome would forever change the course of English history. But was he a charismatic reformer or a bullying tyrant? Find out on History versus Henry VIII. Judge: Order, order. Now, who do we have here? Looks like quite the dashing fellow. Defense: Indeed, your honour. This is Henry VIII, the acclaimed king who reformed England's religion and government and set it on course to becoming a modern nation. Prosecutor: I beg to differ. This is a cruel, impulsive, and extravagant king who had as little regard for his people as he did for his six wives. Judge: Six wives? Defense: Your honor, Henry's first marriage was arranged for him when he was only a child. He only married Catherine of Aragon to strengthen England’s alliance with Spain. Prosecutor: An alliance he was willing to toss aside with no regard for the nation. Defense: Henry had every regard for the nation. It was imperative to secure the Tudor dynasty by producing a male heir – something Catherine failed to do in over twenty years of marriage. Prosecutor: It takes two to make an heir, your honor. Defense: Ahem. Regardless, England needed a new queen to ensure stability, but the Pope refused to annul the union and let the king remarry. Judge: Sounds like quite a pickle. Can’t argue with the Pope. Prosecutor: And yet that’s exactly what the king decided to do. He uprooted the country’s religious foundations and broke the Church of England away from Rome, leading to centuries of strife. Defense: All Henry did was give the Church honest domestic leadership. He freed his subjects from the corrupt Roman Catholic establishment. And by rejecting the more radical changes of the Protestant reformation, he allowed his people to preserve most of their religious traditions. Prosecutor: Objection! The Church had been a beloved and popular institution that brought comfort and charity to the masses. Thanks to Henry, church property was seized; hospitals closed, and precious monastic libraries lost forever, all to enrich the Crown. Defense: Some of the funds were used to build new cathedrals and open secular schools. And it was necessary for England to bring its affairs under its own control rather than Rome’s. Prosecutor: You mean under Henry’s control. Defense: Not true. All of the king’s major reforms went through Parliament. No other country of the time allowed its people such a say in government. Prosecutor: He used Parliament as a rubber stamp for his own personal will. Meanwhile he ruled like a tyrant, executing those he suspected of disloyalty. Among his victims were the great statesman and philosopher Thomas More – once his close friend and advisor – and Anne Boleyn, the new queen Henry had torn the country apart to marry. Judge: He executed his own wife? Defense: That…wasn’t King Henry’s initiative. She was accused of treason in a power struggle with the King’s minister, Thomas Cromwell. Prosecutor: The trial was a sham and she wouldn’t have been convicted without Henry’s approval. Besides, he wasn’t too upset by the outcome - he married Jane Seymour just 11 days later! Defense: A marriage that, I note, succeeded in producing a male heir and guaranteeing a stable succession… though the new queen tragically died in childbirth. Prosecutor: This tragedy didn’t deter him from an ill conceived fourth marriage to Anne of Cleves, which Henry then annulled on a whim and used as an excuse to execute Cromwell. As if that weren’t enough, he then married Catherine Howard – a cousin of Anne Boleyn – before having her executed too. Defense: She was engaged in adultery to which she confessed! Regardless, Henry’s final marriage to Catherine Parr was actually very successful. Prosecutor: His sixth! It only goes to show he was an intemperate king who allowed faction and intrigue to rule his court, concerned only with his own pleasure and grandiosity. Defense: That grandiosity was part of the king’s role as a model for his people. He was a learned scholar and musician who generously patronized the arts, as well as being an imposing warrior and sportsman. And the lavish tournaments he hosted enhanced England’s reputation on the world stage. Prosecutor: And yet both his foreign and domestic policies were a disaster. His campaigns in France and his brutal invasion of Scotland drained the treasury, and his attempt to pay for it by debasing the coinage led to constant inflation. The lords and landowners responded by removing access to common pastures and turning the peasant population into beggars. Defense: Beggars who would soon become yeomen farmers. The enclosures made farming more efficient, and created a labor surplus that laid the foundation for the Industrial Revolution. England would never have become the great power that it did without them …and without Henry. Judge: Well, I think no matter what, we can all agree he looks great in that portrait. A devout believer who broke with the Church. A man of learning who executed scholars. A king who brought stability to the throne, but used it to promote his own glory, Henry VIII embodied all the contradictions of monarchy on the verge of the modern era. But separating the ruler from the myth is all part of putting history on trial.

**P647 2018-11-05 History vs. Henry VIII - Mark Robinson and Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=647)

翻译人员: Lin Zhu 校对人员: Karen Xu作为一位权倾天下的国王， 他和罗马教廷的决裂，永久改变了英国的历史。但他究竟是一位极富魅力的改革者, 还是一位蛮横霸道的暴虐君主?答案尽在“史评亨利八世”。法官：肃静肃静！ 今天审的谁？看着来头不小。辩方：尊敬的法官阁下。这是亨利八世，一位据说重塑了英国宗教与政府的国王，并开启了英国现代化的历史进程。控方：我可不这样认为。 这位国王残忍，冲动，放纵。对他的臣民毫不关心， 前后娶了六位妻子。法官：六位妻子？辩方：法官阁下，亨利的第一次婚姻 是在其幼童时被包办的政治联姻。他娶阿拉贡的凯瑟琳 只是为了加强英国与西班牙的联合。控方：事后他还是罔顾国家利益 把联姻弃置一边。辩方：这正是亨利把国家利益 置于首位的表现。他急需一位男性继承人 以确保都铎王朝的延续，而凯瑟琳在二十年的婚姻里 却未能成功诞下任何男婴。控方：生育继承人可是需要双方的努力，阁下。辩方：哼，无论如何英格兰需要一位新皇后 来保证国家的稳定，但教皇拒绝废除英国与西班牙的联姻 以使亨利得以再婚。法官：情况看来很为难。 没人能和教皇唱反调。控方：可这正是亨利八世决心做的。他废除了整个国家的宗教根基，切断了全英教会与罗马教廷的联系，导致英国与罗马教廷几个世纪的纷争。辩方：亨利做的只不过是还英国教会 绝对的国内领导权。他把国民从腐朽的罗马天主教廷里解放出来。舍弃了较为激进的新教改革，允许臣民保留大部分自己的宗教传统。控方：反对！教会一直以来都是一个 深受爱戴的大众机构，为劳苦大众带去心灵的安慰与福祉。却因为亨利，教会财产被没收；医院关闭，珍贵的修道院书籍永久流失，而这一切只是为了加强亨利的王权。辩方：其实一些被没收的财产被用于建筑新教堂和开设独立于都会的世俗学校。并且把自身事务置于英国而不是罗马教廷的统辖是非常必要的。控方：你说的是置于亨利的统辖吧。辩方：并不完全正确。国王所有主要的改革 都是经国会商议的。同一时代的其他国家都未曾像英国一样 允许其臣民在政府内公开议事。控方：他只不过利用国会为其私人意愿正名罢了。期间他的统治独裁暴虐， 随意处死他怀疑对其不忠的人。在他的受害人里就有 伟大的政治哲学家托马斯 · 摩尔——摩尔曾是他亲近的朋友与顾问——另一位受害者安 · 博林， 甚至是他不惜分裂国家也要娶的新皇后。法官：他处死了他自己的妻子？辩方：那并非亨利国王的本意。她被指控叛国——与国王的大臣托马斯 · 克伦威尔有权力瓜葛。控方：那场判决简直是公开的耻辱。如果没有亨利的允许， 她本不可能被定罪。而且，他对结果也不置可否，11 天后就和简 · 西摩结了婚。辩方：据我所知，这次婚姻成功地 诞下了一位男性继承人，保证了都铎王朝的延续……虽然这位新皇后悲剧性的死于难产。控方：可这悲剧并未阻止亨利迎娶其第四位妻子克里维斯的安妮公主，而亨利很快就一时兴起宣布婚姻无效， 甚至以此为借口处决了克伦威尔。这还不够，亨利又迎娶了凯瑟琳 · 霍华德——安 · 博林的表妹—— 不久后却也处决了她。辩方：那是因为她犯有通奸， 她自己也承认了！无论如何，亨利与凯瑟琳 · 帕尔的最后一次婚姻倒是非常成功。控方：这也是他的第六场婚姻！ 通通显示了他是一位多么放纵的国王任由内讧和诡计充斥他的朝廷，却只关心他自己的享乐与宏伟身价。辩方：宏伟身价可是国王作为全民楷模 不可缺少的一部分。他是一位博学的学者与音乐家， 慷慨赞助各种艺术，也是一位伟岸的战士和运动健将。他赞助的锦标赛各种各样，让英国在世界舞台上声名远扬。控方：但他的国际与国内政策简直是一场灾难。他在法国的运动和 对苏格兰的野蛮入侵耗光了财库却以铸造成色不足的货币来进行偿还， 导致了经常性的通货膨胀。贵族与地主趁机大搞圈地运动让众多农民流离失所沦为乞丐。辩方：乞丐不久之后即演变为自耕农。而封闭式农场动作更高效， 生产了富余劳动力为后续的工业革命垫定了基础。没有这些劳动力英格兰决不会 演变成后来的世界霸主当然没有亨利也不行。法官：好吧，无论如何，我们得同意他在画像里看着不错。对宗教虔诚敬仰却与罗马断绝关系。博学多才却不断处死著名学者。为王权带了了稳定，却只以王权满足自己的荣耀。亨利八世不愧是现代改革前沿上一位独裁帝王所有矛盾的综合体。但把君王与神话分开不正是 我们客观审视历史的精髓。

**P648 2018-11-05 The myth of Sisyphus - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=648)

Whether it’s being chained to a burning wheel, turned into a spider, or having an eagle eat one’s liver, Greek mythology is filled with stories of the gods inflicting gruesome horrors on mortals who angered them. Yet one of their most famous punishments is not remembered for its outrageous cruelty, but for its disturbing familiarity. Sisyphus was the first king of Ephyra, now known as Corinth. Although a clever ruler who made his city prosperous, he was also a devious tyrant who seduced his niece and killed visitors to show off his power. This violation of the sacred hospitality tradition greatly angered the gods. But Sisyphus may still have avoided punishment if it hadn’t been for his reckless confidence. The trouble began when Zeus kidnapped the nymph Aegina, carrying her away in the form of a massive eagle. Aegina’s father, the river god Asopus, pursued their trail to Ephyra, where he encountered Sisyphus. In exchange for the god making a spring inside the city, the king told Asopus which way Zeus had taken the girl. When Zeus found out, he was so furious that he ordered Thanatos, or Death, to chain Sisyphus in the underworld so he couldn’t cause any more problems. But Sisyphus lived up to his crafty reputation. As he was about to be imprisoned, the king asked Thanatos to show him how the chains worked – and quickly bound him instead, before escaping back among the living. With Thanatos trapped, no one could die, and the world was thrown into chaos. Things only returned to normal when the god of war Ares, upset that battles were no longer fun, freed Thanatos from his chains. Sisyphus knew his reckoning was at hand. But he had another trick up his sleeve. Before dying, he asked his wife Merope to throw his body in the public square, from where it eventually washed up on the shores of the river Styx. Now back among the dead, Sisyphus approached Persephone, queen of the Underworld, and complained that his wife had disrespected him by not giving him a proper burial. Persephone granted him permission to go back to the land of living and punish Merope, on the condition that he would return when he was done. Of course, Sisyphus refused to keep his promise, now having twice escaped death by tricking the gods. There wouldn’t be a third time, as the messenger Hermes dragged Sisyphus back to Hades. The king had thought he was more clever than the gods, but Zeus would have the last laugh. Sisyphus’s punishment was a straightforward task – rolling a massive boulder up a hill. But just as he approached the top, the rock would roll all the way back down, forcing him to start over …and over, and over, for all eternity. Historians have suggested that the tale of Sisyphus may stem from ancient myths about the rising and setting sun, or other natural cycles. But the vivid image of someone condemned to endlessly repeat a futile task has resonated as an allegory about the human condition. In his classic essay The Myth of Sisyphus, existentialist philosopher Albert Camus compared the punishment to humanity’s futile search for meaning and truth in a meaningless and indifferent universe. Instead of despairing, Camus imagined Sisyphus defiantly meeting his fate as he walks down the hill to begin rolling the rock again. And even if the daily struggles of our lives sometimes seem equally repetitive and absurd, we still give them significance and value by embracing them as our own.

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翻译人员: Yifan L 校对人员: Liu Qi不论是将凡人捆到燃烧的车轮上、 或是将其变成蜘蛛、还是让老鹰啄食肝脏，希腊神话里总是充斥着各种故事，讲述着天神用残酷的手段 折磨激怒他们的凡人。其中最出名的惩罚故事 之所以被铭记，并非因为其残忍骇人听闻， 而是因为故事本身令人不安的熟悉感。西西弗斯是艾菲拉的第一任国王， 现在也被称作科林斯。虽然他是位善于治理国家的明君， 但也以残暴著称。他曾勾引侄女，屠杀宾客， 来展示自己的权力。这种违反待客之道的行为， 使众神震怒。如果西西弗斯没有盲目自信的话，他也许可以逃脱惩罚。故事的起因是这样的， 当宙斯绑架了仙女伊琴娜，变成巨鹰带走了她。伊琴娜的父亲，河神伊索普斯 循着踪迹追到了艾菲拉，在那里他遇到了西西弗斯。西西弗斯以一条四季常流的 河川做为交换条件，告诉了伊索普斯 宙斯和女孩的去向。宙斯知道后大发雷霆，他命令死神桑纳托斯将西西弗斯 绑到地狱，让他无法再惹是生非。但西西弗斯的足智多谋名不虚传，当他快被监禁时，他要求死神桑纳托斯 展示怎样使用锁链，然后趁机捆住了死神， 并逃回了人间。桑纳托斯被捆住后，再没有死亡， 世界也因此陷入了混乱。直到战神阿瑞斯 厌倦了没有死亡的战争，把桑纳托斯从铁链中解救出来， 一切才恢复了正常。西西弗斯知道他的报应就在眼前了，但他还留了一手。临死前，他嘱咐妻子墨洛珀 把他的尸体扔在公共广场尸体最后被冲到了冥河岸上。西西弗斯回到冥界后， 找到了冥后珀尔塞福涅，并向冥后诉苦，抱怨妻子对他不敬， 没有好好安葬他。冥后帕尔塞福涅 准许他回到人间惩罚他的妻子墨洛珀， 条件是完事之后必须回到冥界。当然，西西弗斯 并没有信守承诺。他通过糊弄天神 两次逃脱了死亡，但不会有第三次了。神使赫耳墨斯将西西弗斯 带给了冥王哈迪斯，西西弗斯自认为比诸神都聪明，但宙斯才是笑到最后的赢家。西西弗斯的惩罚很简单：就是把一块巨石推到山顶。但每当他快到山顶时， 石头都会滚回山脚，迫使他不得不重新开始，一次又一次，直到永远。历史学家指出西西弗斯的故事 可能来源于古代神话，讲述的是日月交替或自然循环。但受罚之人永无止境地 做无用功的生动画面，如同是对人类生活状况的隐喻。在存在主义哲学家阿尔贝·加缪所写的经典论文《西西弗斯神话》中，他将这个惩罚比作是人类在这个 无意义且冷酷的世界里对意义和真理的徒劳追求。加缪认为西西弗斯在一次次 下山去重新推石头的时候，并没有绝望，而是在与命运对抗。我们的日常生活 也会经历一些困难，即使他们看起来同样的 重复且荒谬，我们还是会赋予它们意义， 承认这也是我们人生的一部分。

**P649 2018-11-05 What’s the smallest thing in the universe - Jonathan Butterworth**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=649)

If you were to take any everyday object, say a coffee cup, and break it in half, then in half again, and keep carrying on, where would you end up? Could you keep on going forever? Or would you find a set of indivisible building blocks out of which everything is made? Physicists have found the latter- that matter is made of fundamental particles, the smallest things in the universe. Particles interact with each other according to a theory called the “Standard Model”. The Standard Model is a remarkably elegant encapsulation of the strange quantum world of indivisible, infinitely small particles. It also covers the forces that govern how particles move, interact, and bind together to give shape to the world around us. So how does it work? Zooming in on the fragments of the cup, we see molecules, made of atoms bound up together. A molecule is the smallest unit of any chemical compound. An atom is the smallest unit of any element in the periodic table. But the atom is not the smallest unit of matter. Experiments found that each atom has a tiny, dense nucleus, surrounded by a cloud of even tinier electrons. The electron is, as far as we know, one of the fundamental, indivisible building blocks of the universe. It was the first Standard Model particle ever discovered. Electrons are bound to an atom’s nucleus by electromagnetism. They attract each other by exchanging particles called photons, which are quanta of light that carry the electromagnetic force, one of the fundamental forces of the Standard Model. The nucleus has more secrets to reveal, as it contains protons and neutrons. Though once thought to be fundamental particles on their own, in 1968 physicists found that protons and neutrons are actually made of quarks, which are indivisible. A proton contains two “up” quarks and one “down” quark. A neutron contains two down quarks and one up. The nucleus is held together by the strong force, another fundamental force of the Standard Model. Just as photons carry the electromagnetic force, particles called gluons carry the strong force. Electrons, together with up and down quarks, seem to be all we need to build atoms and therefore describe normal matter. However, high energy experiments reveal that there are actually six quarks– down & up, strange & charm, and bottom & top - and they come in a wide range of masses. The same was found for electrons, which have heavier siblings called the muon and the tau. Why are there three (and only three) different versions of each of these particles? This remains a mystery. These heavy particles are only produced, for very brief moments, in high energy collisions, and are not seen in everyday life. This is because they decay very quickly into the lighter particles. Such decays involve the exchange of force-carrying particles, called the W and Z, which – unlike the photon – have mass. They carry the weak force, the final force of the Standard Model. This same force allows protons and neutrons to transform into each other, a vital part of the fusion interactions that drive the Sun. To observe the W and Z directly, we needed the high energy collisions provided by particle accelerators. There’s another kind of Standard Model particle, called neutrinos. These only interact with other particles through the weak force. Trillions of neutrinos, many generated by the sun, fly through us every second. Measurements of weak interactions found that there are different kinds of neutrinos associated with the electron, muon, and tau. All these particles also have antimatter versions, which have the opposite charge but are otherwise identical. Matter and antimatter particles are produced in pairs in high-energy collisions, and they annihilate each other when they meet. The final particle of the Standard Model is the Higgs boson – a quantum ripple in the background energy field of the universe. Interacting with this field is how all the fundamental matter particles acquire mass, according to the Standard Model. The ATLAS Experiment on the Large Hadron Collider is studying the Standard Model in-depth. By taking precise measurements of the particles and forces that make up the universe, ATLAS physicists can look for answers to mysteries not explained by the Standard Model. For example, how does gravity fit in? What is the real relationship between force carriers and matter particles? How can we describe “Dark Matter”, which makes up most of the mass in the universe but remains unaccounted for? While the Standard Model provides a beautiful explanation for the world around us, there is still a universe’s worth of mysteries left to explore.

**P649 2018-11-05 What’s the smallest thing in the universe - Jonathan Butterworth**

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翻译人员: Ziyan Fan 校对人员: Lipeng Chen如果拿一个日常的物品， 比如一个咖啡杯，把它切成两半，然后再切成一半，之后继续切， 什么时候才会结束？你会一直继续下去吗？你会不会找到一套 不可以被分割的“积木块”，万事万物都可由其组成？物理学家们已经发现了后者—— 物质是由基础的粒子组成，这些粒子是宇宙里最微小的东西。这些粒子在被称为“标准模型“的 理论下互相作用。标准模型是对不可分割的、无限小的粒子的量子世界的提炼。它也包含了力如何指导粒子运动，相互作用，以及结合在一起 形成世间万物。那么它是怎么工作的呢？放大杯子上的碎片，我们看到原子聚集在一起形成分子。一个分子是任何化合物中的最小组成单元。一个原子是任何元素周期表中 元素的最小组成单元。但是原子不是物质最小的组成单元。实验发现每一个原子都有微小的、 密实的原子核，原子核被极小的电子云包围着。正如我们所知，电子是宇宙中基础的、 不可分割的基础材料之一。它是第一个被发现的标准模型粒子。电子通过电磁场聚集在原子核周围。它们通过交换一种叫做 光子的粒子来互相吸引，光子是带着电磁场力的光量子，电磁场力是标准模型的基础力。原子核有更多的秘密需要被发现， 它包含了光子和中子。虽然它曾被认为是最基础的粒子，但是在1968年物理学家发现 光子和中子是由夸克组成，而夸克是不可分割的。一个光子包含两个上夸克 和一个下夸克。一个中子包含两个上夸克 和一个下夸克。原子核被很强的力凝聚在一起，这是标准模型的另一个基础力。正如光子带着电磁场力，一个叫胶子的粒子带着很强的力。似乎电子与上下夸克一起就是我们所需构建原子的东西， 进而来描述一般的物质。然而，高能量实验 揭露实际上有六种夸克：上和下，粲和奇，底和顶，它们数量巨大。正如我们发现电子，电子有重同类元素叫介子和钛。为什么对于这些粒子来说，有三种（只有三种）不同的版本？这仍是一个谜。这些重粒子只是在非常短的片刻产生，它们只产生于高能量的碰撞中， 而不出现在日常生活中。这是因为它们会非常快地衰减回较轻的粒子。这些衰减包含在力的交换和粒子运载，它们被称为 W 和 Z ——不像光子——有质量。它们带有弱力， 这是标准模型中的最后的力。相同的力允许光子和中子互相转换，一个驱动太阳的重要融合反应。为了直接观察 W 和 Z，我们需要通过粒子加速度器产生高能量碰撞。有另一种标准模型粒子，称为中微子。它们只通过弱力互相作用。通过太阳，产生数万亿的中微子， 每一秒在我们身边飞过。我们通过弱力相互作用的方法 发现有不同种类的中微子它们与电子、介子和钛关联。所有这些粒子都存在相对应的反物质，这些粒子有相反的极性但是其他方面一样。物质和反物质是在高能量碰撞中成对产生的，当它们相遇时互相抵消。标准模型中的最后一种粒子是希格斯粒子——一种宇宙中能量域背景的量子波。正如标准模型所说， 这个领域的相互反应就是基础物质粒子如何获取质量的。大强子对撞机上做的超环面仪器实验就是在深入学习标准模型。通过精准测度组成宇宙的粒子和力，超环面仪器物理学家可以找到 无法用标准模型解释的未解之谜的答案。例如：重力如何嵌入模型？什么是承载力和物质粒子之间的真正关系？我们如何描述组成宇宙中大部分物质但是仍未被观测到的“黑物质”？虽然标准模型对我们周围的世界 提供了很好的解释，宇宙中仍存在众多谜题等待探索。

**P650 2018-11-13 The life cycle of a neutron star - David Lunney**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=650)

About once every century, a massive star somewhere in our galaxy runs out of fuel. This happens after millions of years of heat and pressure have fused the star’s hydrogen into heavier elements like helium, carbon, and nitrogen— all the way to iron. No longer able to produce sufficient energy to maintain its structure, it collapses under its own gravitational pressure and explodes in a supernova. The star shoots most of its innards into space, seeding the galaxy with heavy elements. But what this cataclysmic eruption leaves behind might be even more remarkable: a ball of matter so dense that atomic electrons collapse from their quantum orbits into the depths of atomic nuclei. The death of that star is the birth of a neutron star: one of the densest known objects in the universe, and a laboratory for the strange physics of supercondensed matter. But what is a neutron star? Think of a compact ball inside of which protons and electrons fuse into neutrons and form a frictionless liquid called a superfluid— surrounded by a crust. This material is incredibly dense – the equivalent of the mass of a fully-loaded container ship squeezed into a human hair, or the mass of Mount Everest in a space of a sugar cube. Deeper in the crust, the neutron superfluid forms different phases that physicists call “nuclear pasta,” as it’s squeezed from lasagna to spaghetti-like shapes. The massive precursors to neutron stars often spin. When they collapse, stars that are typically millions of kilometers wide compress down to neutron stars that are only about 25 kilometers across. But the original star’s angular momentum is preserved. So for the same reason that a figure skater’s spin accelerates when they bring in their arms, the neutron star spins much more rapidly than its parent. The fastest neutron star on record rotates over 700 times every second, which means that a point on its surface whirls through space at more than a fifth of the speed of light. Neutron stars also have the strongest magnetic field of any known object. This magnetic concentration forms vortexes that radiate beams from the magnetic poles. Since the poles aren’t always aligned with the rotational axis of the star, the beams spin like lighthouse beacons, which appear to blink when viewed from Earth. We call those pulsars. The detection of one of these tantalizing flashing signals by astrophysicist Jocelyn Bell in 1967 was in fact the way we indirectly discovered neutron stars in the first place. An aging neutron star’s furious rotation slows over a period of billions of years as it radiates away its energy in the form of electromagnetic and gravity waves. But not all neutron stars disappear so quietly. For example, we’ve observed binary systems where a neutron star co-orbits another star. A neutron star can feed on a lighter companion, gorging on its more loosely bound atmosphere before eventually collapsing cataclysmically into a black hole. While many stars exist as binary systems, only a small percentage of those end up as neutron-star binaries, where two neutron stars circle each other in a waltz doomed to end as a merger. When they finally collide, they send gravity waves through space-time like ripples from a stone thrown into a calm lake. Einstein’s theory of General Relativity predicted this phenomenon over 100 years ago, but it wasn't directly verified until 2017, when gravitational-wave observatories LIGO and VIRGO observed a neutron star collision. Other telescopes picked up a burst of gamma rays and a flash of light, and, later, x-rays and radio signals, all from the same impact. That became the most studied event in the history of astronomy. It yielded a treasure trove of data that’s helped pin down the speed of gravity, bolster important theories in astrophysics, and provide evidence for the origin of heavy elements like gold and platinum. Neutron stars haven’t given up all their secrets yet. LIGO and VIRGO are being upgraded to detect more collisions. That’ll help us learn what else the spectacular demise of these dense, pulsating, spinning magnets can tell us about the universe.

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翻译人员: Christina Wang 校对人员: rong wang大约每个世纪一次，在我们银河中的某处 一个巨大的星体会用光燃料。这种情况发生是因为 百万年来的高温与高压把星体的氢合成了更重的元素， 像是氦、碳、氮——一直到铁。无法再产生足够的能量 来维持其结构，星体会因自身的引力坍塌， 爆炸成超新星。星体会将其 大部分的物质射入宇宙中把重元素散播到星系中。不过这剧烈爆炸留下来的东西 可能更惊人：一团物质，其密度高到 原子中的电子会从量子轨道坍缩到原子核的深处。这个星体的死亡 成了一颗中子星的诞生：宇宙中已知密度最大的物体之一，它还是有关超凝聚体的 奇异物理的实验室。但中子星到底是什么？想象一个紧实的球，在它里面 质子和电子融合成中子形成一种零摩擦力的流体， 叫做超流体——被一层外壳包起来。这种材料有非常高的密度——相当于把一个满载的货船的质量挤到一根人的头发上，或者把珠穆朗玛峰的质量 挤到一块方糖的大小中。在外壳的更深处，中子超流体 构成不同的形态物理学家管它叫“核面食”，因为它被压缩成 千层面到意大利面的形状。中子星巨大的前身通常会旋转。当它们坍塌时，典型的有几百万公里宽的星体压缩成只有 25 公里宽的中子星。但是原始星体的角动量不会改变。所以就像花样滑冰运动员把手臂收进来就能 加速旋转的道理一样，中子星的旋转速度 会比它的母体快很多。记录中最快的中子星 每秒会旋转超过 700 次意味着它的表面上的一个点 在太空中的移动速度比光速的五分之一还要快。中子星还有 所有已知物体中最强的磁场。这种磁力的集中会形成漩涡它会从磁极发射出光束。因为磁极并不一定 和星体旋转轴对齐，这些光束会像灯塔指示灯一样旋转，从地球看就像是在闪烁。我们称这些天体为脉冲星。1967 年天体物理家乔瑟琳 · 贝尔探测到的这激动人心的闪烁信号实际上是我们最一开始 间接发现中子星的方法。衰老的中子星的激烈旋转会 在数十亿年的时间里减慢因为它以电磁波和引力波的形式 辐射出它的能量。但不是所有中子星 都会这么安静的消失。比如，我们曾经观测到双星系统其中一颗中子星 和另一颗绕着同一中心。一个中子星可以蚕食轻一点的同伴，吞食它没有紧密吸引住的大气层，然后最终剧烈坍塌成为黑洞。虽然很多星体都存在于双星系统中，但只有一小部分 会形成中子星双星系统，其中两颗中子星像 跳着华尔兹一样绕着彼此直至注定的合并。当它们最终相撞，它们会向时空中 发射引力波像投进平静湖面的 一块石头造成的涟漪。爱因斯坦的广义相对论一百多年前就预测了这种现象， 但是直到 2017 年它并未被直接证明，当引力波探测器 LIGO 和 VIRGO观测到了中子星碰撞。其他望远镜探测到了 一阵伽玛射线和一道闪光之后是 X 射线和无线电信号， 都是从同一个碰撞而来。这变成了天文史上 被研究最多的事件。它提供了一众珍贵的数据帮助我们确定了引力的速度，支持天体物理中重要的理论，并为像金和铂 这些重元素的来源提供了证据。中子星还并未吐露出 它们所有的秘密。LIGO 和 VIRGO 正在被升级来检测更多碰撞。这会帮助我们了解这些高密度的、脉动的、旋转的磁铁 壮观的消亡还能告诉我们什么 其他关于宇宙的知识。

**P651 2018-11-13 Why is meningitis so dangerous - Melvin Sanicas**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=651)

In 1987, tens of thousands of people gathered in Saudi Arabia for the annual Hajj pilgrimage. But what started out as a celebration led to a health crisis: just a few days after the pilgrimage, more than 2,000 cases of meningitis broke out spreading across Saudi Arabia and the rest of the world. The outbreak was so fierce that it was believed to have sparked a wave of deadly meningitis epidemics that ultimately infected tens of thousands of people worldwide. Meningitis is the inflammation of the meninges, three tissue layers responsible for protecting the brain and spinal cord. What makes meningitis so dangerous compared to other diseases is the sheer speed with which it invades a person’s body. In the worst cases, it causes death within a day. Fortunately, that’s rare for patients who receive early medical treatment. The disease primarily comes in three forms: fungal, viral, and bacterial-- the last being the most deadly by far, and what we’ll focus on. People usually contract bacterial meningitis by breathing in tiny particles of mucus and saliva that spray into the air when an infected person sneezes or coughs. It can also be transmitted through kissing, or sharing cigarettes, toothbrushes or utensils. Some people can be infected and carry the disease without showing symptoms or getting sick, which helps the disease spread quickly to others. Once the bacteria enter the nose, mouth, and throat, they cross the surrounding membranes and enter the bloodstream. From there, bacteria have rapid access to the body’s tissues --including a membrane called the blood-brain barrier. This is made of a tight mesh of cells which separate blood vessels from the brain, and block everything except for a specific set of particles, including water molecules and some gases. But in ways that scientists are still trying to understand, meningitis bacteria can trick the barrier into letting them through. Inside the brain, the bacteria swiftly infect the meninges. This triggers inflammation as the body’s immune response kicks into overdrive, bringing on fever and intense headaches. As swelling in the meninges worsens, the neck begins to stiffen. Swelling in the brain disrupts its normal function-- causing symptoms like hearing loss and extreme light sensitivity. As pressure increases in the cranium, it may also make the person confused-- one of the hallmarks of the disease. A few hours in, the rapidly multiplying bacteria start to release toxins, leading to septicemia, also known as blood poisoning. This breaks down blood vessels, letting blood seep out and form what starts out looking like a rash, and evolves into big discoloured blots beneath the skin. At the same time, these toxins burn through oxygen in the blood, reducing the amount that gets to major organs like the lungs and kidneys. That increases the chance of organ shut down --and alongside spreading septicemia, threatens death. That all sounds scary, but doctors are so good at treating meningitis that a visit to the hospital can drastically reduce an adult’s risk of dying from it. The longer it’s left untreated, though, the more likely it will lead to lasting damage. If declining oxygen levels cause cell death in extreme parts of the body --like fingers, toes, arms and legs-- the risk of amputation goes up. And if bacterial toxins accumulate in the brain and trigger cell death, meningitis could also cause long-term brain damage and memory loss. So fast treatment, or better yet, prevention, is critical. That's why most countries have vaccines that defend against the disease in its deadliest forms. Those are usually given to the people who are most at risk--like young children, people with weak immune systems, or people who gather in large groups where an outbreak of meningitis could potentially happen. In addition to those gatherings, meningitis is most common in a region called the meningitis belt that stretches across Africa, though cases do happen all over the world. If you’re concerned that you or someone you know may have meningitis, get to the doctor as soon as possible; quick action could save your life.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=651)

翻译人员: Yichen Huang 校对人员: Yingyu Liu在1987年，数以万计的人聚集在沙特阿拉伯， 参加一年一度的麦加朝圣。但本是一场宗教仪式的朝圣， 却导致了一场健康危机。仅在朝圣后的几天，就有超过2000起脑膜炎病例爆发，并扩散到整个沙特阿拉伯 和世界其他地区。这场爆发势头强劲，以至于引发了一轮致死性脑膜炎的大流行，最终使得全球数以万计的人被感染。脑膜炎是脑膜的炎症，脑膜是保护脑和脊髓的三层组织。脑膜炎比起其他疾病十分致命，是因为它以极快的速度入侵人体。在极端的案例中， 脑膜炎可在一天内致死。幸运的是，这种情况在 及时接受治疗的患者中很少见。脑膜炎主要有三种形式：真菌，病毒和细菌。细菌性脑膜炎是三者中最危险的， 我们会解释此类脑膜炎的机理。当脑膜炎患者咳嗽或打喷嚏时，空气中的黏液和唾液微粒可能会被吸入以导致细菌性脑膜炎的传播。此类脑膜炎也可以通过接吻、共享香烟、牙刷或餐具传播。有些患者可能不会 显现出明显的症状，使得脑膜炎在人群中快速传播。一旦细菌进入鼻腔、口腔和咽喉，就会跨越周围的黏膜并进入血液循环。在血液中，细菌可以快速侵入人体组织。这些组织包括了血脑屏障：一种隔开血管和脑的， 由细胞紧密排列组成的膜。血脑屏障只允许特定的微粒通过，包括水分子和一些气体。但让科学家困惑的是，导致脑膜炎的细菌 会“欺骗”血脑屏障来允许它通过。在脑中，细菌会快速感染脑膜，使得人体发生激烈的 免疫反应，引起炎症，并导致发热和强烈的头痛。脑膜的肿胀加剧会使得患者的颈部僵硬，并阻碍脑的正常功能，导致失聪或畏光等症状。颅内压力的增加会导致神志模糊，这是脑膜炎的典型症状之一。在数个小时中，快速繁殖的 细菌会开始释放毒素，导致败血病。败血病会破坏血管，从血管中渗出的血液 会形成形如皮疹的淤血并不断扩大。同时，细菌中的毒素 会大量消耗血液中的氧气，减少肺和肾等重要器官的供氧。这会增加器官衰竭的几率，并使败血病扩散，有致死风险。这听起来很吓人， 但现代医学可以有效治疗脑膜炎，及时治疗可以显著减少脑膜炎的致死几率。 （接受治疗的脑膜炎病患中死亡率低于2%）然而，若是不及时接受治疗，脑膜炎就可能造成长期的损害。若是细胞缺氧导致肢体末端的细胞死亡，如手指、脚趾和上下肢， 截肢风险就会上升。若细菌毒素在脑中积累并引发细胞死亡，脑膜炎就会造成长期的脑损伤和失忆。所以及时的治疗或是预防十分重要。因此绝大多数国家 都有针对细菌性脑膜炎的育苗储备。此类疫苗通常被分配给易感染脑膜炎的群体，如幼儿，免疫系统虚弱者 和经常处于大量人群中的人。在这些群体中，脑膜炎更容易爆发。除了人群聚集处，脑膜炎最多发于被称作“脑膜炎带”的地区，这个地区横跨非洲。 当然，全球的其他地区也出现过脑膜炎的病例。若你担心你或你认识的人患有脑膜炎，请尽快就医！及时的治疗可能拯救生命。

**P652 2018-11-15 Who decides what art means - Hayley Levitt**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=652)

Imagine you and a friend are strolling through an art exhibit and a striking painting catches your eye. The vibrant red appears to you as a symbol of love, but your friend is convinced it's a symbol of war. And where you see stars in a romantic sky, your friend interprets global warming-inducing pollutants. To settle the debate, you turn to the internet, where you read that the painting is a replica of the artist's first-grade art project: Red was her favorite color and the silver dots are fairies. You now know the exact intentions that led to the creation of this work. Are you wrong to have enjoyed it as something the artist didn’t intend? Do you enjoy it less now that you know the truth? Just how much should the artist's intention affect your interpretation of the painting? It's a question that's been tossed around by philosophers and art critics for decades, with no consensus in sight. In the mid-20th century, literary critic W.K. Wimsatt and philosopher Monroe Beardsley argued that artistic intention was irrelevant. They called this the Intentional Fallacy: the belief that valuing an artist's intentions was misguided. Their argument was twofold: First, the artists we study are no longer living, never recorded their intentions, or are simply unavailable to answer questions about their work. Second, even if there were a bounty of relevant information, Wimsatt and Beardsley believed it would distract us from the qualities of the work itself. They compared art to a dessert: When you taste a pudding, the chef's intentions don't affect whether you enjoy its flavor or texture. All that matters, they said, is that the pudding "works." Of course, what "works" for one person might not "work" for another. And since different interpretations appeal to different people, the silver dots in our painting could be reasonably interpreted as fairies, stars, or pollutants. By Wimsatt and Beardsley's logic, the artist's interpretation of her own work would just be one among many equally acceptable possibilities. If you find this problematic, you might be more in line with Steven Knapp and Walter Benn Michaels, two literary theorists who rejected the Intentional Fallacy. They argued that an artist's intended meaning was not just one possible interpretation, but the only possible interpretation. For example, suppose you're walking along a beach and come across a series of marks in the sand that spell out a verse of poetry. Knapp and Michaels believed the poem would lose all meaning if you discovered these marks were not the work of a human being, but an odd coincidence produced by the waves. They believed an intentional creator is what makes the poem subject to understanding at all. Other thinkers advocate for a middle ground, suggesting that intention is just one piece in a larger puzzle. Contemporary philosopher Noel Carroll took this stance, arguing that an artist's intentions are relevant to their audience the same way a speaker's intentions are relevant to the person they’re engaging in conversation. To understand how intentions function in conversation, Carroll said to imagine someone holding a cigarette and asking for a match. You respond by handing them a lighter, gathering that their motivation is to light their cigarette. The words they used to ask the question are important, but the intentions behind the question dictate your understanding and ultimately, your response. So which end of this spectrum do you lean towards? Do you, like Wimsatt and Beardsley, believe that when it comes to art, the proof should be in the pudding? Or do you think that an artist's plans and motivations for their work affect its meaning? Artistic interpretation is a complex web that will probably never offer a definitive answer.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=652)

翻译人员: Congmei Han 校对人员: Yingyu Liu想象你和一位朋友正漫步观赏 一个艺术作品展览，你被一幅引人注目的画作所吸引。醒目的红色在你看来象征着爱，但你的朋友坚持认为 这红色象征着战争。你看到星星在浪漫的天空下，而你的朋友将此理解为 全球变暖引发的污染物。为了解决争议，你上网查到 如下解读——此画是艺术家复制自己 小学一年级时在美术课上的画作：红色是她当时最喜欢的颜色 那些银色的点是小精灵。你此时明白了这幅画的 确切创作意图。你对这幅画的解读 与其作者的创作意图不符，你欣赏错了吗？你知道了这一点，此时 你对此画作的欣赏减少了吗？艺术家的创作意图到底能影响多少你对其作品的解读？这个问题已经被哲学家们和艺术评论家们 争论了几十年，仍未达成一致。在二十世纪中叶，文学评论家W·K·威姆斯特 与哲学家曼诺·比尔斯雷认为艺术家的创作意图 无关其作品的含义。他们称之为意图谬误：倚重于艺术创作者的意图—— 这种看法是一种误导。他们的论点分为两部分：一方面，我们研究的 艺术创作者已不在世，这些艺术家从未留下 关于自己的创作意图的记录，即：他们的作品创作意图 根本没有考据。另一方面，即使有一大堆相关信息，威姆斯特和比尔斯雷相信这些信息会让我们这些观赏者分心 ——无法专注于作品本质。他们将艺术比作甜点：当你品尝布丁时，你是否喜欢其味道和质感 并不取决于厨师的意图。关键是布丁对胃口。当然，一个人觉得好吃， 另一个人也许觉得不好吃。既然不同的人有不同的鉴赏理解，画作中的银点 当然可以被理解成精灵、星星，或者 污染物。以威姆斯特和比尔斯雷的逻辑， 艺术家对其作品的诠释只是众多平等的可接受的 可能的诠释之一。如果你对这种观点存疑，你也许更支持史蒂文·萘普 和怀特·本·迈克尔，这两位文艺理论家反对 “意图谬误”。他们认为艺术家的创作意图并不是 可能的含义之一，而是唯一可能的含义。比方说，想象你正在沿着海边散步，偶然看见沙子上有诗文的痕迹。萘普和迈克尔认为 如果你发现这些痕迹并不是出自什么作家的诗篇 那这首诗就毫无意义了，只不过是浪花造成的奇怪巧合而已。他们认为有意图的创作者才是赋予诗篇以内涵的关键。其他思想家倡导折中,即：意图只是一个更大的 难题中的一个小问题。当代哲学家诺儿·卡罗尔 持这个立场，他认为艺术家的意图与观众有关联,道理如同说者的意图与对话中的另一方是有关联的。想要理解意图是如何 在对话中起作用的，卡罗尔认为——想象某人 拿着一根烟要借根火柴。你递给对方一个打火机，因为你认为对方的动机就是点烟。对方问问题的用词的确重要，但是影响你去领会的 是问题背后的意图，最终，你做出反馈。那么，你对这一系列的观点 倾向哪一个？你是倾向威姆斯特和比尔斯雷 认为有关艺术创作意图可以用布丁的例子来证明？抑或，你认为艺术家的创作动机影响着其作品的含义？艺术解读 是个错综复杂的网，很可能永远不会有明确答案。

**P653 2018-11-15 Why should you read 'A Midsummer Night's Dream' - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=653)

a group of youths sneak into the woods, where they take mind-altering substances, switch it up romantically, and brush up against creatures from another dimension. "A Midsummer’s Night’s Dream" sees Shakespeare get psychedelic – and the result is a treat in the theatre and on the page. First performed in the 1590's, this play is one of Shakespeare’s friskiest works, filled with trickery, madness and magic. Set over the course of one night, Midsummer progresses at a rollicking pace. The plot is structured around patterns of collision and dissolution, where characters from different worlds are thrown together and torn apart. Shakespeare uses these patterns to mock the characters’ self-obsession and question authority with a comic twist. The action is set in Ancient Greece, but like many of Shakespeare’s plays it reflects his contemporary concerns. The magical setting of the woods at night disrupts the boundaries between separate groups, with bizarre results. Here, the bard plays with the rigid class system of his own time, taking three distinct groups and turning their society upside-down in a world where no mortal is in control. The play opens with young Hermia raging at her father Egeus and Theseus, the King of Athens, who have forbidden her to marry her lover Lysander. Hermia has no interest in her father's choice for her of Demetrius – but her best friend Helena definitely does. Furious at their elders, Hermia and Lysander elope under cover of darkness, with Demetrius in hot pursuit. This is further complicated by Helena’s decision to follow them all into the woods, in the hope of winning Demetrius’ heart. At this point, the woods are getting crowded, as the lovers are sharing the space with a group of “rude mechanicals”— a troupe of workers drunkenly rehearsing a play, led by the jovial Nick Bottom. Unbeknownst to them, the humans have entered into the world of the fairies. Despite their magical splendor, Oberon and Titania, the king and queen of the fairies, have their own romantic problems. Furious at his inability to control Titania, the jealous Oberon commands the trickster Puck to squeeze the juice of a magical flower over her eyes. When she wakes up, she’ll fall in love with the first thing she sees. On his mission, Puck gleefully sprinkles the juice over the eyes of the napping Demetrius and Lysander, and transforms Bottom’s head into that of a donkey for good measure. As eyes flicker open, a night of chaos commences that includes broken hearts, mistaken identity, and transformations. Out of all the characters, Bottom probably fares the best – when the bewitched Titania lays eyes on him, she calls on her fairies to lavish him with wine and treasures and sweeps the transfigured donkeyman off his feet: “pluck the wings from painted butterflies/ To fan the moonbeams from his sleeping eyes. Nod to him, elves, and do him courtesies.” While magic is the catalyst to the action, the play reflects the real drama of the things we do for love – and the nonsensical behavior of the people under its spell. The moon overlooks the action “like a silver bow,” signifying erratic behavior, the dark side of love, and the bewitching allure of a world where the usual rules don’t apply. Although the characters eventually come to their senses, "A Midsummer Night's Dream" raises the question of how much agency we have over our own daily lives. But it’s not the more realistically rendered lovers, rulers or workers who have the last word, but the impish Puck who queries whether we can ever truly trust what we see: If we shadows have offended, Think but this and all is mended: That you have but slumbered here While these visions did appear. And in so doing, he evokes the effect of entering into the magical world of great theatre that plays with the boundary between illusion and reality – and dramatizes the possibility that life is but a dream.

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翻译人员: janice zhu 校对人员: Lipeng Chen趁着月色，一群年轻人悄悄溜进树林，在那里，他们服下迷魂剂，离奇地移情换爱，并意外碰到来自另一个世界的生灵。《仲夏夜之梦》呈现出 莎士比亚的迷幻——为读者和观者带来 一场美妙的视觉盛宴。该剧于 16 世纪 90 年代首次上演，是莎士比亚最喧闹的作品之一，充满了诡计、疯狂和魔力。《仲夏夜之梦》设定在一个夜晚，整部剧在欢快的节奏中进行。情节按冲突与瓦解的模式构造，来自不同世界的角色 相遇相识、分离分裂。莎士比亚用这些模式讽刺角色的自恋，并用一个喜剧性转折质疑权威。故事发生于古希腊，但和莎士比亚的众多戏剧一样， 它反映出作者对现实的担忧。夜间森林的魔法环境，打破族群间界限， 产生离奇效应。在剧中，诗人拿当时的 刻板等级制度大做文章，将三个不同族群带入一个 凡人无法控制的世界里，在那里他们的等级社会被彻底颠覆。戏剧一开场，年轻的赫米娅因为父亲伊吉斯和雅典大公忒修斯阻挠她嫁给心上人拉山德而大发雷霆。赫米娅对父亲选定的 狄米特律斯毫无兴趣——但她最好的朋友海伦娜却钟情于他。由于对长辈不满， 赫米娅和拉山德趁着夜色私奔，狄米特律斯也紧追过来。事情变得愈发复杂，因为海伦娜决定跟踪他们到树林， 希望以此赢得德米特吕斯的欢心。这时树林拥挤起来，因为还有一群“粗鲁的工人”——开朗的尼克 · 波顿正领着 一群醉醺醺的工人排练戏剧。他们这些人类还不知道 自己已经闯入了精灵世界。即便有迷人的光彩， 奥布朗和提泰妮娅，精灵世界的仙王和仙后， 也有自己的爱情难题。因为无法控制提泰妮娅， 生性妒忌的奥布朗震怒不已，命令小淘气帕克将一种魔法花的汁液 滴在仙后的眼皮上。当她醒来时， 就会爱上第一眼看到的人或物。执行任务时，帕克顺便恶作剧地在把汁液 滴在了打盹的狄米特律斯和拉山德眼皮上， 又把波顿的头变成驴头。当所有人的眼睛眨动着睁开，一个混合着心碎、错认、变身的混乱夜晚开始了。在所有角色中， 波顿的境遇也许最好的——中了魔法的提泰妮娅一看到他，就召唤精灵重赏他美酒和珍宝,把这个变身驴人迷的神魂颠倒：“摘下蝴蝶斑斓的彩色翅膀，扇去他睡眼上的莹莹月光。小精灵们，来，给他鞠躬。”虽然魔法推动了情节发生，但这部剧却真实展示出 我们为了爱情做的事——还有中了爱情魔咒后的荒谬举止。月亮在天上俯瞰一切， “如同一弯银弓，”寓意古怪的行为， 爱情的黑暗面，以及一个秩序颠倒的世界 带来的致命诱惑。尽管角色最终都恢复理智，《仲夏夜之梦》却引出一个问题：我们对自己的日常生活有多少控制权？不是更为真实的角色， 恋人、统治者或者工人说出了结束语，而是小淘气帕克问我们 是否能深信自己看到的：“若我们精灵有所得罪，只要这么想，一切好解决：您不过在这儿打了个瞌睡，当这些幻象如实显现。”如此一来，他制造出一种效果， 让人感觉进入了大剧院里的魔法世界，那个世界玩弄虚实之间的界限——戏剧化地展现人生可能只是一场梦。

**P654 2018-11-19 Inside the killer whale matriarchy - Darren Croft**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=654)

Off the rugged coast of the pacific northwest, pods of killer whales inhabit the frigid waters. Each family is able to survive here thanks mainly to one member, its most knowledgeable hunter: the grandmother. These matriarchs can live eighty years or more, while most males die off in their thirties. Though killer whales inhabit every major ocean, until recently we knew very little about them. The details of their lives eluded scientists until an organization called the Center for Whale Research began studying a single population near Washington State and British Columbia in 1976. Thanks to their ongoing work, we’ve learned a great deal about these whales, known as the Southern Residents. And the more we learn, the more this population’s elders’ vital role comes into focus. Each grandmother starts her life as a calf born into her mother’s family group, or matriline. The family does everything together, hunting and playing, even communicating through their own unique set of calls. Both sons and daughters spend their entire lives with their mothers’ families. That doesn’t mean a young whale only interacts with her relatives. Besides their own special calls, her matriline shares a dialect with nearby families, and they socialize regularly. Once a female reaches age fifteen or so, these meetings become opportunities to mate with males from other groups. The relationships don’t go much beyond mating— she and her calves stay with her family, while the male returns to his own mother. Until approximately age forty, she gives birth every 6 years on average. Then, she goes through menopause— which is almost unheard of in the animal kingdom. In fact, humans, killer whales and a few other whales are the only species whose females continue to live for years after they stop reproducing. After menopause, grandmothers take the lead hunting for salmon, the Southern Residents’ main food source. Most of the winter they forage offshore, supplementing salmon with other fish. But when the salmon head towards shore in droves to spawn, the killer whales follow. The matriarch shows the younger whales where to find the most fertile fishing grounds. She also shares up to 90% of the salmon she catches. With each passing year, her contributions become more vital: overfishing and habitat destruction have decimated salmon populations, putting the whales at near-constant risk of starvation. These grandmothers’ expertise can mean the difference between life and death for their families– but why do they stop having calves? It’s almost always advantageous for a female to continue reproducing, even if she also cares for her existing children and grandchildren. A couple unique circumstances change this equation for killer whales. The fact that neither sons or daughters leave their families of origin is extremely rare— in almost all animal species, one or both sexes disperse. This means that as a female killer whale ages, a greater percentage of her family consists of her children and grandchildren, while more distant relatives die off. Because older females are more closely related to the group than younger females, they do best to invest in the family as a whole, whereas younger females should invest in reproducing. In the killer whale’s environment, every new calf is another mouth to feed on limited, shared resources. An older female can further her genes without burdening her family by supporting her adult sons, who sire calves other families will raise. This might be why the females have evolved to stop reproducing entirely in middle age. Even with the grandmothers’ contributions, the Southern Resident killer whales are critically endangered, largely due to a decline in salmon. We urgently need to invest in restoring salmon populations to save them from extinction. In the long term, we’ll need more studies like the Center for Whale Research’s. What we’ve learned about the Southern Residents may not hold true for other groups. By studying other populations closely, we might uncover more startling adaptations, and anticipate their vulnerabilities to human interference before their survival is at risk.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=654)

翻译人员: Beichen Ding 校对人员: David Shi在崎岖的太平洋西北部海岸线，一群虎鲸生活在冰冷的海水里。每个虎鲸家庭之所以能够在这里生存，是因为它们的一个家庭成员，是经验丰富的猎手：它们的祖母。这些女族长们可以活八十年或者更多，而家庭中的男性成员 通常在它们 30 多岁时死去。尽管虎鲸分布在世界各处，直到最近我们对它们都知之甚少。学界中一直缺乏对它们生活习性的研究，直到 1976 年，一个叫做鲸类研究中心的组织开始对一群生活在华盛顿州和英属哥伦比亚的虎鲸进行研究。得益于科学家们的工作，我们能够了解这群被称为“南方居民”的鲸鱼。而我们越深入研究，虎鲸族群中的女族长的角色越显得重要。每一个“祖母”都从幼崽长大，出生在它们母亲的家族， 或是说，一个母系氏族中。家庭成员聚在一起生活、打猎和玩耍，甚至通过 它们独特的鸣叫进行交流。鲸鱼公崽和母崽的一生 都会生活在它们的母系家族。但这不意味着年轻的鲸鱼 只和它的亲属们互动。除了一些特殊的鸣叫，一个母系氏族通常与邻近的家庭们共享方言，它们中的成员因此可以频繁社交。当雌性鲸鱼到了 15 岁左右，这样的邻里聚会就成为了它们的求偶机会。这种跨家庭的关系通常仅仅是为了交配，交配过后，雌性和雄性鲸鱼，会分别回到它们的母亲身边。从 15 岁到 40 岁，雌性鲸鱼平均每隔六年产子。之后，它就会绝经，这在动物王国中基本上绝无仅有。事实上，只有人类、虎鲸和一些其它鲸类的雌性， 在绝经之后仍然会存活一段时间。在绝经后，祖母们领头带着家庭捕猎鲑鱼，“南方居民”的主要食物来源。大多数冬天它们在海上觅食，既捕捉鲑鱼也捕捉其他鱼类。但当鲑鱼成群结队地 游往岸边产卵时，虎鲸会跟着它们。女族长会向年轻的鲸鱼展示哪里是最肥沃的渔场。女族长还将它高达 90% 的猎物 分享给其它成员。每过一年，她的贡献都变得更加重要：过度捕捞和栖息地破坏 导致鲑鱼数量减少，使得鲸鱼面临着持续饥饿的危险。这些祖母的经验技巧是它们家族生存的关键。但是它们为何会停止产子呢？对雌性来说，维持生育能力通常是一个优势，即使她们需要照顾自己的孩子和孙子们。几个独特的环境导致 这个定律在虎鲸群体中不存在。首先，无论是儿子还是女儿，离开它们原生家庭的现象都极为罕见。在几乎所有的动物物种中，两性之一或之二会离开原生家庭。这意味着当雌性虎鲸长大时，它直系亲属（包括它的孩子和孙子）的占比，会越来越大，而其它的旁系亲属的占比，会不断减少。由于年老的雌性虎鲸和家庭的纽带更为紧密，它们也愿意为家庭付出更多，而年轻雌性会将更多精力用于繁殖上。在虎鲸的生存环境中，多一个幼崽就多一张口，而食物资源却总是有限。年长的母鲸可以通过支持它的成年儿子来进一步维持她的基因， 而不给自己的家庭带来负担，因为它成年儿子的后代 将由其它鲸群抚养。这也许就是雌性鲸鱼在中年后绝经的原因。即使祖母们付出了十分努力，“南部居民”虎鲸的生存仍然岌岌可危。鲑鱼的减少是主要原因。我们迫切需要加强恢复鲑鱼种群的投资，来保护鲸鱼使其免于灭绝。从长远来看，我们需要更多 像鲸类研究中心的研究。我们了解的“南方居民”的生活习性，可能不适用于其它虎鲸群体。只有通过详细研究其它鲸鱼族群，我们才可能在它们的生存面临危险之前，了解更多虎鲸为了 应对人类干扰的变异和预测它们在哪些方面 对人类行为会比较脆弱。

**P655 2018-11-19 The dangerous race for the South Pole - Elizabeth Leane**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=655)

Roald Amundsen had spent nearly two years preparing his Arctic expedition. He had secured funding from the Norwegian Crown and hand-picked a trusted crew. He’d even received the blessing of the famed explorer Fridtjof Nansen, along with the use of his ship, Fram, specially constructed to withstand the ice. Now, with the voyage departing, he had one final announcement to his shipmates: They were going to head in the opposite direction. By the early 20th century, nearly every region of the globe had been visited and mapped, with only two key locations remaining: the North Pole, deep in the frozen waters of the Arctic region, and the South Pole, nestled within a recently discovered icy continent in the vast Antarctic Ocean. A veteran of several expeditions, Amundsen had long dreamed of reaching the North Pole. But in 1909, amidst his preparations, news came that the American explorers Frederick Cook and Robert Peary had staked rival claims to the achievement. Instead of abandoning the planned voyage, Amundsen decided to alter its course to what he called “the last great problem.” But Amundsen’s crew weren’t the only ones kept in the dark. British naval officer Robert F. Scott had already visited the Antarctic, and was leading his own South Pole expedition. Now, as Scott’s ship Terra Nova reached Melbourne in 1910, he was greeted with the news that Amundsen was also heading south. Reluctantly, Scott found himself pitted against the Norwegian in what the newspapers called a ‘race to the Pole.’ Yet if it was a race, it was a strange one. The expeditions left at different times from different locations, and they had very different plans for the journey. Amundsen was focused solely on reaching the Pole. Informed by his Arctic exploration, he drew on both Inuit and Norwegian experience, arriving with a small team of men and more than a hundred dogs. His explorers were clothed in sealskin and furs, as well as specially designed skis and boots. But Scott's venture was more complicated. Launching an extensive scientific research expedition, he traveled with over three times more men than Amundsen, alongside over 30 dogs, 19 Siberian ponies, and three state-of-the-art motorized sledges. But these additional tools and bodies weighed down the ship as it battled the storms of the southern ocean. And as they finally began to lay supplies, they found both their ponies and motor-sledges ineffective in the harsh ice and snow. In the spring of 1911, after waiting out the long polar night, both parties began the journey south. Scott’s team traveled over the Beardmore Glacier, following the path of Ernest Shackleton's earlier attempt to reach the pole. But although this course had been documented, it proved slow and laborious. Meanwhile, despite an initial false start, Amundsen’s five-man team made good time using a previously uncharted route through the same Transantarctic Mountains. They stayed ahead of Scott’s team, and on December 14, arrived first at their desolate destination. To avoid the ambiguity that surrounded Cook and Peary’s North Pole claims, Amundsen’s team traversed the area in a grid to make sure they covered the Pole’s location. Along with flags and a tent marker, they left a letter for Scott, which would not be found until over a month later. But when Scott’s party finally reached the pole, losing the ‘race’ was the least of their problems. On the way back towards the camp, two of the five men succumbed to frostbite starvation, and exhaustion. The remaining explorers hoped for a prearranged rendezvous with a team sent from their base, but due to a series of mishaps, misjudgements and miscommunications, their rescue never arrived. Their remains, along with Scott’s diary, would not be found until spring. Today, scientists from various countries live and work at Antarctic research stations. But the journeys of these early explorers are not forgotten. Despite their divergent fates, they are forever joined in history, and in the name of the research base that marks the South Pole.

**P655 2018-11-19 The dangerous race for the South Pole - Elizabeth Leane**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=655)

翻译人员: Riley WANG 校对人员: rong wang罗尔德·阿蒙森已经为 北极探险准备了近两年。他从挪威皇家学院获得资金支持， 并且亲自挑选了值得信赖的队员。他甚至收到了来自 著名探险家弗里乔夫·南森的祝福，并且可以使用他的富勒姆号， 一条专门为应对寒冰而建造的船。现在，旅程即将开始， 他最后向船员宣布：他们要朝着正相反的方向行进。在20世纪早期，地球上几乎所有地区 都有人类到访并被标注在地图中，只剩下两个关键位置：北极，位于冰封的北冰洋深处，南极，位于广阔的南极海上一块最近发现的冰雪大陆。罗尔德·阿蒙森有过几次探险经历，他一直梦想着到达北极。但在1909年，他正为此准备之时，消息传来，美国探险家 罗伯特·皮里和弗雷德里克·库克都宣称自己已经到达北极。阿蒙森并未放弃筹备中的航行，而是决定改变路线，去往南极， 他将其称为“最后一个大问题”。但并非只有阿蒙森的船员被蒙在鼓里，英国海军军官罗伯特·斯科特 已经到过南极地区，并且有自己的南极探险队。1910年，当斯科特的新大陆号 到达墨尔本时。他收到了阿蒙森也要前往南极的消息。斯科特不情愿地 与这个挪威人成了竞争对手，当时的新闻报纸将其称为 “前往南极的竞赛”。若真是如此， 那么它绝对是一场奇怪的竞赛。远征队从不同地点，在不同时间出发，他们对路程的规划也截然不同。阿蒙森的目标只是到达极地。受到北极探险的启发， 他借鉴了因纽特人和挪威人的经验，队伍由较少的人员 和一百多只狗组成。他的探险队员们身着海豹皮和毛皮衣服，配备专门设计的雪橇和靴子。但是斯科特的冒险却更加复杂。他发起了一项宏大的的科学研究式探险，出行的人数是阿蒙森团队的三倍以上，配备30多条狗和19匹西伯利亚小马，还有三台最先进的机动雪橇。但是这些额外的工具和队员使他们的船在南方海洋的风暴中不堪重负。最终他们开始减轻装备，并且发现小马和机动雪橇在冰天雪地中派不上什么用场。1911年的春天， 在熬过了漫长的极夜之后，两支队伍都开始了向南的旅程。斯科特的队伍在比尔德摩尔冰川上穿行，沿着未能成功到达极地的探险家 欧内斯特·沙克尔顿的路线前进。尽管这条路线是前人所记载， 但事实上走起来却缓慢且劳累。与此同时， 阿蒙森的五人团队虽然起点不佳，但通过一条未曾标记的路线迎头赶上，这条路线同样经过横贯南极山脉。他们领先于斯科特的队伍，在12月14日，阿蒙森队伍 率先到达了这片荒芜的目的地。为了避免出现库克和皮里 谁先到达北极之争的情况，阿蒙森一队来来回回穿过这片区域，以确保他们覆盖了南极点区域。他们不仅留下了旗子和帐篷标记，还给斯科特留下了一封信， 而这封信在一个多月后才被发现。当斯科特一行人最后到达极地时，失去比赛胜利已算不上什么问题。在返回大本营的路上，五人小队中的两人 因冻伤、饥饿和疲惫而失去了生命。剩下的探险队员希望能够与从大本营出发的另一只队伍汇合。但是由于一系列的事故、 误判和沟通不畅，他们始终没能等到救援。他们的尸体和斯科特的日记 直到春天才被人找到。如今，各个国家的科学家们在南极科考站工作生活。但是早期探险家的旅程没有被遗忘。尽管他们的命运不尽相同， 他们在历史中得以相会。并且象征南极的科考大本营 也以他们命名。

**P656 2018-11-26 A brie(f) history of cheese - Paul Kindstedt**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=656)

Before empires and royalty, before pottery and writing, before metal tools and weapons – there was cheese. As early as 8000 BCE, the earliest Neolithic farmers living in the Fertile Crescent began a legacy of cheesemaking almost as old as civilization itself. The rise of agriculture led to domesticated sheep and goats, which ancient farmers harvested for milk. But when left in warm conditions for several hours, that fresh milk began to sour. Its lactic acids caused proteins to coagulate, binding into soft clumps. Upon discovering this strange transformation, the farmers drained the remaining liquid – later named whey – and found the yellowish globs could be eaten fresh as a soft, spreadable meal. These clumps, or curds, became the building blocks of cheese, which would eventually be aged, pressed, ripened, and whizzed into a diverse cornucopia of dairy delights. The discovery of cheese gave Neolithic people an enormous survival advantage. Milk was rich with essential proteins, fats, and minerals. But it also contained high quantities of lactose – a sugar which is difficult to process for many ancient and modern stomachs. Cheese, however, could provide all of milk’s advantages with much less lactose. And since it could be preserved and stockpiled, these essential nutrients could be eaten throughout scarce famines and long winters. Some 7th millennium BCE pottery fragments found in Turkey still contain telltale residues of the cheese and butter they held. By the end of the Bronze Age, cheese was a standard commodity in maritime trade throughout the eastern Mediterranean. In the densely populated city-states of Mesopotamia, cheese became a staple of culinary and religious life. Some of the earliest known writing includes administrative records of cheese quotas, listing a variety of cheeses for different rituals and populations across Mesopotamia. Records from nearby civilizations in Turkey also reference rennet. This animal byproduct, produced in the stomachs of certain mammals, can accelerate and control coagulation. Eventually this sophisticated cheesemaking tool spread around the globe, giving way to a wide variety of new, harder cheeses. And though some conservative food cultures rejected the dairy delicacy, many more embraced cheese, and quickly added their own local flavors. Nomadic Mongolians used yaks’ milk to create hard, sundried wedges of Byaslag. Egyptians enjoyed goats’ milk cottage cheese, straining the whey with reed mats. In South Asia, milk was coagulated with a variety of food acids, such as lemon juice, vinegar, or yogurt and then hung to dry into loafs of paneer. This soft mild cheese could be added to curries and sauces, or simply fried as a quick vegetarian dish. The Greeks produced bricks of salty brined feta cheese, alongside a harder variety similar to today’s pecorino romano. This grating cheese was produced in Sicily and used in dishes all across the Mediterranean. Under Roman rule, “dry cheese” or “caseus aridus,” became an essential ration for the nearly 500,000 soldiers guarding the vast borders of the Roman Empire. And when the Western Roman Empire collapsed, cheesemaking continued to evolve in the manors that dotted the medieval European countryside. In the hundreds of Benedictine monasteries scattered across Europe, medieval monks experimented endlessly with different types of milk, cheesemaking practices, and aging processes that led to many of today’s popular cheeses. Parmesan, Roquefort, Munster and several Swiss types were all refined and perfected by these cheesemaking clergymen. In the Alps, Swiss cheesemaking was particularly successful – producing a myriad of cow’s milk cheeses. By the end of the 14th century, Alpine cheese from the Gruyere region of Switzerland had become so profitable that a neighboring state invaded the Gruyere highlands to take control of the growing cheese trade. Cheese remained popular through the Renaissance, and the Industrial Revolution took production out of the monastery and into machinery. Today, the world produces roughly 22 billion kilograms of cheese a year, shipped and consumed around the globe. But 10,000 years after its invention, local farms are still following in the footsteps of their Neolithic ancestors, hand crafting one of humanity’s oldest and favorite foods.

**P656 2018-11-26 A brie(f) history of cheese - Paul Kindstedt**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=656)

翻译人员: Tzu Tien Chiu 校对人员: rong wang在王国与皇室存在之前，在陶器与文字存在之前，在金属工具与武器存在之前，奶酪就已经存在了。早在公元前 8000 年，新石器时代早期， 居住在新月沃土的农民就开始了奶酪制造的传承，几乎和文明一样久远。农业的崛起使农民们 开始圈养绵羊和山羊，以获取羊乳。当他们把羊乳放在 高温的环境数小时后，新鲜羊乳开始发酸。这是因为羊乳里的乳酸使蛋白质凝结， 变成柔软的半固体结块。当发现这个奇怪的现象后，农民们把剩余的液体倒掉——后称乳清——然后发现这些柔软，可涂开的黄色结块 可以新鲜食用。这些结块，或称凝乳，能用来做奶酪，而奶酪经过陈化、压榨、 成熟和搅拌等加工处理后，便能制成各种各样的乳制品。奶酪的发现给了新石器时代 人类巨大的生存优势。奶中含有丰富的蛋白质、 脂肪与矿物质，但同时也含有大量的乳糖——而乳糖不耐症是过去到现代 很多人的通病。然而，奶酪不但能提供 所有奶中含有的营养，且乳糖含量较低。由于奶酪可以长期储存，这些营养可以随时被食用，无论是在饥荒时期或是寒冬。在土耳其出土的 前 7 千纪时期的陶器碎片上，仍含有奶酪和黄油的残留物。在青铜时代末期，奶酪已是整个地中海东部地区港口贸易的常见货物。在人口密集的美索不达米亚城市，奶酪是人们的料理和宗教生活中 很重要的一部分。已知最古老的文献当中包含奶酪配额的行政记录，详细记载了美索不达米亚地区 不同人群和祭典的奶酪配额。附近土耳其文明的记录中 也提到凝乳酶。这是某些哺乳动物胃中 生产的一种酶，可用来加速和控制 乳汁内蛋白质的凝结。最终，这种先进的奶酪制造技术传遍全球，推进了各种全新的，更硬的奶酪的发明。虽然一些比较保守的饮食文化 拒绝了这种美味的乳制品，但更多接受了奶酪， 并添加了他们本土的风味。蒙古的游牧民族用牦牛的奶， 晒干变硬后制成蒙古奶酪。埃及人喜欢吃山羊奶制成的白软干酪， 利用芦苇制成的奶酪席来排除乳清。南亚地区的居民使用多种酸性食品 来促进乳汁的凝结，其中包括柠檬汁、醋或酸奶，随后挂起来风干制成印度奶酪。这种奶酪较松软且味道较淡， 因此能加到咖喱和调料当中，或者直接煎制， 做成一道快速的素食料理。希腊人把砖块状的奶酪 浸泡在盐水里制成菲达奶酪，和其他更坚硬的种类， 类似于现今的罗马诺奶酪。这种能刨成丝的奶酪生产于西西里岛，整个地中海地区都会用到它来制做料理。在罗马的统治下，干奶酪是一种非常重要的军需，供给约 50 万名守卫着 罗马帝国边界的军人。而在西罗马帝国消亡时 的中世纪时期，奶酪的制造技术仍然在欧洲郊区各地散布的庄园中 持续的进化。在遍布欧洲的几百个本笃会修道院中，僧侣们没日没夜的研究着不同种类的乳汁，奶酪制造方法，和陈化奶酪的过程， 研发出了现今非常受欢迎的多种奶酪。帕尔玛奶酪、罗克福奶酪、 芒斯特奶酪和几种瑞士的奶酪，都是因为这些牧师的研究而得到改良和完善。在阿尔卑斯山脉， 瑞士的奶酪制造尤其成功——研发了无数的牛乳奶酪。在 14 世纪末，瑞士格鲁耶尔地区的 高山奶酪变得非常赚钱，因此邻国的军队侵占了此地，以便控制迅速发展的奶酪贸易。在文艺复兴时期，奶酪依旧十分受欢迎，而工业革命把奶酪的制造移出了修道院，进入了工厂。现在，全世界一年共生产 约 220 亿公斤的奶酪，出口至全球并被食用。但在奶酪被发明 1 万年后的今日，本地的农场依旧追随着 新石器时代先祖们的脚步，手工制造人类文明中 最古老也最受欢迎的食物。

**P657 2018-11-27 Why should you read Kurt Vonnegut - Mia Nacamulli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=657)

Billy Pilgrim can’t sleep because he knows aliens will arrive to abduct him in one hour. He knows the aliens are coming because he has become “unstuck” in time, causing him to experience events out of chronological order. Over the course of Kurt Vonnegut’s Slaughterhouse-five, he hops back and forth between a childhood trip to the Grand Canyon, his life as a middle-aged optometrist, his captivity in an intergalactic zoo, the humiliations he endured as a war prisoner, and more. The title of Slaughterhouse-five and much of its source material came from Vonnegut’s own experiences in World War II. As a prisoner of war, he lived in a former slaughterhouse in Dresden, where he took refuge in an underground meat locker while Allied forces bombed the city. When he and the other prisoners finally emerged, they found Dresden utterly demolished. After the war, Vonnegut tried to make sense of human behavior by studying an unusual aspect of anthropology: the shapes of stories, which he insisted were just as interesting as the shapes of pots or spearheads. To find the shape, he graphed the main character’s fortune from the beginning to the end of a story. The zany curves he generated revealed common types of fairy tales and myths that echo through many cultures. But this shape can be the most interesting of all. In a story like this, it’s impossible to distinguish the character’s good fortune from the bad. Vonnegut thought this kind of story was the truest to real life, in which we are all the victims of a series of accidents, unable to predict how events will impact us long term. He found the tidy, satisfying arcs of many stories at odds with this reality, and he set out to explore the ambiguity between good and bad fortune in his own work. When Vonnegut ditched clear-cut fortunes, he also abandoned straightforward chronology. Instead of proceeding tidily from beginning to end, in his stories “All moments, past, present and future always have existed, always will exist.” Tralfamadorians, the aliens who crop up in many of his books, see all moments at once. They “can see where each star has been and where it is going, so that the heavens are filled with rarefied, luminous spaghetti.” But although they can see all of time, they don’t try to change the course of events. While the Trafalmadorians may be at peace with their lack of agency, Vonnegut’s human characters are still getting used to it. In The Sirens of Titan, when they seek the meaning of life in the vastness of the universe, they find nothing but “empty heroics, low comedy, and pointless death.” Then, from their vantage point within a “chrono-synclastic infundibulum,” a man and his dog see devastating futures for their earthly counterparts, but can’t change the course of events. Though there aren’t easy answers available, they eventually conclude that the purpose of life is “to love whoever is around to be loved.” In Cat’s Cradle, Vonnegut’s characters turn to a different source of meaning: Bokonism, a religion based on harmless lies that all its adherents recognize as lies. Though they’re aware of Bokonism’s lies, they live their lives by these tenets anyway, and in so doing develop some genuine hope. They join together in groups called Karasses, which consist of people we “find by accident but […] stick with by choice”— cosmically linked around a shared purpose. These are not to be confused with Granfalloons, groups of people who appoint significance to actually meaningless associations, like where you grew up, political parties, and even entire nations. Though he held a bleak view of the human condition, Vonnegut believed strongly that “we are all here to help each other get through this thing, whatever it is." We might get pooped and demoralized, but Vonnegut interspersed his grim assessments with more than a few morsels of hope. His fictional alter ego, Kilgore Trout, supplied this parable: two yeast sat “discussing the possible purposes of life as they ate sugar and suffocated in their own excrement. Because of their limited intelligence, they never came close to guessing that they were making champagne.” In spite of his insistence that we’re all here to fart around, in spite of his deep concerns about the course of human existence, Vonnegut also advanced the possibility, however slim, that we might end up making something good. And if that isn’t nice, what is?

**P657 2018-11-27 Why should you read Kurt Vonnegut - Mia Nacamulli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=657)

翻译人员: Sophia Wang 校对人员: Ella Chen毕利·皮尔格里姆难以入睡因为他知道一个小时后 外星人会来把他绑走。他知道外星人会来 因为他已经"脱离"了时间，这让他经历的事情都不按照 正常的时间顺序。在库尔特·冯内古特的 《五号屠宰场》中，毕利穿梭于各种不同的经历中： 他儿时一次去大峡谷的旅行，他作为一个中年配镜师的生活，他在一个外星动物园的囚禁遭遇，和他作为战俘时所经受的羞辱经历等等。《五号屠宰场》的标题和大量素材都来源于冯内古特 在二战中的亲身经历。作为一个战俘，他被关押在 德累斯顿的一个废弃屠宰场中。当盟军轰炸城市的时候， 他躲在一个地下肉窖幸免于难。当他和其他战俘从地窖中出来时，他们发现德累斯顿已被夷为平地。战后，冯内古特试图解释人类的行为通过研究人类学中的一个独特分支：故事的形状。他认为故事的形状和 罐子或者矛头的形状一样有趣。为了探索故事的形状， 他用图表的形式表示故事主人公从头到尾的经历。这些独特的曲线展现了 很多童话或神话的常见模式。这些模式在很多文化中都很普遍。但是接下来的这个形状 是所有曲线中最有趣的。在这种类型的故事中，你很难分辨主人公的遭遇是好是坏。冯内古特认为这样的故事 是最能真实反映现实生活的。在这样的故事中， 我们对一系列偶然事件无法反抗，我们无法预知这些事情对 我们会有什么长久的影响。他发现那种平滑理想的故事走向 与现实不符。于是，他决定在他的作品中探索顺境与逆境之间的一步之遥。冯内古特不仅抛弃了 绝对的好坏运气之分，他也抛弃了简单的时间顺序描述。不同于由开始到结尾的正常故事推进，在他的故事中，“过去、现在 和将来都始终共同存在并延续。”特拉法马多尔人是一群 在他书中反复出现的外星人，他们可以一次看到所有的时间节点。他们可以”看到所有星星所处的位置和 它们将移动的轨迹，所以对他们来说天空像是 覆满了缥缈闪烁的意大利面”。但即使他们可以看透时间，他们不会试图改变任何事件发生的轨迹。虽然特拉法马多尔人 安于不干涉外界的状态，冯内古特的人类角色还在为之苦恼。在《泰坦星的海妖》中，主人公们在浩瀚的宇宙 中探索生命的奥义。到头来，他们只发现了“空洞的宏大、 庸俗的滑稽以及无意义的死亡。”以他们所处的一个 “时间-弹性漏斗”的视角，一个人和他的狗看到了 他们令人惊愕的未来，但他们却不能改变事情发生的轨迹。虽然一句话很难概括他们的体会， 但他们最终总结出人生的意义就在于 “去爱身边可以去爱的人”。在《猫的摇篮》中，冯内古特笔下的角色 有着另一种人生哲学：布克农教。这个宗教的信徒都公认 这个宗教中的一切都是善意的谎言。即使信徒们知道 布克农教的一切都是谎言，他们还是依照教义信条生活，并以此来获得一些抚慰人心的希望。书中的人聚集在一起 组成了许多叫“卡拉斯”的群体，这个群体中的人是“偶然相识， 但经过选择而在一起”。大家因为一个共同的目的， 机缘巧合中产生了联系。这个群体不能与格朗法伦群体混为一谈，格朗法伦群体的人是给 本身泛泛无意义的联系强加以重要意义，比如你长大的地方、政治派别、 甚至国籍之类的联系。虽然冯内古特对于人类的处境 很悲观，但他认为”我们存在是要帮助彼此共度难关， 无论难关是什么。”我们可能被困难打倒而意志消沉，但冯内古特也在他尖锐的评论中，穿插着很多乐观和希望。他在小说中的分身，基尔戈·特劳特， 曾给出了这个比喻：两个酵母坐在一起“探讨人生的意义”，他们一边吸收糖分 一边又因他们产生的排泄物窒息而死。因为他们智慧有限，它们从不曾想到 它们其实是在生产香槟酒。尽管他常说我们始终在四处闲荡；尽管他为人类的生存忧愁思虑，冯内古特也提出了微小但存在的可能性，就是——我们终将创造美好。还能有什么比这更好呢？

**P658 2018-11-28 Can you solve the time travel riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=658)

Your internship in Professor Ramsey’s physics lab has been amazing. Until, that is, the professor accidentally stepped through a time portal. You’ve got just a minute to jump through the portal to save him before it closes and leaves him stranded in history. Once you’re through it, the portal will close, and your only way back will be to create a new one using the chrono-nodules from your lab. Activated nodules connect to each other via red or blue tachyon entanglement. Activate more nodules and they’ll connect to all other nodules in the area. As soon as a red or blue triangle is created with a nodule at each point, it opens a doorway through time that will take you back to the present. But the color of each individual connection manifests at random, and there’s no way to choose or change its color. And there’s one more problem: each individual nodule creates a temporal instability that raises the chances the portal might collapse as you go through it. So the fewer you bring, the better. The portal’s about to close. What’s the minimum number of nodules you need to bring to be certain you’ll create a red or blue triangle and get back to the present? Pause here if you want to figure it out for yourself! Answer in: 3 Answer in: 2 Answer in: 1 This question is so rich that an entire branch of mathematics known as Ramsey Theory developed from it. Ramsey Theory is home to some famously difficult problems. This one isn’t easy, but it can be handled if you approach it systematically. Imagine you brought just three nodules. Would that be enough? No - for example, you might have two blue and one red connection, and be stuck in the past forever. Would four nodules be enough? No - there are many arrangements here that don’t give a blue or red triangle. What about five? It turns out there is an arrangement of connections that avoids creating a blue or red triangle. These smaller triangles don’t count because they don’t have a nodule at each corner. However, six nodules will always create a blue triangle or a red triangle. Here’s how we can prove that without sorting through every possible case. Imagine activating the sixth nodule, and consider how it might connect to the other five. It could do so in one of six ways: with five red connections, five blue connections, or some mix of red and blue. Notice that every possibility has at least three connections of the same color coming from this nodule. Let’s look at just the nodules on the other end of those same three color connections. If the connections were blue, then any additional blue connection between those three would give us a blue triangle. So the only way we could get in trouble is if all the connections between them were red. But those three red connections would give us a red triangle. No matter what happens, we’ll get a red or a blue triangle, and open our doorway. On the other hand, if the original three connections were all red instead of blue, the same argument still works, with all the colors flipped. In other words, no matter how the connections are colored, six nodules will always create a red or blue triangle and a doorway leading home. So you grab six nodules and jump through the portal. You were hoping your internship would give you valuable life experience. Turns out, that didn’t take much time.

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翻译人员: Zhenlan Yao 校对人员: Liu Qi你在拉姆齐教授物理实验室的 实习工作一直以来都非常棒，直到教授不小心穿过了时间传送门。在传送门关闭、将教授 困在历史时空之前，你有一分钟的时间 穿过传送门拯救他。当你进入传送门之后， 传送门会关闭，返回当前时空的唯一办法是利用实验室里的“时间结节” 建立一个新的传送门。激活后的结节会互相连接，通过红色或蓝色超光速粒子缠结。更多结节激活后，它们将会与区域内其他结节相互连接。一旦形成一个以结节为顶点的 蓝色或红色三角形时，时空之门即可打开， 将你带回当前时空。但每次连接的颜色随机出现，无法选择或者改变连接的颜色。还有一个问题是：每个结节都会降低 时空稳定性，增加穿越时传送门崩溃的风险。所以携带的时间结节越少越好。传送门即将关闭。最少需要带多少个结节才能保证可以组成一个红色或 蓝色三角形，回当前时空呢？(想要自行计算可以在此处暂停)（答案将在三秒后揭晓）321这个问题内涵丰富，知名的拉姆齐理论的整个 数学分支都由此发展而来。拉姆齐理论包含了许多著名难题。本题虽不简单， 但通过系统性地分析，还是可以解决的。假设只带三个结节，三个够吗？不够。举个例子， 可能会出现两蓝一红的连接，那么你会被永远地困在过去。四个够不够？不够。 因为存在多种排列方式可以使蓝色或红色三角不成立。那么五个呢？还是会有一种排列方式，会使蓝色或红色三角不成立。中间这些小三角形不算， 因为它们的各顶点不是结节。但是，六个结节将始终可以构成 蓝色或红色三角形。下面是不用排除法， 我们证明这个结论的方法。试想，激活第六个结节时，它将如何与其它五个连接。一定会是下列六种情况中的一种：五红，五蓝，或红蓝混合。可以发现，所有可能性中该结节的连接至少有三个是同色的。只看这三条同色连接的另一端的结节，如果连接为蓝色线，那么在这三个结节之间任意位置 添加蓝色连接都会构成蓝色三角形。所以唯一会让我们遇到麻烦的情形是，结节间的连接全部是红色。但是三个红色连接将会 构成一个红色三角形。无论怎样，我们都会得到 一个红色或蓝色三角形，打开传送门。另一方面，如果原来的三个连接 均为红色，而非蓝色，所有颜色翻个样， 同样的结论依然成立。换句话说，不论连接是什么颜色，六个结节始终能组成一个红色或 蓝色三角，打开回家的大门。所以带上六个结节， 跳进传送门吧。你所期待的实习期 带给你宝贵的人生经历，其实并不需要花费太长时间。

**P659 2018-11-29 From slave to rebel gladiator - The life of Spartacus - Fiona Radford**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=659)

As the warrior slept, a snake coiled around his face. Instead of a threat, his wife saw an omen– a fearsome power that would lead her husband to either glory or doom. For now, however, he was only a slave – one of millions taken from the territories conquered by Rome to work the mines, till the fields, or fight for the crowd’s entertainment. A nomadic Thracian from what is now Bulgaria, he had served in the Roman Army but was imprisoned for desertion. His name was Spartacus. Spartacus had been brought to Capua by Batiatus, a lanista, or trainer of gladiators. And life at the ludus, or gladiator school, was unforgiving. New recruits were forced to swear an oath “to be burned, to be bound, to be beaten, and to be killed by the sword,” and to obey their master’s will without question. But even harsh discipline couldn’t break Spartacus’s spirit. In 73 BCE, Spartacus led 73 other slaves to seize knives and skewers from the kitchen and fight their way out, hijacking a wagon of gladiator equipment along the way. They were done fighting for others– now, they fought for their freedom. When the news reached Rome, the Senate was too busy with wars in Spain and the Pontic Empire to worry about some unruly slaves. Unconcerned, praetor Claudius Glaber took an army of three thousand men to the rebel’s refuge at Mount Vesuvius, and blocked off the only passage up the mountain. All that remained was to wait and starve them out– or so he thought. In the dead of night, the rebels lowered themselves down the cliffside on ropes made from vines, and flanked Glaber’s unguarded camp. Thus began the legend of Rome’s defiant gladiator. As news of the rebellion spread, its ranks swelled with escaped slaves, deserting soldiers, and hungry peasants. Many were untrained, but Spartacus’s clever tactics transformed them into an effective guerrilla force. A second Roman expedition led by praetor Varinius, was ambushed while the officer bathed. To elude the remaining Roman forces, the rebels used their enemy’s corpses as decoy guards, stealing Varinius’s own horse to aid their escape. Thanks to his inspiring victories and policy of distributing spoils equally, Spartacus continued attracting followers, and gained control of villages where new weapons could be forged. The Romans soon realized they were no longer facing ragtag fugitives, and in the spring of 72 BCE, the Senate retaliated with the full force of two legions. The rebels left victorious, but many lives were lost in the battle, including Spartacus’ lieutenant Crixus. To honor him, Spartacus held funeral games, forcing his Roman prisoners to play the role his fellow rebels had once endured. By the end of 72 BCE, Spartacus’ army was a massive force of roughly 120,000 members. But those numbers proved difficult to manage. With the path to the Alps clear, Spartacus wanted to march beyond Rome’s borders, where his followers would be free. But his vast army had grown brash. Many wanted to continue pillaging, while others dreamed of marching on Rome itself. In the end, the rebel army turned south– forgoing what would be their last chance at freedom. Meanwhile, Marcus Licinius Crassus had assumed control of the war. As Rome’s wealthiest citizen, he pursued Spartacus with eight new legions, eventually trapping the rebels in the toe of Italy. After failed attempts to build rafts, and a stinging betrayal by local pirates, the rebels made a desperate run to break through Crassus’s lines– but it was no use. Roman reinforcements were returning from the Pontic wars, and the rebels’ ranks and spirits were broken. In 71 BCE, they made their last stand. Spartacus nearly managed to reach Crassus before being cut down by centurions. His army was destroyed, and 6000 captives were crucified along the Appian Way– a haunting demonstration of Roman authority. Crassus won the war, but it is not his legacy which echoes through the centuries. Thousands of years later, the name of the slave who made the world’s mightiest empire tremble has become synonymous with freedom– and the courage to fight for it.

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翻译人员: Riley WANG 校对人员: Carol Wang这名勇士正在熟睡，一条蛇环住了他的脸，他妻子认为这是吉兆，而非凶险——一种强大力量将指引她丈夫 走向荣光或灾难。但现在，他还仅仅是个奴隶——和其他数以百万计的奴隶一样，罗马军队征服了他们家园， 他们被带走而沦为奴隶。在矿场工作、在农田耕种，或供人们娱乐的角斗士。他是游牧民族色雷斯人， 来自现在的保加利亚地区，在罗马军队里服役， 却因擅离职守而锒铛入狱，他名叫斯巴达克斯。巴蒂亚图斯是一名角斗士训练师，他把斯巴达克斯带到卡普亚。角斗士训练所的生活非常严酷，新学员被强迫发誓，“誓愿上刀山、下火海、 英勇搏斗、或是死于剑下，”并且要绝对服从主人的意志。但严酷的纪律也无法摧毁 斯巴达克斯的意志，在公元前 73 年， 斯巴达克斯带领其他 73 名奴隶手握厨房刀具和串肉钎一路杀出去，并沿路抢劫了装有训练设备的马车。他们厌倦了为他人而搏斗，现在他们要为自己的自由而抗争。当消息传至罗马，元老院正忙于应对 在西班牙和本都帝国的战争，因此无暇顾及几个叛乱的奴隶。执政官克劳狄斯·格拉伯尔 若无其事地带领 3000 名士兵，来到位于维苏威山的叛党营地，并封锁了上山的唯一通道。静等待饥饿的奴隶自己出来——然而他的如意算盘落空了。夜深人静时，叛者用藤条制成的绳索从悬崖下山，并从一侧攻击了毫无防备的军营，罗马叛乱角斗士的传奇由此开始。随着反叛消息的传播，斯巴达克斯的军队不断扩大， 加入者有逃亡的奴隶，叛逃的士兵和饥饿的农民。大多数人都未接受过训练，但是斯巴达克斯机智的战术将他们变成一支高效的游击力量。第二支罗马远征队 由执政官瓦力乌尼思率领，这支队伍在执政官洗澡时被伏击。为了避开剩余的罗马军队，反叛者利用敌人的尸体作为掩护，偷了瓦力乌尼思的马以助他们逃走。由于斯巴达克斯激励人心的胜利 和平均分配战利品的政策，他不断吸引着追随者，并且控制了村庄，在此他们得以铸造兵器。罗马人迅速意识到 他们面对的不再是破衣烂衫的难民，因此，在公元前 72 年的春天，元老院命令两个军团进行反攻。反叛者虽然取得了胜利，但是在战争中牺牲者众多，包括斯巴达克斯的助理官克雷斯。为了纪念他，斯巴达克斯 为其葬礼举办了角斗士比赛，让罗马俘虏遭受 他及其他奴隶曾经历过的痛苦。公元前 72 年年底，斯巴达克斯的军队实力雄厚， 大约达到 12 万人。但是人数众多使管理变得困难。在去往阿尔卑斯山的路上，斯巴达克斯本想要穿过罗马边境线，这样他的追随者就获得了自由。但是他的军队开始变得自以为是。许多人想要继续劫掠，而其他人则幻想可以攻入罗马。最终，反叛军向南进发，放弃了他们获得自由的最后机会。与此同时，马库斯·李锡尼·克拉苏 掌控了战争大局。作为罗马最富有的居民，他许诺给斯巴达克斯八个新军团，以此作为诱饵 将反叛军围困在意大利南部。在自制木筏失败并惨遭当地海盗欺骗之后，反叛军绝望地四散逃跑 想要冲破克拉苏的包围圈，但仍无济于事。罗马的增援力量从本都战争返回，反叛军队和士气溃败。公元前 71 年，他们做出了最后的抵抗。就在斯巴达克斯几乎冲到克拉苏面前时， 他被百人队队长砍中而倒下。他的军队瓦解了，6000 名俘虏被钉死在 阿皮亚大道沿线的十字架上，以这种可怕的形式 宣示着罗马帝国的权威。克拉苏获得了战争的胜利，但传颂了几个世纪的 传奇故事的主人公并不是他。几千年之后，曾让世界最强帝国战栗的奴隶的名字成为了自由的代名词，也给了人们为了自由而奋斗的勇气。

**P660 2018-12-03 Are we running out of clean water - Balsher Singh Sidhu**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=660)

From space, our planet appears to be more ocean than Earth. But despite the water covering 71% of the planet’s surface, more than half the world’s population endures extreme water scarcity for at least one month a year. And current estimates predict that by 2040, up to 20 more countries could be experiencing water shortages. Taken together, these bleak statistics raise a startling question: are we running out of clean water? Well yes, and no. At a planetary scale, Earth can’t run out of freshwater thanks to the water cycle, a system that continuously produces and recycles water, morphing it from vapour, to liquid, to ice as it circulates around the globe. So this isn’t really a question of how much water there is, but of how much of it is accessible to us. 97% of earth’s liquid is saltwater, too loaded with minerals for humans to drink or use in agriculture. Of the remaining 3% of potentially usable freshwater, more than two-thirds is frozen in ice caps and glaciers. That leaves less than 1% available for sustaining all life on Earth, spread across our planet in rivers, lakes, underground aquifers, ground ice and permafrost. It’s these sources of water that are being rapidly depleted by humans, but slowly replenished by rain and snowfall. And this limited supply isn’t distributed evenly around the globe. Diverse climates and geography provide some regions with more rainfall and natural water sources, while other areas have geographic features that make transporting water much more difficult. And supplying the infrastructure and energy it would take to move water across these regions is extremely expensive. In many of these water-poor areas, as well as some with greater access to water, humanity is guzzling up the local water supply faster than it can be replenished. And when more quickly renewed sources can’t meet the demand, we start pumping it out of our finite underground reserves. Of Earth’s 37 major underground reservoirs, 21 are on track to be irreversibly emptied. So while it’s true that our planet isn’t actually losing water, we are depleting the water sources we rely on at an unsustainable pace. This might seem surprising – after all, on average, people only drink about two liters of water a day. But water plays a hidden role in our daily lives, and in that same 24 hours, most people will actually consume an estimated 3000 liters of water. In fact, household water – which we use to drink, cook, and clean – accounts for only 3.6% of humanity’s water consumption. Another 4.4% goes to the wide range of factories which make the products we buy each day. But the remaining 92% of our water consumption is all spent on a single industry: agriculture. Our farms drain the equivalent of 3.3 billion Olympic-sized swimming pools every year, all of it swallowed up by crops and livestock to feed Earth’s growing population. Agriculture currently covers 37% of Earth’s land area, posing the biggest threat to our regional water supplies. And yet, it’s also a necessity. So how do we limit agriculture’s thirst while still feeding those who rely on it? Farmers are already finding ingenious ways to reduce their impact, like using special irrigation techniques to grow “more crop per drop”, and breeding new crops that are less thirsty. Other industries are following suit, adopting production processes that reuse and recycle water. On a personal level, reducing food waste is the first step to reducing water use, since one-third of the food that leaves farms is currently wasted or thrown away. You might also want to consider eating less water-intensive foods like shelled nuts and red meat. Adopting a vegetarian lifestyle could reduce up to one third of your water footprint. Our planet may never run out of water, but it doesn’t have to for individuals to go thirsty. Solving this local problem requires a global solution, and small day-to-day decisions can affect reservoirs around the world.

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翻译人员: Ran Lan 校对人员: Yinchun Rui从外太空看，我们的星球上 海洋比土地更多。尽管地球表面的71%覆盖着水，世界上超过一半人口每年至少有一个月要经受严重缺水。以目前预计，到了2040年会新增20个国家陷入用水短缺。总的说来，这些冰冷的统计数据 带来了一个骇人的问题：我们将会用尽仅有的净水吗？嗯，也是，也不是。就行星而言，地球不会用完淡水得益于水循环系统不断地产生和回收水，将其形态不断汽化、液化、固化， 并在全球循环往复。所以问题并不在于水有多少，而是我们能得到多少水。地球上97%的水是海水，对人类来说矿物质太多了， 不合适饮用或灌溉。在剩下3%的淡水中，3分之2以上都封存于冰盖和冰川之中。只有不到1%的水可以 维持地球上所有生命，而这些净水遍布于江河、湖泊、地下蓄水层、地下冰和永冻层。人类正在快速地消耗着这些水源，而雨雪的补充却很慢。这些有限的水源在全球的 分布不是平均的，不同的气候和地理为某些地区带来不绝的雨水和自然水资源，其他地区的地理因素令引水艰难。这些地区的引水工程和能源消耗费用极为昂贵。在很多缺水的地方和 水资源充裕的地方，人类的用水量都超越了 自然补充的速率。当快速补水资源不再满足需求时，我们开始抽取有限的地下水储备。全球37个主要的天然地下水库当中， 有21正在被耗尽。虽然地球确实不会失去水，我们正以不可持续的方式 消耗着赖以生存的水源。出人意外的是——平均每人一天毕竟只需饮用2升水。但是水在日常生活中的作用是潜在的，同样的24小时中， 多数人其实要消耗3000升水。事实上，家庭用水—— 饮用、做饭、清洗等等——只是人类用水的3.6%。另外有4.4%的水用于广泛的工厂中用以制造出我们的日常用品。而剩下的92%的水都是用在一件事上：农业。每年，农场消耗的淡水足以填满33亿个奥运标准泳池。全都用于农作物和畜牧业用以养活全球不断增长的人口。目前农业用地占全球陆地面积的37%，对地区供水是最大的威胁。话说回来，这是必须的。我们能否控制农业的渴求， 同时也能满足其他的用水需求呢？农民们想出了创造性的方法 来降低他们的影响，比如采用特殊的灌溉技术 让每滴水养更多作物，以及种植耐旱的新作物。其他工业也从善如流，采用的生产过程可以循环用水。对个人来说，减少食物浪费是 降低用水的第一步，因为种出来的食物有三分之一是 浪费掉或扔掉的。你也可以考虑少吃耗水的食物，比如脱壳坚果和牛羊肉。素食的生活方式可以减少三分之一的广义用水。我们的星球永远不会缺水，但她不必为了人类而变得干涸。这样的区域性问题需要 全球性的解决方案，日常的每个改变可以 影响全世界的水资源。

**P661 2018-12-04 Can animals be deceptive - Eldridge Adams**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=661)

A male firefly glows above a field on a summer’s night, emitting a series of enticing flashes. He hopes a nearby female will respond with her own lightshow and mate with him. Sadly for this male, it won’t turn out quite the way he plans. A female from a different species mimics his pulsing patterns: by tricking the male with her promise of partnership, she lures him in– and turns him into an easy meal. He’s been deceived. Behavioral biologists have identified three defining hallmarks of deception by non-human animals: it must mislead the receiver, the deceiver must benefit, and it can’t simply be an accident. In this case we know that the predatory firefly’s signal isn’t an accident because she flexibly adjusts her flash pattern to match males of different species. Based on this definition, where is animal deception seen in nature? Camouflage is a good starting point– and one of the most familiar examples of animal trickery. The leaf-tailed gecko and the octopus fool viewers by blending into the surfaces on which they rest. Other animals use mimicry to protect themselves. Harmless scarlet kingsnakes have evolved red, yellow, and black patterns resembling those of the venomous eastern coral snake to benefit from the protective warnings these markings convey. Even some plants use mimicry: there are orchids that look and smell like female wasps to attract hapless males, who end up pollinating the plant. Some of these animals benefit by having fixed characteristics that are evolutionary suited to their environments. But in other cases, the deceiver seems to anticipate the reactions of other animals and to adjust its behavior accordingly. Sensing a threat, the octopus will rapidly change its colors to match its surroundings. Dwarf chameleons color-match their environments more closely when they see a bird predator rather than a snake– birds, after all, have better color vision. One of the more fascinating examples of animal deception comes from the fork-tailed drongo. This bird sits atop tall trees in the Kalahari Desert, surveying the landscape for predators and calling when it senses a threat. That sends meerkats, pied babblers, and others dashing for cover. But the drongo will also sound a false alarm when those other species have captured prey. As the meerkats and babblers flee, the drongo swoops down to steal their catches. This tactic works about half the time– and it provides drongos with much of their food. There are fewer solid cases of animals using signals to trick members of their own species, but that happens too. Consider the mantis shrimp. Like other crustaceans, it molts as it grows, which leaves its soft body vulnerable to attack. But it’s still driven to protect its home against rivals. So it has become a masterful bluffer. Despite being fragile, a newly molted shrimp is actually more likely to threaten intruders, spreading the large limbs it usually uses to strike or stab its opponents. And that works – bluffers are more likely to keep their homes than non-bluffers. In its softened condition, a mantis shrimp couldn’t withstand a fight– which is why we can be confident that its behavior is a bluff. Biologists have even noticed that its bluffs are tactical: newly molted mantis shrimp are more likely to bluff against smaller rivals, who are especially likely to be driven away. It would seem that instead of just threatening reflexively, the mantis shrimp is swiftly gauging the situation and predicting others’ behavior, to get the best result. So we know that animals can deceive, but do they do so with intent? That’s a difficult question, and many scientists think we'll never be able to answer it. We can't observe animals’ internal thoughts. But we don’t need to know what an animal is thinking in order to detect deception. By watching behavior and its outcomes, we learn that animals manipulate predators, prey, and rivals, and that their capacity for deception can be surprisingly complex.

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翻译人员: Xu Xingruo 校对人员: Lipeng Chen夏夜，一只雄性萤火虫 在田野上闪闪发光，释放着一串求偶的灯光信号。他盼望附近的异性 会用她的灯光秀来回应，并且和他交配。可悲的是，计划赶不上变化。另一雌性物种正模仿着 他的灯光频率：用虚假的爱情承诺将他引诱到自己身边，并轻易将他化为盘中之餐。他被耍了。行为生物学家们已经确定了动物欺骗术的三个特征：误导受骗者，施计者得利，欺骗行为并非偶然产生。在上述情境中，我们可以确定 雌性捕食者的信号不是偶然产生的，因为她灵活地调整着灯光信号以和其它雄性物种的信号对应。基于以上定义，自然界中有哪些动物欺骗现象呢？不妨从天然保护色说起，这是最为熟知的动物骗术之一。枯叶平尾壁虎和章鱼通过与其栖息的环境融合骗过其他生物。其它动物通过模仿进行自我保护。无毒的猩红王蛇进化出了 红、黄、黑色的图案，和剧毒的珊瑚蛇极为相似，这便占了这些保护性 恐吓图案的便宜。更有甚者，一些植物也会进行模仿：有些兰花在外观和气味上 与雌性黄蜂相似，以此吸引不幸的雄性黄蜂为它们授粉。有些动物从其固有的特征上获益，这些都是长期进化、适应环境的结果。但在其它情况下，行骗者似乎能预料到 其他动物的特定行为，并据此相应地调整自身行为。当察觉到危险时，章鱼会迅速变为 与周围环境相似的颜色。在发现鸟类捕食者时， 侏儒变色龙的颜色会变得与环境极其相似，遇见蛇时颜色却未如此相近——毕竟鸟类对颜色更加敏感。动物诈骗者中最耀眼的明星当属叉尾乌鹃。这种鸟栖于卡拉哈里沙漠的 高大树木之顶，视察领地，关注捕食者的身影，并在察觉危险时发出警报。警报声使非洲獴、斑鸫鹛 和其它动物四处逃窜。但当其它物种的动物捕获了猎物时，乌鹃也会发出假警报。当非洲獴和斑鸫鹛逃离时，乌鹃飞旋而下， 偷走它们的战利品。这种战术有一半的成功几率，是卷尾鸟重要的食物来源。动物很少利用信号欺骗同类物种，但这也会发生，比如说，螳螂虾。和其它甲壳动物一样，它在生长过程中也会蜕壳，蜕壳后身体柔弱， 易受攻击。但它还是无法推卸 保家抗敌的重任。环境将它塑造成了 老谋深算的江湖骗子。虽然身体不堪一击，刚蜕壳的螳螂虾更爱伸展开通常用于击打对手的粗大肢节， 以此吓退对手。这还真有有效。这些骗术大师们比正常的螳螂虾 更可能守住自己的洞穴。在身体柔弱的条件下，螳螂虾没有能力干上一架，这也是我们能够确定此类行为是骗术的原因。生物学家们发现， 如此虚张声势也是有针对性的：刚蜕壳的螳螂虾更倾向于 吓唬体型较小的对手，这类对手容易被吓退。与其说是本能地虚张声势，不如说螳螂虾是在快速地掂量 所处现状，和预测对方的行为，以取得最优结果。所以我们明白地知道， 动物们会欺骗，但它们是在有意识地欺骗吗？很难回答。很多科学家认为我们 永远无法揭开这个谜底。我们无法窥见动物的思维，但无需通过知晓动物的思维 来辨别欺骗行为存在与否。通过观察它们的行为及其结果，我们发现动物能够操纵 捕食者、猎物和对手，而且，骗术的复杂程度超乎我们的想象。

**P662 2018-12-05 How Thor got his hammer - Scott A. Mellor**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=662)

Loki the mischief-maker, was writhing uncomfortably in Thor’s iron grip. The previous night, while the rest of the gods slept, he’d snuck up on Thor’s wife Sif and shorn off her beautiful hair. It’d seemed like a funny prank at the time, but now Thor was about to break every bone in his body. Loki had to think of some way to fix what he’d done. Yet who could replace Sif’s matchless hair, golden like a field of summer wheat? The dwarves! – their legendary smiths could make anything. So Loki rushed to their realm, deep within the mountains of the earth. Even before he arrived, the wily Loki was already scheming how he would get the dwarves to do his bidding. He decided that his best bet was to pit two families against each other. He first visited the masterful sons of Ivaldi. He told them that their rivals, a pair of brothers named Brokk and Eitri, had claimed that they were the best craftsmen in the world and were determined to prove it in a competition. The rules were that each family had to create three gifts for the gods, including, for the Ivaldis, golden hair. Then Loki visited Brokk and Eitri, and told them the same thing, only now claiming that the sons of Ivaldi had issued the challenge. But Brokk and Eitri couldn’t be fooled so easily, and only agreed to participate if Loki put his own head on the line. Literally—if Brokk and Eitri won, Loki would forfeit his head to them. Loki had no choice but to agree, and to save himself had to find a way to make sure the sons of Ivaldi emerged victorious. Both sets of dwarves got to work. Eitri set Brokk to man the bellows and told him not to stop for any reason, or the treasures would be ruined. Soon a strange black fly flew into the room. As a piece of pigskin was placed in the forge, the fly stung Brokk’s hand, but he didn’t flinch. Next, while Eitri worked a block of gold, the fly bit Brokk on the neck. The dwarf carried on. Finally, Eitri placed a piece of iron in the furnace. This time the fly landed right on Brokk’s eyelid and bit as hard as it could. And for just a split second, Brokk’s hand left the bellows. That’s all it took; their final treasure hadn’t stayed in the fire long enough. Loki now reappeared in his normal form, overjoyed by their failure, and accompanied the dwarves to present their treasures to the gods. First, Loki presented the treasures from the sons of Ivaldi. Their golden hair bound to Sif’s head and continued to grow, leaving her even more radiant than before. Next, for Odin the all-father, a magnificent spear that could pierce through anything. And finally a small cloth that unfolded into a mighty ship built for Freyr, god of the harvest. Then Brokk presented the treasures made by him and his brother. For Freyr they’d forged a golden-bristled boar who’d pull Freyr’s chariot across the sky faster than any mount. For Odin, a golden arm ring which would make eight more identical rings on every ninth night. And for Thor, a hammer called Mjolnir. Its handle was too short, and Loki smirked at the obvious defect. But then Brokk revealed its abilities. Mjolnir would never shatter, never miss its mark and always return to Thor’s hand when thrown. Despite the short handle, the gods all agreed this was the finest gift of all. Remembering what was at stake, Loki tried to flee, but Thor reached him first. But before the dwarves could have their due, clever Loki pointed out that they had won the rights to his head, but not his neck, and thus had no right to cut it. All begrudgingly admitted the truth in that, but Brokk would have the last laugh. Taking his brother’s awl, he pierced it through Loki’s lips and sewed his mouth shut, so the trickster god could no longer spread his malicious deceit. Yet the irony was not lost on the gods. For it was Loki’s deceit that had brought them these fine treasures and given Thor the hammer for which he’s still known today.

**P662 2018-12-05 How Thor got his hammer - Scott A. Mellor**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=662)

翻译人员: Xu Xingruo 校对人员: Lipeng Chen诡计之神洛基正在雷神托尔的 铁掌之下瑟瑟发抖。昨晚， 他趁众神入睡之际 潜到托尔的妻子西芙身旁，一把剪下了她的秀发。当时这不过是个恶作剧，但现在托尔恨不得让他粉身碎骨。洛基得想办法弥补他的过错，但谁能挽回西芙那头无与伦比、 如夏天的麦子般金黄的秀发呢？侏儒！没有什么是他们的能工巧匠 造不出的。于是洛基匆匆赶到他们 藏于深山的国度。早在路上， 狡猾的洛基就已在盘算着怎样才能让侏儒按他的命令行事。他认为最可靠的方法是 让两个家族相互挑战。他先拜访了伊瓦尔迪 技术高超的儿子们，并说他们的竞争对手， 布洛克和辛德里兄弟，自称是世界上最厉害的工匠，而且打算组织一场竞赛证明这一点。比赛规则：每个家族各设计 三个献给诸神的礼物，其中的金发由伊瓦尔迪家族设计。洛基又拜访了布洛克和辛德里， 把同样的事情告诉了他们，不过却说是伊瓦尔迪的儿子们 发起了这场挑战。但布洛克和辛德里还没有愚蠢到 完全相信他，只肯在洛基以自己的脑袋为担保 的条件下参加比赛。也就是说，如果布洛克和辛德里赢了， 洛基的脑袋就归他们了。洛基只好答应，但为了保住脑袋他必须想方设法使 伊瓦尔迪的儿子们获胜。两派侏儒都投入了工作。辛德里派布洛克去拉风箱， 并吩咐无论如何都不能停下来，否则礼物就做不成了。不一会儿，一只奇怪的黑苍蝇 飞进了房间。趁一块猪皮革还在锻铁炉里， 苍蝇叮了布洛克的手，但布洛克没有停下。接着，在辛德里锻造金块时， 苍蝇咬了布洛克的脖子。这位侏儒忍痛工作。最后，辛德里把一铁块放进了熔炉。这回苍蝇停在了布洛克的眼皮上，使尽浑身力气咬了下去。就在那一刻， 布洛克的手松开了风箱。这就玩完了：最后一件礼物 没有被锻造充足。洛基现回了原型，幸灾乐祸，还陪着侏儒们将礼物送给众神。洛基先送上伊瓦尔迪的儿子们的 礼物。他们制作的金发与西芙的头 完美融合，而且还能继续生长，令她更加光彩照人。紧接着送给众神之王奥丁的是一把无所能敌的矛， 没有它刺穿不了的东西。最后，一块展开之后变为神船的布料被送给了弗雷——丰饶之神。接下来布洛克递上了 由他们兄弟俩制作的礼物。他们为弗雷送上一只金鬓山猪，它能拉着弗雷的战车穿过天空， 速度之快令其它坐骑望尘莫及。他们为奥丁送上一只金手镯它每过九个晚上就会复制出 八只一样的镯子。他们为托尔送上一把名为 “姆乔尔尼尔”的铁锤。锤柄很短，洛基为这个明显的缺陷 偷偷发笑，但接着布洛克展示了铁锤的威力。“姆乔尔尼尔”坚不可摧，每击必中，每次投掷后都会返回托尔手中。尽管锤柄偏短，众神还是一致推选 铁锤为最佳礼物。想到自己的脑袋危在旦夕， 洛基试图逃跑，但被托尔捉了回来。但在侏儒们得手之前，机灵的洛基指出他们的确赢了 他的脑袋，但没有权利动他的脖子，所以不能动刀。在场的人不情愿地承认了这个事实， 但笑到最后的还是布洛克。他拿出兄弟的尖锥， 用它穿过洛基的嘴唇，最终缝上了他的嘴。所以这个诡计之神再也不能 施展他恶毒的骗术了。但对众神来说， 仍然颇为讽刺。要不是洛基的把戏， 他们就不会有这么多珍贵的礼物，托尔也不会拥有这把 传诵至今的雷神之锤了。

**P663 2018-12-06 The truth about electroconvulsive therapy (ECT) - Helen M. Farrell**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=663)

In 1982, a young nurse was suffering from severe, unrelenting depression. She couldn’t work, socialize, or even concentrate well enough to read the newspaper. One treatment changed everything. After two courses of electroconvulsive therapy, or ECT, her symptoms lifted. She went back to work, then on to graduate school, where she earned high grades. At first, she talked openly about her life changing treatment. But as she realized many people had an extremely negative impression of ECT, she stopped sharing her experience. ECT carried a deep stigma, leftover from a history that bears little resemblance to the modern procedure. The therapy was first used in medicine in 1938. In its early years, doctors administered a strong electrical current to the brain, causing a whole-body seizure during which patients might bite their tongues or even break bones. Modern ECT is very different. While a patient is under general anesthesia, electrodes deliver a series of mild electrical pulses to the brain. This causes huge numbers of neurons to fire in unison: a brief, controlled seizure. A muscle relaxant keeps spasms from spreading to the rest of his body. The only physical indication of the electricity flooding the brain is a twitching foot. The treatment lasts for about a minute, and most patients are able to resume normal activities about an hour after each session. ECT is commonly used to treat severe cases of major depression or bipolar disorder in patients who haven’t responded to other therapies, or who have had adverse reactions to medication. Half or more of those who undergo treatment experience an improvement in their symptoms. Most patients treated with ECT have two or three sessions per week for several weeks. Some begin to notice an improvement in their symptoms after just one session, while others take longer to respond. Patients often continue less frequent treatments for several months to a year, and some need occasional maintenance sessions for the rest of their lives. Modern ECT is much safer than it used to be, but patients can still experience side effects. They may feel achy, fatigued, or nauseated right after treatment. Some have trouble remembering what happened right before a session— for example, what they had for dinner the previous evening. Rarely, they might have trouble remembering up to weeks and months before. For most patients, this memory loss does improve over time. What's fascinating is that despite its proven track record, we still don't know exactly why ECT works. Neurons in the brain communicate via electrical signals, which influence our brain chemistry, contributing to mood and behavior. The flood of electrical activity sparked by ECT alters that chemistry. For example, ECT triggers the release of certain neurotransmitters, molecules that help carry signals between neurons and influence mental health. ECT also stimulates the flow of hormones that may help reduce symptoms of depression. Interestingly, ECT maintenance works better when paired with medication, even in patients who were resistant to medication before. As we come to a better understanding of the brain, we’ll likely be able to make ECT even more effective. In 1995, more than a decade after her first course of ECT, the nurse decided to publish an account of her experience. Because of the stigma surrounding the treatment, she worried that doing so might negatively impact her personal and professional life, but she knew ECT could make a difference for patients when all else failed. Though misperceptions about ECT persist, accounts like hers have helped make doctors and patients alike aware of the treatment’s life changing potential.

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翻译人员: Evan Xu 校对人员: x Vicky在1982年，一个年轻的护士 饱受持续的严重抑郁症困扰。她不能工作，社交，甚至不能集中注意力阅读报纸。一次治疗改变了一切。在两次电休克（ECT）疗程之后， 她的症状得到改善。她重新工作，然后去了 研究生院，取得高分成绩。一开始，她公开谈论改变她人生的治疗。但当她意识到很多人 对ECT有非常负面的印象时，她不再分享经验。ECT背负着深深的污名，历史遗留下来的污名， 即认为它和现代做法相去甚远。该疗法在1938年第一次 在医学得到上运用。在早期，医生会对大脑施加强电流，导致全身痉挛，期间病人会咬舌甚至折断骨头。现代ECT则非常不同。病人处于全身麻醉时，电极将轻微的电脉冲输进大脑。这使大量神经元一齐激活：带来简短、可控的发作。肌肉松弛剂防止痉挛蔓延全身。电流涌入大脑的唯一身体反应是脚痉挛。治疗时长为一分钟， 并且大多数病人在一小时之后能恢复正常活动。ECT主要用于治疗其他疗法无效的重度抑郁或燥郁症病人，或是对药物有不良反应的病人。一半及以上接受治疗的病人得到好转。多数接受ECT的病人在连续几周内， 每周都会接受两到三次的治疗。一些人仅在一次治疗后症状就有所改善，而其他人则需要更长时间。病人通常会继续治疗，但降低频率， 从几个月到一年不等，而有些病人在余生需要偶尔进行维持治疗。现代ECT比以前更加安全，但依旧有副作用。治疗之后，病人可能会感到疼痛、虚弱或恶心。一些病人则会记不起来治疗之前发生的事，比如他们前一天晚餐吃了什么。极少有的情况下， 病人会记不起几周几月前的事。大多数病人的失忆情况会随着时间改善。有意思的是，尽管ECT证实有效，我们依旧不知道它究竟为什么起作用。大脑中的神经元通过电信号交流，影响大脑化学性质， 进而影响情绪和行为。ECT引起的大量电子活动 改变了这种化学性质。例如，ECT促进释放神经递质，传递神经元之间的信号从而影响精神健康。ECT也可以刺激荷尔蒙流动， 帮助缓解抑郁症症状。有趣的是，搭配药物可以 更好的维持ECT疗效，既是对之前抗拒药物的病人 来说也是如此。随着我们对大脑进一步了解，我们可能可以使ECT更加有效。1995年，在第一次接受ECT治疗的十多年后，那名护士决定出版她的经历。因为这项治疗有很多骂名，她担心这样的做法或许会影响个人和职业生活，但她知道当其他疗法不管用时， ECT可以造福病人。尽管关于ECT的误解依旧存在，像这名护士这样的经历 已经帮助医生和病人意识到ECT疗法很可能会改变人生。

**P664 2018-12-07 Can you solve the multiplying rabbits riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=664)

After years of experiments, you’ve finally created the pets of the future– nano-rabbits! They’re tiny, they’re fuzzy… and they multiply faster than the eye can see. In your lab there are 36 habitat cells, arranged in an inverted pyramid, with 8 cells in the top row. The first has one rabbit, the second has two, and so on, with eight rabbits in the last one. The other rows of cells are empty… for now. The rabbits are hermaphroditic, and each rabbit in a given cell will breed once with every rabbit in the horizontally adjacent cells, producing exactly one offspring each time. The newborn rabbits will drop into the cell directly below the two cells of its parents, and within minutes will mature and reproduce in turn. Each cell can hold 10^80 nano-rabbits – that’s a 1 followed by 80 zeros – before they break free and overrun the world. Your calculations have given you a 46-digit number for the count of rabbits in the bottom cell– plenty of room to spare. But just as you pull the lever to start the experiment, your assistant runs in with terrible news. A rival lab has sabotaged your code so that all the zeros at the end of your results got cut off. That means you don’t actually know if the bottom cell will be able to hold all the rabbits – and the reproduction is already underway! To make matters worse, your devices and calculators are all malfunctioning, so you only have a few minutes to work it out by hand. How many trailing zeros should there be at the end of the count of rabbits in the bottom habitat? And do you need to pull the emergency shut-down lever? Pause the video now if you want to figure it out for yourself. Answer in 3 Answer in 2 Answer in 1 There isn’t enough time to calculate the exact number of rabbits in the final cell. The good news is we don’t need to. All we need to figure out is how many trailing zeros it has. But how can we know how many trailing zeros a number has without calculating the number itself? What we do know is that we arrive at the number of rabbits in the bottom cell through a process of multiplication – literally. The number of rabbits in each cell is the product of the number of rabbits in each of the two cells above it. And there are only two ways to get numbers with trailing zeros through multiplication: either multiplying a number ending in 5 by any even number, or by multiplying numbers that have trailing zeroes themselves. Let’s calculate the number of rabbits in the second row and see what patterns emerge. Two of the numbers have trailing zeros – 20 rabbits in the fourth cell and 30 in the fifth cell. But there are no numbers ending in 5. And since the only way to get a number ending in 5 through multiplication is by starting with a number ending in 5, there won’t be any more down the line either. That means we only need to worry about the numbers that have trailing zeros themselves. And a neat trick to figure out the amount of trailing zeros in a product is to count and add the trailing zeros in each of the factors – for example, 10 x 100 = 1,000. So let’s take the numbers in the fourth and fifth cells and multiply down from there. 20 and 30 each have one zero, so the product of both cells will have two trailing zeros, while the product of either cell and an adjacent non-zero-ending cell will have only one. When we continue all the way down, we end up with 35 zeros in the bottom cell. And if you’re not too stressed about the potential nano-rabbit apocalypse, you might notice that counting the zeros this way forms part of Pascal’s triangle. Adding those 35 zeros to the 46 digit number we had before yields an 81 digit number – too big for the habitat to contain! You rush over and pull the emergency switch just as the seventh generation of rabbits was about to mature – hare-raisingly close to disaster.

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翻译人员: Evina Wang 校对人员: Fandi Yi经过数年的实验，你终于创造出了未来宠物——纳米兔子！它们很小且毛茸茸的.......它们繁殖的速度快到肉眼看不见。在你的实验室里，有36间"孵化小屋"，以倒金字塔形式排列。最上面一层有8间。第1间有一只兔子，第2间有2只兔子，以此类推，最后一间有8只兔子。其它层的"小屋"都是空的——目前是空的。这些兔子雌雄同笼，在每一间中的每一只兔子都会与横向隔壁间的兔子交配一次，每次都生出一只新兔子。新生出来的兔子会直接落到父母住处正下方的那件“小屋”，在几分钟之内就会长大， 可以换它们开始交配。每一间“小屋”可以容纳 10^80只纳米兔子——也就是是1后面加80个0——超过这个数字的话，他们就会 逃出“小屋”，占领世界。你通过计算，得出在最低下的“小屋”中兔子的个数只有46位数——空间绰绰有余但当你拉动操作杆要开始实验时，你的助理带着坏消息跑来。你竞争对手的实验室 破坏了你的程序代码，所以你最后算出的结果 其实最后面的0都被切掉了。那就表示你其实不知道最下面的“小屋”是否能 容纳所有的兔子——但繁殖已经开始了！更糟糕的是，你的设备和计算器都出故障了，你只有几分钟的时间手动计算。最底层小屋中兔子的数量应该含有多少个0？你需要去拉动紧急关闭的控制杆吗？【如果你想要自己解题 请在这里将影片暂停】【答案即将公布：倒计时3】【答案即将公布：倒计时2】【答案即将公布：倒计时1】我们没有足够的时间算出 最后一间小屋中的兔子数目。好消息是，我们并不需要算出它。我们只需要算出后面有多少个0。但我们怎么能在不计算出 这个数目的情况下知道后面有几个0呢？我们只知道，底层小屋的兔子数目是经过相乘运算得到的——字面意义。每间小屋的兔子数目是上面两间小屋中的兔子数目相乘。只有两种方法可以透过乘法得到 后面有0的数字：把尾数是5的数字 和任何偶数相乘。或是将本身尾数就是0的数字相乘。让我们来算一下 第二层的兔子数目，看看会发现什么规律。有两个数字的尾数有0——第4间有20只兔子， 第5间有30只。没有尾数是5的数字出现。因为若要透过乘法 得到尾数是5的数字，一定要用尾数是5的数字来乘，因此可确定下面也不会 出现尾数是5的数字。那就表示: 我们只需担心本身末尾是0的数字。有个小妙招可以知道 乘积的尾数有几个0，那就是算出每个因数尾数的 0有几个，再将再们相加——比如，10 × 100 = 1000。所以，我们从第二排第4、第5间的数目着手开始向下相乘。20和30尾数都有1个0，所有这两间相乘尾数会有2个0，这两间小屋和其隔壁 数目尾数非0小屋相乘得到的乘积尾数只有1个0。我们继续向下计算，会算出在最底层小屋中的 兔子数目尾数有35个0。如果你不太担心纳米兔 可能带来的灾难，你可能会注意到用这种方式计算0会形成杨辉三角形。将那35个0加在我们之前 算出的46位数字后面得到一个81位数数字——超出小屋的容量！你跑过去，拉下紧急开关，此时第7代兔子刚要长大——差一点点就要发生大灾难...

**P665 2018-12-11 Can you solve the troll’s paradox riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=665)

You’ve discovered a doorway to another realm, and now you and your brother are off exploring the wonderful world of Paradoxica. Fantastically paradoxical creatures crawl, run, and fly around you. And then you see the troll. It’s catching all the creatures in an enormous net. You bravely step forward and demand it let them go. The troll laughs. “If you’re such a fan of paradoxes,” it says, “then I’ll make you an offer. If you say something true, I’ll release all these creatures." You’re about to say, “You are a troll,” but before you can, the troll grabs your brother. “If you say something false,” he continues, “then I’ll release your brother." Your statement can only be a single sentence. And as you can see, I hate paradoxes more than anything. If you try to cheat by saying something paradoxical, like, ‘this statement is false,’ then I'll eat your brother and the creatures." What true/false statement can you say to force the troll to free your brother and the paradoxical creatures? [Pause the video now if you want to figure it out for yourself!] Answer in: 3 Answer in: 2 Answer in: 1 This seems like an impossible situation, but incredibly, you can say something that will force the troll to release all its prisoners. This is an example of coercive logic, invented by the great logician and puzzle creator Raymond Smullyan. The trick Smullyan came up with involves saying a statement whose truth or falseness depends on what you want the troll to do. Your statement still has to be carefully crafted. For example, if you were to say, “You are going to free the creatures and my brother,” the troll could respond, “that’s false… I’m only going to free your brother.” Similarly, if you said, “You will free the paradoxes,” the troll could say, “That’s true,” and free the paradoxes. But watch what happens if you say, “You will free my brother.” The statement can’t be false, because if it were, the troll, by its own rules, would have to free your brother. That would make the statement paradoxically true and false. But the troll hates paradoxes and would never willingly create one. So his only option is for the statement to be true. If “you will free my brother” is true, then the troll has to release your brother. And by its own rules, the troll has to free the creatures as well, since you said a true statement. By wielding just 5 words like a logical scalpel, you’ve forced the troll to free all its prisoners. As the troll stomps off in anger, the paradoxes cheer you for winning them their freedom, and promise to lead you to the treasure at the top of the stairs. If you can reach it.

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翻译人员: Ying Lu 校对人员: Lipeng Chen你发现了通往另一世界的入口，现在你和你的兄弟 准备出发来探索“悖论”这个奇妙的新世界。令人难以置信的神奇生物 在你四周爬行，奔跑和飞翔。接着你就看到了洞穴巨怪。他正把所有的生物 抓入一个巨网中。你勇敢地站了出来， 命令他将它们放生。巨怪大笑道：“如果你是个 悖论的粉丝，那我给你一个机会， 如果你说了真话，我将放走这些生物。”就在你准备开口： “你是一个洞穴巨怪。”说时迟那时快， 巨怪抓走了你的兄弟。“如果你说了假话，”他接着说道， “那我就放你的兄弟，你的陈述只能是一个简单句。正如你所见，我最讨厌悖论了。如果你想靠说一些 模棱两可的话来作弊的话，比如，‘这句话是错的，’那我不仅会吃掉你的兄弟， 还有这些生物。”你能说什么是/非同时成立的 陈述来强迫巨怪不仅放了你的兄弟， 还放了那些神奇的生物？如果你想要自己弄明白， 请暂停此视频！答案揭晓：321这看上去是一个无解的困境， 但令人诧异地是，你的陈述可以强迫巨怪放生 所有被囚禁的生物。这是伟大的逻辑学家和谜语创作者 雷蒙德 · 斯穆里安提出了一个强制逻辑的例子。斯穆里安想出来的解决方式是说一句真假与否取决于你想让巨怪怎么做的话。你说的话当然还得精心设计。比方说，如果你想说：“你会释放生物和我的兄弟，”巨怪可以回答， “不对，我只会放走你的兄弟。”同理，如果你说，“你将释放生物，” 巨怪可以回答，“正确。”然后释放神奇的生物们。但如果你说，“你将放走我的兄弟。” 会发生什么呢？这句话不可能是假的，因为如果它是假的， 巨怪就得遵照他设定的原则，放走你的兄弟。那这句话即为一个 既正确又错误的悖论。但是巨怪讨厌悖论，永远也不会自己想出一个。所以他惟一的选择就是 承认这句话是正确的。如果“你将放走我的兄弟”正确的，那巨怪就应该放走你的兄弟。并且根据他自己的规则， 巨怪也必须放走那些生物，因为你说的是真命题。简单 5 个单词正如 一把逻辑的手术刀，你成功让巨怪放走了他所有的俘虏。当你把巨怪气得跳脚时，神奇生物正为 你帮他们赢得自由而喝彩，并承诺将你带到台阶的 最高层寻找宝藏。如果你能达到的话。

**P666 2018-12-13 A day in the life of a Mongolian queen - Anne F. Broadbridge**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=666)

As dawn breaks over a moveable city of ten thousand yurts, Queen Boraqchin is in for a rude awakening. A rogue sheep has slipped past her servants and guards and bolted into her yurt, where he springs into bed and bleats in her ear. Although she’s the formidable khatun of the Golden Horde, a huge kingdom in the Mongolian Empire, Boraqchin has a hands-on approach to ruling. She’s been married to Batu Khan, the fearsome grandson of Genghis Khan himself, since she was fifteen – and while her husband is out on his raids, she juggles the duties of flocks, family and empire at home. This makes her the manager – and the mover – of a city of thousands. Twice a year, Boraqchin moves the city between two seasonal camping grounds. This ensures constant water and lush grass in summer, and protection from harsh winds in winter. The whole operation requires weeks of strict planning, liaising with the other camps in her domain, strategic delegation – and the patience to move at the speed of dawdling animals. Today is moving day, and she’ll have to direct throngs of her ladies, commanders, slaves and animals up the river Volga for the summer. As Boraqchin steps outside, she’s greeted by a commotion – her unwanted visitor is now running circles around her stewards. They’re attempting to stow her possessions securely into wagons. Boraqchin orders them to get it under control – but she’s the only one quick enough to catch the stray. She next supervises her ladies who are unpinning her yurt and lifting it onto its custom wagon. It requires a team of twenty oxen to pull, and Boraqchin wouldn’t trust anyone to steer it but herself. Next, Boraqchin and her woolly companion meet with the guards. She orders them to keep close watch on her husband's special reception yurt and port-able throne during the journey. They’ll also act as outriders, and she tells them how to secure the route, surround her for safety – and keep the animals in check. But when the sheep finally breaks free and makes for the fields, the guards can barely keep up as it scampers through crowds packing up their yurts. Exasperated, Boraqchin rides down to the pastures herself. When she gets there, she catches sight of the troublesome sheep wriggling into the middle of a flock. When she follows him in, he’s nestled next to a ewe, his mother. She’s pregnant, and seems to be in pain. With a start, Boraqchin realizes that this ewe’s impending delivery has been forgotten in the flurry of moving day. There’s no time to find a shepherd – instead, Boraqchin rolls up her sleeves, greases her arm and helps the ewe give birth to two new additions to the empire. Leaving the lambs and their mother, Boraqchin dashes back to the camp. Here the final touches have been put to packing, and vehicles are starting to line up. This vast procession starts with the queen and two hundred wagons filled with her treasures. Next up are the junior wives and crew, then the concubines – and this is only Boraqchin's camp. After this comes the second imperial camp led by another senior wife, then two more camps, also led by wives. Boraqchin has been checking in with them for weeks to ensure a smooth departure and orderly queue. But they only make up the royal portion of the line – behind them winds the entire civilian city, which includes holy men with portable chapels and mosques, families, tradesmen, and shepherds. Finally, Boraqchin settles into her wagon. It’ll take weeks to reach their destination – but over the course of the journey, she’ll keep everyone expertly in check – from her proud children and attentive subjects, to the most meandering sheep at the back of line.

**P666 2018-12-13 A day in the life of a Mongolian queen - Anne F. Broadbridge**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=666)

翻译人员: Youyou Gu 校对人员: Tianji (Homer) Li晨光照耀在这座由万顶蒙古包 组成的移动城市，皇后孛剌合真被粗鲁地叫醒了。一只横冲直撞的羊 避过她的侍从和守卫，钻进了她的蒙古包，这只羊跳上床， 在她耳边咩咩叫。虽然孛剌合真是钦察汗国 一人之下，万人之上的皇后，钦察汗国是蒙古帝国的汗国之一，但她做事喜欢亲力亲为。她嫁给了威震四方的拔都可汗，成吉思汗的孙子，那时她15岁。当她的丈夫外出抢掠时，她就负责处理羊群、 家庭和帝国事务。这让她成了一座千人之城 的管理者和迁徙指挥官。孛剌合真每年要将城市在 两个季节性营地间移动两次。这样就能确保夏天有 充足的水源和繁茂的草地，冬天则可以避免刺骨的寒风。整个过程需要几周的严密计划，联系她管辖的其他营地， 合理分配任务——以及耐心配合懒散 动物们的行进速度。今天就是迁徙日，一大群女官、首领、 奴隶和动物等着她指挥去伏尔加河度过夏天。孛剌合真走出帐篷时，她遇到了一阵骚动——这个不速之客正围着 她的管事们转圈。他们正试着把孛剌合真的财物 妥善安置到马车上。她命令管事控制住场面——但只有她速度足够快，抓住了羊。然后她监督女官的工作， 她们在拆帐篷，并且把帐篷放到她的专用马车上。马车需要20头牛拉，孛剌合真不放心其他人， 她要自己驾车。接着，孛剌合真带着 羊群与侍卫汇合。她命令侍卫在迁徙途中 密切注意她丈夫的特殊帐篷以及携带的王座。他们还担任斥候，她告诉他们如何确保路线安全， 在她周围护她周全——以及管住动物。但这只羊最终 脱了缰跑向田野，侍卫根本追不上它，它惊慌地穿过正在 收拾蒙古包的人群。孛剌合真恼怒地 策马奔向牧场。当她到达时，她看到这只闹事的羊 正往羊群中间钻。她跟着进去，发现他依偎在一只母羊边上， 那是他的母亲。她怀孕了，看上去很痛苦。孛剌合真吃了一惊 她意识到这只母羊即将分娩，但这件事在繁忙的 迁徙日被遗忘了。没时间找牧羊人了——于是，孛剌合真卷起袖子， 在手臂上涂了油，帮助母羊生产， 帝国又多了两只小羊。离开这些羊和它们的母亲后，孛剌合真又冲回了营地。这里的打包工作已在收尾，车马都已整装待发。浩浩荡荡的队伍以皇后为首两百辆马车装满了她的宝物。后面是地位稍低的妻子和侍官们，再后面是妾——而这只是孛剌合真的队伍。在她之后是帝国第二营队由另一位地位高的妻子带领，之后还有两个队伍， 也由妻子们带领。几周以来，孛剌合真 一直和她们沟通，以确保顺利启程，秩序井然。但这只是整个队伍中的 皇室部分——她们身后还跟着所有的百姓，包括带着移动教堂和 清真寺的神职人员、各个家庭、商人和牧羊人。最后，孛剌合真坐进了她的马车。到达目的地需要几周时间——但在旅途中，她将驾轻就熟地管好每个人——不管是她骄傲的孩子、 细心的侍从，还是队伍最后懒散的羊群。

**P667 2018-12-13 The history of the world according to cats - Eva-Maria Geigl**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=667)

On May 27th, 1941, the German battleship Bismarck sank in a fierce firefight, leaving only 118 of her 2,200 crew members alive. But when a British destroyer came to collect the prisoners, they found an unexpected survivor - a black and white cat clinging to a floating plank. For the next several months this cat hunted rats and raised British morale - until a sudden torpedo strike shattered the hull and sank the ship. But, miraculously, not the cat. Nicknamed Unsinkable Sam, he rode to Gibraltar with the rescued crew and served as a ship cat on three more vessels – one of which also sank - before retiring to the Belfast Home for Sailors. Many may not think of cats as serviceable sailors, or cooperative companions of any kind. But cats have been working alongside humans for thousands of years - helping us just as often as we help them. So how did these solitary creatures go from wild predator to naval officer to sofa sidekick? The domestication of the modern house cat can be traced back to more than 10,000 years ago in the Fertile Crescent, at the start of the Neolithic era. People were learning to bend nature to their will, producing much more food than farmers could eat at one time. These Neolithic farmers stored their excess grain in large pits and short, clay silos. But these stores of food attracted hordes of rodents, as well as their predator, Felis silvestris lybica - the wildcat found across North Africa and Southwest Asia. These wildcats were fast, fierce, carnivorous hunters. And they were remarkably similar in size and appearance to today’s domestic cats. The main differences being that ancient wildcats were more muscular, had striped coats, and were less social towards other cats and humans. The abundance of prey in rodent-infested granaries drew in these typically solitary animals. And as the wildcats learned to tolerate the presence of humans and other cats during mealtime, we think that farmers likewise tolerated the cats in exchange for free pest control. The relationship was so beneficial that the cats migrated with Neolithic farmers from Anatolia into Europe and the Mediterranean. Vermin were a major scourge of the seven seas. They ate provisions and gnawed at lines of rope, so cats had long since become essential sailing companions. Around the same time these Anatolian globe trotting cats set sail, the Egyptians domesticated their own local cats. Revered for their ability to dispatch venomous snakes, catch birds, and kill rats, domestic cats became important to Egyptian religious culture. They gained immortality in frescos, hieroglyphs, statues, and even tombs, mummified alongside their owners. Egyptian ship cats cruised the Nile, holding poisonous river snakes at bay. And after graduating to larger vessels, they too began to migrate from port to port. During the time of the Roman Empire, ships traveling between India and Egypt carried the lineage of the central Asian wildcat F. s. ornata. Centuries later, in the Middle Ages, Egyptian cats voyaged up to the Baltic Sea on the ships of Viking seafarers. And both the Near Eastern and North African wildcats – probably tamed at this point -- continued to travel across Europe, eventually setting sail for Australia and the Americas. Today, most house cats have descended from either the Near Eastern or the Egyptian lineage of F.s.lybica. But close analysis of the genomes and coat patterns of modern cats tells us that unlike dogs, which have undergone centuries of selective breeding, modern cats are genetically very similar to ancient cats. And apart from making them more social and docile, we’ve done little to alter their natural behaviors. In other words, cats today are more or less as they’ve always been: Wild animals. Fierce hunters. Creatures that don’t see us as their keepers. And given our long history together, they might not be wrong.

**P667 2018-12-13 The history of the world according to cats - Eva-Maria Geigl**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=667)

翻译人员: Christina Wang 校对人员: Ran Lan1941年5月27日， 德国的俾斯麦号战列舰在一场激烈的交火中沉没了，2200 名船员中仅有 118 人存活。但当一艘英国驱逐舰 前来收领战犯时，他们找到了一个意外的幸存者－－一只黑白的猫， 正紧紧抓住一块漂浮的木板。在接下来的几个月中， 这只猫抓捕老鼠并激励了英军士气直到一次突然的鱼雷袭击 打碎了船体，船沉没了。但是，奇迹般地，这只猫活了下来。被称为“永不沉没的山姆”，这只猫跟随着救援队到了直布罗陀并又在其它三条船上担任了船猫－－其中一艘船也沉了－－直到它退役 去了贝尔法斯特水手之家。很多人都认为猫不是有用的水手，也不是任何一种合作伙伴。但猫已在人类的身旁工作了数千年－－帮助我们的次数 不比我们帮它们少。那么这些独行侠是如何 从野生猎人演变成海军军官再到沙发伴侣？现代家猫的驯化可以追溯到一万多年以前， 在新月沃土地带，新石器时代的早期。人们在学习按自己的意志来征服自然生产出的大量食物根本不能一次吃完这些新石器时代的农民把 多余的粮食存进了大坑和矮的土仓。但这些食物吸引了成群的鼠类以及它们的捕食者， 利比亚猫－－一种分布在 北非和西南亚的野猫。这些野猫是 敏捷凶猛的肉食狩猎者，它们的大小和外貌 与如今的家猫相当类似。主要的区别是 古时的野猫肌肉更多，身体带条纹， 且更少与其它猫和人类互动。鼠患肆意的粮仓中的大量猎物吸引来了这些一般独居的动物。当这些野猫学会了在进食时 接纳了人类与其它猫的存在，我们认为农民同样也接受了猫 来换取免费的害鼠控制。这种关系如此互惠 使这些猫跟随着新石器时代的农民从安纳托利亚迁徙到了欧洲和地中海。在当时的七大洋， 害鼠是主要祸害。他们会吃掉粮食，啃咬绳索所以猫从来都是航海必不可少的伙伴。就在安纳托利亚人起航全球遛猫的时候埃及人驯化了当地的猫。人们敬仰它们 驱蛇、捕鸟、杀鼠的能力，家猫因而成为了 埃及宗教文化中重要的一部分。它们在壁画、象形文字、雕塑、甚至是坟墓中， 得到了永生，被制成木乃伊葬在主人身旁。埃及船猫航行于尼罗河上，把有毒的河蛇抵御在外。晋升到大型船只后，猫也开始移居到不同港口。罗马帝国时代， 往来印度和埃及的船只承载了中亚的亚洲野猫的血统。几个世纪后，中世纪时期， 埃及猫随着维京海员的船航行到了波罗的海。近东与北非的野猫－－很可能此时已经被驯化了－－ 继续游走欧洲最终起航前往澳洲与美洲。今天，大部分的家猫是利比亚猫在近东或者埃及血统的后裔。但对当代猫的基因组和毛色图案的仔细分析告诉我们不同于狗类经历了多个世纪的选择性繁殖，现代的猫和古代的猫 基因上十分相似。除了使它们变得 社交互动更多、更温顺人类并没有太多改变 它们的自然行为。换句话来说，今天的猫或多或少 和昔日的它们一样是野生动物、凶猛的猎人， 不把我们视作主人的动物。鉴于我们共同的历史， 它们可能是对的。

**P668 2018-12-17 Why should you read “Fahrenheit 451” - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=668)

“It was a pleasure to burn. It was a special pleasure to see things eaten, to see things blackened and changed.” Fahrenheit 451 opens in a blissful blaze - and before long, we learn what’s going up in flames. Ray Bradbury’s novel imagines a world where books are banned from all areas of life - and possessing, let alone reading them, is forbidden. The protagonist, Montag, is a fireman responsible for destroying what remains. But as his pleasure gives way to doubt, the story raises critical questions of how to preserve one’s mind in a society where free will, self-expression, and curiosity are under fire. In Montag’s world, mass media has a monopoly on information, erasing almost all ability for independent thought. On the subway, ads blast out of the walls. At home, Montag’s wife Mildred listens to the radio around the clock, and three of their parlor walls are plastered with screens. At work, the smell of kerosene hangs over Montag’s colleagues, who smoke and set their mechanical hound after rats to pass the time. When the alarm sounds they surge out in salamander-shaped vehicles, sometimes to burn whole libraries to the ground. But as he sets tomes ablaze day after day like “black butterflies,” Montag’s mind occasionally wanders to the contraband that lies hidden in his home. Gradually, he begins to question the basis of his work. Montag realizes he’s always felt uneasy - but has lacked the descriptive words to express his feelings in a society where even uttering the phrase “once upon a time” can be fatal. Fahrenheit 451 depicts a world governed by surveillance, robotics, and virtual reality- a vision that proved remarkably prescient, but also spoke to the concerns of the time. The novel was published in 1953, at the height of the Cold War. This era kindled widespread paranoia and fear throughout Bradbury’s home country of the United States, amplified by the suppression of information and brutal government investigations. In particular, this witch hunt mentality targeted artists and writers who were suspected of Communist sympathies. Bradbury was alarmed at this cultural crackdown. He believed it set a dangerous precedent for further censorship, and was reminded of the destruction of the Library of Alexandria and the book-burning of Fascist regimes. He explored these chilling connections in Fahrenheit 451, titled after the temperature at which paper burns. The accuracy of that temperature has been called into question, but that doesn’t diminish the novel’s standing as a masterpiece of dystopian fiction. Dystopian fiction as a genre amplifies troubling features of the world around us and imagines the consequences of taking them to an extreme. In many dystopian stories, the government imposes constrictions onto unwilling subjects. But in Fahrenheit 451, Montag learns that it was the apathy of the masses that gave rise to the current regime. The government merely capitalized on short attention spans and the appetite for mindless entertainment, reducing the circulation of ideas to ash. As culture disappears, imagination and self-expression follow. Even the way people talk is short-circuited - such as when Montag’s boss Captain Beatty describes the acceleration of mass culture: "Speed up the film, Montag, quick. Click? Pic? Look, Eye, Now, Flick, Here, There, Swift, Pace, Up, Down, In, Out, Why, How, Who, What, Where, Eh? Uh! Bang! Smack! Wallop, Bing, Bong, Boom! Digest-digests, digest-digest-digests. Politics? One column, two sentences, a headline! Then, in mid-air, all vanishes!" In this barren world, Montag learns how difficult it is to resist when there's nothing left to hold on to. Altogether, Fahrenheit 451 is a portrait of independent thought on the brink of extinction - and a parable about a society which is complicit in its own combustion.

**P668 2018-12-17 Why should you read “Fahrenheit 451” - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=668)

翻译人员: Cynthia Li 校对人员: Lipeng Chen“燃烧使人感到愉悦。而看到东西被吃掉，看到东西黑化改变， 更是极致的享受。”《华氏451度》以极乐的燃烧开场 ——而且不久，我们就会知道 在火里燃烧的是什么。雷·布莱德利的小说 描写了一个幻想的世界在那里，任何书本都被彻底禁止——甚至禁止持有， 阅读它们就更不用提了。主角蒙太格是一个消防员， 负责销毁残留的书籍。但是随着他的享受渐渐转变为怀疑，故事便引出了一个关键的问题：怎样在自由意志、 自我表达和好奇心受到摧残的社会中保存一个人的心智。在蒙太格的社会中， 大众媒体垄断了资讯，几乎消除了所有独立思考的能力。在地铁上，广告布满了墙。在家里，蒙太格的妻子米尔德里 整天都在听广播，而且客厅的三面墙壁上都满是荧幕。在工作的时候， 蒙太格的同事浑身散发着煤油味，他们打发时间的方式是抽烟， 以及用机械猎犬抓老鼠。当警报响起，他们会冲上蝾螈型的车辆，有的时候要把图书馆烧毁。但是随着他日复一日 像“黑蝴蝶”一样的焚书,蒙太格的思绪时常会游移到 藏在他家的违禁品上。渐渐地，他开始怀疑这份工作的出发点。蒙太格发现他总是感觉不自在——但是他没有能够描述它们的文字， 因为这是在一个念出“很久很久以前” 就可以招来杀生之祸的社会。《华氏451》描写了一个被监视，机器人和虚拟现实主宰的社会——一个预知性的视角， 但也替时代的担忧发声。小说在1953年出版， 当时正值冷战的时代。这个时代所激起的 是广泛的多疑和恐慌。它遍及布莱德利的祖国美国。对于资讯的打压以及 残酷的政府调查使得情况变得更糟，特别是这样猎杀女巫的心态瞄准了那些被怀疑 为支持共产主义的艺术家和作家们。布莱德利察觉到了这样的文化压迫。他认为这是一个危险的先例， 极可能招致未来的审查制度，并且使他联想起了在法西斯统治的年代亚历山大的图书馆被摧毁， 书籍被烧毁的情形。他在《华氏451度》里探讨了 这样令人心寒的联想，书本的名字就是纸张燃烧时的温度。温度的准确性有待考证，但这并不会影响这本小说成为反乌托邦小说的代表作。反乌托邦小说放大了 我们周遭事物的负面特征，并想象这种特征在到了极致的时候 可能会产生的后果。在许多的反乌托邦故事里，政府会对有反对意见的对象施加约束。但是在《华氏451度》里，蒙太格发现，其实是多数人的冷漠造成了目前的政权。政府只是利用了人们很短的注意力集中时间 以及对无脑娱乐的喜好，就把思想的交流付之一炬。随着文化消失， 接下来的就是想象力和自我表达。就连大家聊天的方式都是思维短路的——比如说蒙太格的老板比提队长 是这样描写大众文化的加速的：“把影片加速，蒙太格，快点。点击？ 照片？看，眼睛，现在，弹，这里，那里，快，节奏，上，下，里，外， 为什么，怎么，谁，什么，哪里，啊？嗯！砰！啪！击打，乒，乓，砰！ 消化消化，消化消化消化。政治？一道专栏，两句话，一个头条！ 然后，在半空中，全部消失！”在这个贫瘠的社会，蒙太格了解到，当没有什么可以守住的时候， 抗拒是很难的。总体说，《华氏451度》描绘的是独立的思想摇摆在灭绝的边缘——而它也是一个寓言故事，说明了社会其实也是使它自己燃烧的共犯之一。

**P669 2018-12-18 Can you survive nuclear fallout - Brooke Buddemeier and Jessica S. W**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=669)

The full scope of a nuclear detonation is almost unimaginable. Hopefully, no one will ever experience another of these catastrophic incidents. But there is a scientifically supported plan of action that could save hundreds of thousands of lives in the area surrounding a nuclear explosion. So what is this plan, and what exactly would it protect us from? To create their destructive blast, these weapons harness the power of nuclear fission– in which an atom’s nucleus is split in two. This process produces an incredible amount of energy, and in some materials the neutrons produced by one fission are absorbed by nearby atoms, splitting additional nuclei. These chain reactions can produce a range of explosive yields, but let’s consider an explosion equivalent to 10,000 tons of TNT. An explosion like this would create a fireball capable of decimating a few city blocks and a shockwave damaging buildings several kilometers away. There is tragically nothing that can be done to save those in the fireball’s radius. However, for those in the shockwave and beyond, our scientifically supported protocol could be life saving. And though it may sound surprising, the best way to stay protected before, during, and after a nuclear detonation, is getting inside. Similar to protecting yourself from tornadoes or hurricanes, getting and staying inside a sturdy building would offer protection from the explosion’s shockwave, heat, and radiation. The shockwave of energy would travel several kilometers beyond the fireball’s radius in the first few seconds. Sturdy buildings within that range should be able to withstand the shockwave, and staying in the centers and basements of these buildings also helps provide protection from heat and flying objects. Finding shelter is especially important if the fireball occurs close to the earth, as it will pull thousands of tons of dirt and debris several kilometers into the atmosphere. As the fireball cools, unstable atoms created by the nuclear fission mix with the debris to produce the most dangerous long-term effect of a nuclear detonation: radioactive particles called fallout. These sand-sized particles emit ionizing radiation, capable of separating electrons from molecules and atoms. Exposure to massive amounts of this radiation can result in cell damage, radiation burns, radiation sickness, cancer, and even death. Created several kilometers up, dangerous concentrations of this material would be driven by upper atmospheric winds, potentially leading to hazardous levels of fallout in areas up to tens of kilometers downwind. Thankfully, the same buildings that offer protection from the blast are even better at guarding against fallout. Radiation is reduced as it travels through space and mass. So while a broken window and sealed window both have the same minimal effect on radiation, thick layers of steel, concrete, and packed earth can offer serious protection. And since fallout gives off half of its energy in the first hour and 80% in the first day, staying inside for 24 hours could dramatically improve the odds of avoiding the most serious effects of radiation. Following the blast there would be at least 15 minutes to find shelter before the fallout begins. Since the most hazardous fallout particles are the heaviest, they sink through the air and collect on streets and rooftops, making ideal shelters underground or in the middle of high-rise buildings. But if someone were to get caught in the fallout, there are still measures they could take. After finding a safe space, they should remove their shoes and outer layers, wash any exposed skin, and store the contaminated clothing far away. Once inside, plan on staying there for at least 24 hours. If the shelter is poor, or someone inside needs urgent medical attention, try seeking outside help after an hour. But ideally, stay inside and stay tuned for more information from first responders. While electric power, cell service, and Internet would be down, most radios would likely survive. So listen in for emergency responders to determine the safest course forward. Nuclear weapons are some of the most powerful tools of destruction on Earth, and it may seem naive to put faith in these straightforward protective measures. But studies and simulations have repeatedly shown the benefits of getting inside. So while we’ll hopefully never need to, remember to Get Inside, Stay Inside, and Stay Tuned.

**P669 2018-12-18 Can you survive nuclear fallout - Brooke Buddemeier and Jessica S. W**

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翻译人员: Riley WANG 校对人员: Yinchun Rui核弹爆炸产生的威力 几乎是不可想象的。但愿这种灾难事件 不会发生在任何人身上。但目前有一项科学证实的行动计划，能顾拯救位于核爆炸附近区域的数十万名生命。这项计划是什么呢？它能保护我们不受何种物质的伤害？为了制造出破坏力强大的爆炸，这些核武器驾驭了核裂变的力量，核裂变即原子核一分为二的过程。这个过程会释放大量能量，在某些材料中， 一次裂变后产生的中子会被周围的原子吸收，成为新的原子核。这些连锁反应能够产生 威力不等的爆炸，让我们假定是 与1万吨TNT炸药爆炸等同的核弹。这样的爆炸会形成火球，能够毁灭几个城市街区，也会形成冲击波， 破坏数千米之外建筑。可悲的是， 我们没有任何手段能够救援那些处于火球半径内的人。但对于处于冲击波范围内或 之外的人们，这些经科学证实的准则 能够挽救生命。虽然可能听起来令人惊讶，但是在核弹爆炸之前、之中和之后， 保护自己的最好办法就是待在室内。和台风和龙卷风一样，找到并待在坚固建筑物内部能够得到保护，使我们不受冲击波， 热量和辐射的影响。冲击波的能量能够在最开始的几秒达到火球半径的数公里外。在此范围内的坚固建筑物能够抵挡冲击波，待在这些建筑物内或地下室能够帮助抵抗热量和空中飞行的物体。如果火球在地面附近形成， 寻找避难所尤为重要，因为爆炸能将数千吨的土和垃圾带到几千米高的大气层中。随着火球冷却，核裂变过程中产生的不稳定的原子 会与这些残骸混合，成为核弹爆炸最危险、 最长久的危害：放射性颗粒，也称放射性坠尘。这些沙粒大小的颗粒 会释放离子化的辐射，能够将电子从分子和 原子核中分离出来。大量接触这样的辐射会损害细胞，造成放射性灼伤，放射性眩晕， 癌症，甚至是死亡。由于这些物质是在 几千米的高空产生，它们会聚集达到较高的浓度，受到大气层的风驱使，飘散到数十公里之外的下风区，对其造成危险的放射性坠尘。幸运的是，建筑物能够抵抗 爆炸冲击波，可以更好地保护我们 不受放射性辐射的影响。辐射会在通过空间和物体之后减少，因此一扇破掉的窗户 和一扇密封的窗户对辐射的影响都微乎其微，而厚厚的钢筋水泥和泥土层能够提供周到的保护。由于放射性坠尘会在 第一个小时释放一半的能量，在第一天会释放80%的能量，在室内待24小时能顾显著减少辐射带来的最严重影响。在冲击波发生之后、 形成放射性坠尘之前。将有至少15分钟用来寻找避难所。最具危害性的放射性颗粒 质量也是最大的，它们在空气中下沉，积聚在街道和屋顶，因此最理想的避难所 是位于地下或高层建筑中间楼层。但若真的身处放射性坠尘之中，你仍然可以采取其他措施。在找到安全空间后，应该脱掉鞋子和外层衣服，清洗所有暴露在外的皮肤，将受到污染的衣物存储 到距离较远的地方，一旦进入室内，做好在此停留至少24小时的准备。如果避难所条件较差 或是有人需要紧急医疗救助，请在一小时之后寻求帮助。但在理想条件下，待在室内，保持警惕， 确保能够接受到第一手信息。虽然电力、手机服务和网络 将会中断，但大多数广播将能继续运行。因此要收听来自紧急救援人员的消息来决定最安全的策略。核武器是少数 对地球造成巨大杀伤力的武器，寄希望于这些简单的保护措施 似乎太过天真。但是学术研究和模拟实验反复证明了待在室内大有裨益。因此，虽然我们希望永远不必如此，但还是要记住进入室内， 待在室内和保持警觉。

**P670 2018-12-20 How CRISPR lets you edit DNA - Andrea M. Henle**

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From the smallest single-celled organism to the largest creatures on earth, every living thing is defined by its genes. The DNA contained in our genes acts like an instruction manual for our cells. Four building blocks called bases are strung together in precise sequences, which tell the cell how to behave and form the basis for our every trait. But with recent advancements in gene editing tools, scientists can change an organism’s fundamental features in record time. They can engineer drought-resistant crops and create apples that don’t brown. They might even prevent the spread of infectious outbreaks and develop cures for genetic diseases. CRISPR is the fastest, easiest, and cheapest of the gene editing tools responsible for this new wave of science. But where did this medical marvel come from? How does it work? And what can it do? Surprisingly, CRISPR is actually a natural process that’s long functioned as a bacterial immune system. Originally found defending single-celled bacteria and archaea against invading viruses, naturally occurring CRISPR uses two main components. The first are short snippets of repetitive DNA sequences called “clustered regularly interspaced short palindromic repeats,” or simply, CRISPRs. The second are Cas, or “CRISPR-associated” proteins which chop up DNA like molecular scissors. When a virus invades a bacterium, Cas proteins cut out a segment of the viral DNA to stitch into the bacterium’s CRISPR region, capturing a chemical snapshot of the infection. Those viral codes are then copied into short pieces of RNA. This molecule plays many roles in our cells, but in the case of CRISPR, RNA binds to a special protein called Cas9. The resulting complexes act like scouts, latching onto free-floating genetic material and searching for a match to the virus. If the virus invades again, the scout complex recognizes it immediately, and Cas9 swiftly destroys the viral DNA. Lots of bacteria have this type of defense mechanism. But in 2012, scientists figured out how to hijack CRISPR to target not just viral DNA, but any DNA in almost any organism. With the right tools, this viral immune system becomes a precise gene-editing tool, which can alter DNA and change specific genes almost as easily as fixing a typo. Here’s how it works in the lab: scientists design a “guide” RNA to match the gene they want to edit, and attach it to Cas9. Like the viral RNA in the CRISPR immune system, the guide RNA directs Cas9 to the target gene, and the protein’s molecular scissors snip the DNA. This is the key to CRISPR’s power: just by injecting Cas9 bound to a short piece of custom guide RNA scientists can edit practically any gene in the genome. Once the DNA is cut, the cell will try to repair it. Typically, proteins called nucleases trim the broken ends and join them back together. But this type of repair process, called nonhomologous end joining, is prone to mistakes and can lead to extra or missing bases. The resulting gene is often unusable and turned off. However, if scientists add a separate sequence of template DNA to their CRISPR cocktail, cellular proteins can perform a different DNA repair process, called homology directed repair. This template DNA is used as a blueprint to guide the rebuilding process, repairing a defective gene or even inserting a completely new one. The ability to fix DNA errors means that CRISPR could potentially create new treatments for diseases linked to specific genetic errors, like cystic fibrosis or sickle cell anemia. And since it’s not limited to humans, the applications are almost endless. CRISPR could create plants that yield larger fruit, mosquitoes that can’t transmit malaria, or even reprogram drug-resistant cancer cells. It’s also a powerful tool for studying the genome, allowing scientists to watch what happens when genes are turned off or changed within an organism. CRISPR isn’t perfect yet. It doesn’t always make just the intended changes, and since it’s difficult to predict the long-term implications of a CRISPR edit, this technology raises big ethical questions. It’s up to us to decide the best course forward as CRISPR leaves single-celled organisms behind and heads into labs, farms, hospitals, and organisms around the world.

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翻译人员: Riley WANG 校对人员: Lipeng Chen从最小的单细胞有机体，到地球上最大的生物，每一个生命都由其基因决定。基因中包含的DNA遗传物质 就像是细胞的使用说明。4种碱基以精确的顺序连结成串，指挥细胞的行为，构成我们每项特质的基础。但通过运用最先进的 基因编辑工具，科学家可以用最短的时间 改变有机体的根本特征。他们可以开发出抗旱的农作物，创造出不会氧化变色的苹果。他们甚至能够 防止传染病大规模扩散，并研发出遗传性疾病的治疗方法。CRISPR是最快、最简单、 最便宜的基因编辑工具，引领了新一波科学研究潮流。这个医学奇迹从何而来？它是如何工作的？它能做些什么？令人惊奇的是，CRISPR实际上是一种自然现象，长久以来其功能是 作为细菌的免疫系统。人们最早发现 单细胞细菌和古生菌利用CRISPR抵抗入侵病毒。自然界中的CRISPR 有两个主要组成部分：一个是基因序列的重复片段，称为 “常间回文重复序列丛集”，简写为CRISPRs。第二个是Cas蛋白，也称"常间回文重复序列丛集关联蛋白"。它像一把分子剪刀将DNA切断。当病毒侵入细菌，Cas蛋白剪下 一段病毒DNA片段,将其缝合到细菌的CRISPR区域，捕捉到侵染的化学快照。这些病毒编码 会被复制到一小段RNA上。这个分子在我们细胞中有众多功能，但对于CRISPR来说，RNA与一种特殊蛋白质Cas9结合。形成的复合物仿佛是一群侦查员，它们与遗传物质结合，寻找与病毒配对。如果病毒再次入侵， 这些侦查物质会立刻将其识别，Cas9可以迅速摧毁病毒的DNA。许多细菌都有这种防御机制。但在2012年，科学家找出了如何让CRISPR 不仅仅针对病毒DNA，而是用于 几乎所有组织中的DNA。通过运用适当的工具，病毒免疫系统成为了 一个精细的基因编辑工具。它能够改变DNA和特定基因，这一过程简单地如同修改错别字。在实验室中，其运用方法如下：科学家设计出一个向导RNA 来匹配他们想要编辑的基因，并将其附着在Cas9上。它如同CRISPR 免疫系统中的病毒RNA一样，向导RNA会引导Cas9到目标DNA，蛋白质的分子剪刀将DNA切断。这是CRISPR强大的关键，仅通过注入Cas9 与一小段定制的RNA绑定，科学家就能够改变几乎任何基因。DNA一旦被切断，细胞会试图进行修复。通常，一种叫做核酸酶的蛋白质会修整断掉的两段 并将其重新连接。这种类型的修补过程也称做非同源性末端接合很容易产生错误，并导致多余或丢失碱基。产生的基因通常无法使用或表达。但是如果科学家 将一条模板DNA序列增加到CRISPR组合中，分子蛋白就能够 执行一个不同的DNA修复过程，称为同源介质的双链DNA修复。这个模板DNA能够引导重建过程，修复有缺陷的基因，甚至插入一个全新的基因。这种修复基因错误的能力意味着CRISPR 能够用于创造新的疗法，用于特定基因错误导致的疾病 如囊肿性纤维化或镰刀型红细胞贫血症。这项应用不只局限与人类，它有几乎无限的可能。CRISPR能够创造 长出更大水果的植物，无法传播疟疾的蚊子，甚至是重新编辑拥有抗药性的癌细胞。它也是一个研究基因组的有力工具，使得科学家能够观察在有机体中停止或改变基因表达会发生什么。CRISPR尚不完美，它无法总是做出人们想要的改变，由于难以预测 CRISPR编辑的长期影响，这项技术引起了巨大的道德争议。随着CRISPR脱离单细胞生物，进入实验室、农场、医院，以及世界上的各类有机体，决定前进的最好道路 取决于我们自己。

**P671 2018-12-20 How do ocean currents work - Jennifer Verduin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=671)

In 1992, a cargo ship carrying bath toys got caught in a storm. Shipping containers washed overboard, and the waves swept 28,000 rubber ducks and other toys into the North Pacific. But they didn’t stick together. Quite the opposite– the ducks have since washed up all over the world, and researchers have used their paths to chart a better understanding of ocean currents. Ocean currents are driven by a range of sources: the wind, tides, changes in water density, and the rotation of the Earth. The topography of the ocean floor and the shoreline modifies those motions, causing currents to speed up, slow down, or change direction. Ocean currents fall into two main categories: surface currents and deep ocean currents. Surface currents control the motion of the top 10 percent of the ocean’s water, while deep-ocean currents mobilize the other 90 percent. Though they have different causes, surface and deep ocean currents influence each other in an intricate dance that keeps the entire ocean moving. Near the shore, surface currents are driven by both the wind and tides, which draw water back and forth as the water level falls and rises. Meanwhile, in the open ocean, wind is the major force behind surface currents. As wind blows over the ocean, it drags the top layers of water along with it. That moving water pulls on the layers underneath, and those pull on the ones beneath them. In fact, water as deep as 400 meters is still affected by the wind at the ocean’s surface. If you zoom out to look at the patterns of surface currents all over the earth, you’ll see that they form big loops called gyres, which travel clockwise in the northern hemisphere and counter-clockwise in the southern hemisphere. That’s because of the way the Earth’s rotation affects the wind patterns that give rise to these currents. If the earth didn’t rotate, air and water would simply move back and forth between low pressure at the equator and high pressure at the poles. But as the earth spins, air moving from the equator to the North Pole is deflected eastward, and air moving back down is deflected westward. The mirror image happens in the southern hemisphere, so that the major streams of wind form loop-like patterns around the ocean basins. This is called the Coriolis Effect. The winds push the ocean beneath them into the same rotating gyres. And because water holds onto heat more effectively than air, these currents help redistribute warmth around the globe. Unlike surface currents, deep ocean currents are driven primarily by changes in the density of seawater. As water moves towards the North Pole, it gets colder. It also has a higher concentration of salt, because the ice crystals that form trap water while leaving salt behind. This cold, salty water is more dense, so it sinks, and warmer surface water takes its place, setting up a vertical current called thermohaline circulation. Thermohaline circulation of deep water and wind-driven surface currents combine to form a winding loop called the Global Conveyor Belt. As water moves from the depths of the ocean to the surface, it carries nutrients that nourish the microorganisms which form the base of many ocean food chains. The global conveyor belt is the longest current in the world, snaking all around the globe. But it only moves a few centimeters per second. It could take a drop of water a thousand years to make the full trip. However, rising sea temperatures are causing the conveyor belt to seemingly slow down. Models show this causing havoc with weather systems on both sides of the Atlantic, and no one knows what would happen if it continues to slow or if it stopped altogether. The only way we’ll be able to forecast correctly and prepare accordingly will be to continue to study currents and the powerful forces that shape them.

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翻译人员: Xu Xingruo 校对人员: Lipeng Chen1992年，一艘装载着洗浴玩具的货船 遭遇了风暴。货物被冲入海中，海浪将28000只橡胶鸭 和其它玩具冲卷入北太平洋。但是它们没有集中在一起。恰恰相反——橡皮鸭被冲至世界各地，而研究者则利用它们的漂流轨迹绘制洋流图，以更好地了解它。洋流受到多个因素的驱使：风、潮汐、海水的密度变化和地球的自转。洋底的地形和海岸线的形态 影响着洋流的动态使它们或增速，或减速，或改变方向。洋流分为两种：表层流和深海洋流。表层流控制着顶层10%的海水的动向，而深海洋流驱动着其它90%的海水。虽然这两种洋流的成因不同，但这两种洋流相互影响，以一种复杂的舞蹈保持海水的涌动。近岸处，风和潮汐推动着表层流，使得海水随着海水位的升降 前进或后退。同时，在开阔的洋面上， 风是驱动表层流的主要力量。当风吹过洋面时，顶层的海水随它流动。流动的顶层海水带动了下层的海水，下层的海水又带动了更下一层的海水。事实上，深至400米的海水仍受海水表面的风的影响。如果你身处高空， 观察世界各处洋流的流动模式，就会发现它们形成了 被称为“流涡”的巨大回路，在北半球顺时针流动，而在南半球逆时针流动。这是因为地球自转的方式影响着造就洋流的大气环流。如果地球不自转，大气和海水就只会在赤道的低压带和两极的高压带之间来回移动。但实际上地球在自转，从赤道吹向北极的风向东偏转，而自北极向南吹的风向西偏转。南半球的情况则像是个镜像翻转，所以风的主流在海盆上形成了回路状的图案。这就是所谓的“科里奥利效应”。流动的大气推动其下的海水 形成了同样的流涡。因为水比大气更容易吸收热量，所以洋流促进了热量 在全球范围内的流动。与表层流不同，深海洋流的产生主要缘于 海水密度的变化。当海水向北极流动时，水温逐渐降低。同时海水也有了更高的含盐量，因为冰晶使水凝固，而盐仍留在水中。这种冷且含盐度高的海水的密度越来越高，所以它向下沉，而温暖的表层流取代了它的位置，这便形成了被称作“热盐环流”的垂直洋流。由深层海水和受风驱使的表层流 构成的热盐循环构成了曲曲折折的回路——全球传送带。海水从洋底升至表层时，携带着滋养微生物的营养物质，而这些微生物正是许多海洋食物链的基础。全球传送带是世界上最长的洋流，蜿蜒环绕着整个地球。但它每分钟只移动几厘米。对于一滴海水来说， 做一次完整的旅行需要花上一千年。然而，上升的海平面似乎使得传送带的速度慢了下来。相关模型显示，这正对大西洋两岸的天气系统造成严重破坏，而且人们无从得知，如果传导持续减慢，或干脆停下来的话，会有怎样的后果。正确预测并做好相应防备的唯一方法，是持续研究洋流 和造就它们的巨大力量。

**P672 2018-12-21 How one journalist risked her life to hold murderers accountable - Ch**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=672)

In March of 1892, three Black grocery store owners in Memphis, Tennessee, were murdered by a mob of white men. Lynchings like these were happening all over the American South, often without any subsequent legal investigation or consequences for the murderers. But this time, a young journalist and friend of the victims set out to expose the truth about these killings. Her reports would shock the nation and launch her career as an investigative journalist, civic leader, and civil rights advocate. Her name was Ida B. Wells. Ida Bell Wells was born into slavery in Holly Springs, Mississippi on July 16, 1862, several months before the Emancipation Proclamation released her and her family. After losing both parents and a brother to yellow fever at the age of 16, she supported her five remaining siblings by working as a schoolteacher in Memphis, Tennessee. During this time, she began working as a journalist. Writing under the pen name “Iola,” by the early 1890s she gained a reputation as a clear voice against racial injustice and become co-owner and editor of the Memphis Free Speech and Headlight newspaper. She had no shortage of material: in the decades following the Civil War, Southern whites attempted to reassert their power by committing crimes against Black people including suppressing their votes, vandalizing their businesses, and even murdering them. After the murder of her friends, Wells launched an investigation into lynching. She analyzed specific cases through newspaper reports and police records, and interviewed people who had lost friends and family to lynch mobs. She risked her life to get this information. As a Black person investigating racially motivated murders, she enraged many of the same southern white men involved in lynchings. Her bravery paid off. Most whites had claimed and subsequently reported that lynchings were responses to criminal acts by Black people. But that was not usually the case. Through her research, Wells showed that these murders were actually a deliberate, brutal tactic to control or punish black people who competed with whites. Her friends, for example, had been lynched when their grocery store became popular enough to divert business from a white competitor. Wells published her findings in 1892. In response, a white mob destroyed her newspaper presses. She was out of town when they struck, but they threatened to kill her if she ever returned to Memphis. So she traveled to New York, where that same year she re-published her research in a pamphlet titled Southern Horrors: Lynch Law in All Its Phases. In 1895, after settling in Chicago, she built on Southern Horrors in a longer piece called The Red Record. Her careful documentation of the horrors of lynching and impassioned public speeches drew international attention. Wells used her newfound fame to amplify her message. She traveled to Europe, where she rallied European outrage against racial violence in the American South in hopes that the US government and public would follow their example. Back in the US, she didn’t hesitate to confront powerful organizations, fighting the segregationist policies of the YMCA and leading a delegation to the White House to protest discriminatory workplace practices. She did all this while disenfranchised herself. Women didn’t win the right to vote until Wells was in her late 50s. And even then, the vote was primarily extended to white women only. Wells was a key player in the battle for voting inclusion, starting a Black women’s suffrage organization in Chicago. But in spite of her deep commitment to women’s rights, she clashed with white leaders of the movement. During a march for women’s suffrage in Washington D.C., she ignored the organizers’ attempt to placate Southern bigotry by placing Black women in the back, and marched up front alongside the white women. She also chafed with other civil rights leaders, who saw her as a dangerous radical. She insisted on airing, in full detail, the atrocities taking place in the South, while others thought doing so would be counterproductive to negotiations with white politicians. Although she participated in the founding of the NAACP, she was soon sidelined from the organization. Wells’ unwillingness to compromise any aspect of her vision of justice shined a light on the weak points of the various rights movements, and ultimately made them stronger— but also made it difficult for her to find a place within them. She was ahead of her time, waging a tireless struggle for equality and justice decades before many had even begun to imagine it possible.

**P672 2018-12-21 How one journalist risked her life to hold murderers accountable - Ch**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=672)

翻译人员: Xu Xingruo 校对人员: Wanna Shi1892年3月，田纳西州孟菲斯的 三个黑人杂货店主被一帮白人谋杀。类似这样的私刑 在美国南部极为普遍，通常缺乏事后的法律调查或对谋杀犯的处置。但这一次，一位年轻的记者， 同时也是受害者的朋友着手揭露这起谋杀背后的真相。她的报道将随后震惊全国并开启她作为调查记者、民间领袖和民权捍卫者的职业生涯。她就是艾达·B·韦尔斯。艾达·贝尔·韦尔斯于1862年7月16日出生在密西西比州霍利斯普林斯的 一个黑奴家庭。就在几个月后，《解放宣言》的颁布使她和她的家人获得了自由身份。她16岁时， 黄热病夺去了她父母和弟弟的生命，她便凭在田纳西州孟菲斯的教书工作供养其余五个兄弟姐妹。在这期间，她也开始涉猎新闻工作。她以“艾欧拉”的笔名写作，19世纪90年代初期， 她已因反对种族不平等而著名并成为了报纸《孟菲斯自由言论与前照灯》的共同所有者和主编。她从不缺少素材：南北战争结束后数十年，南部的白人企图通过不法行为打压黑人，以重振自身力量，例如限制黑人的选举，破坏黑人的生意， 甚至谋杀他们。在朋友被谋杀后，韦尔斯对私刑行为进行调查。她通过相关报道和警方的记录 分析特定案件，采访因白人暴徒的谋杀 而失去亲友的人们。她冒着生命危险收集资料。作为一个调查种族谋杀案件的黑人，她激怒了许多参与私刑活动的南方白人。她的勇敢有了回报。多数白人声称并报道说私刑只是对黑人犯罪行为的回应。但这并不完全属实。通过调查，韦尔斯证明，这些谋杀 实际上是为控制和惩罚与白人竞争的黑人 而采取的蓄意而残忍的手段。例如，她的朋友们开办的杂货店受大众欢迎，削减了白人同行的生意， 因而被杀害。韦尔斯于1892年出版了 她的调查结果。出于报复，一帮白人暴民 放火烧毁了她的出版印刷厂。暴民袭击时，韦尔斯并不在城里，但他们威胁她说，如果她敢再回到孟菲斯， 她的性命就不保了。所以她来到纽约，同年再次出版了标题为《南方恐怖：各时期的私刑法》的小册子。1895年，在芝加哥定居后，她将《南方恐怖》扩展后 写成《红色记录》。她对私刑恐怖之处的详细记录和鼓舞人心的演讲获得了世界瞩目。韦尔斯借助新近获得的名声 扩大宣传。她来到欧洲，成功激起了欧洲人民 对美国南部种族暴力的愤恨，以期美国政府和人民 能以欧洲为榜样。回到美国，她毫不犹豫地投身到反抗强势组织、YMCA颁布的隔离主义政策的斗争中去，并率代表团来到白宫，对职场上的种族歧视提出抗议。她组织这一系列活动时， 自己并没有选举权。直到她近60岁时， 女性才获得了选举权。但即便那时， 新获得选举权的也只是白人女性。韦尔斯为争取选举权投入了大量精力，在芝加哥创建了黑人女性选举权组织。尽管韦尔斯在为女性争取选举权的斗争中 做出了很大贡献，她还是与这项运动的白人领导者起了争执。在华盛顿举行的一场 争取女性选举权的游行中，领导者为控制南方人的偏激情绪，将黑人女性安排在游行队伍最后。韦尔斯无视这一安排， 与白人女性肩并肩地游行。她还引起了其他民权领袖的不满，被认为是个危险的激进主义者。她坚持揭露 发生在美国南部的暴行，其他人则觉得这样做 会适得其反，不利于与白人政客协商。虽然她参与了 “美国有色人种协进会（NAACP）”的创建，但不久之后还是被组织孤立了。韦尔斯不屈从于任何 与她心目中的“正义”不符的观点，这使许多维权组织的缺陷 显露了出来，并促进它们一步步壮大，但这又使她难以在组织中找到立足之地。她不知疲倦地为平等和正义而奋斗，甚至在人们觉醒的数十年前 就开始了这项使命，不愧为那一时代的先驱。

**P673 2019-01-03 Can you solve the vampire hunter riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=673)

The greatest challenge a vampire hunter can take on is to bring sunlight into a vampire's lair. You’ve stealthily descended into the darkness of a vampire cave, setting a sequence of mirrors as you go. When the sun reaches the right angle in the sky, a focused beam of light will ricochet along the mirrors, strike your diffuser, and illuminate the great chamber where the vampires sleep. You set the final mirror and sneak through an opening in the corner of the great chamber. The diffuser must be wall-mounted, but the walls are crowded with coffins, which you don’t dare disturb. The only open spots are in the other three corners of the room. The light will enter through the southwest corner at a 45 degree angle and bounce off the perfectly smooth metallic walls until it hits one of the other three corners. But which corner will it hit? You know the room is a rectangle 49 meters wide and 78 meters long. You could probably find the answer by drawing a scale model of the room and tracing the path of the light, but the sun will be in its place in just minutes, and you’ve got no time to spare. Fortunately, there’s a different way to solve this puzzle that’s both simple and elegant. So in which corner should you place the diffuser to flood the vampire lair with sunlight? Pause the video if you want to figure it out for yourself. Answer in 2 Answer in 1 You could tackle this problem by examining smaller rooms, and you’d find a lot of interesting patterns. But there’s one insight that can unravel this riddle in almost no time at all. Let’s draw the chamber on a coordinate grid, with the Southwest corner at the point (0,0). The light passes through grid points with coordinates that are either both even or both odd. This is true even after it bounces off one or more walls. Another way of thinking about it is this: since the light travels at a 45 degree angle, it always crosses the diagonal of a unit square. Traveling 1 meter horizontally changes the x coordinate from even to odd or vice versa. Traveling 1 meter vertically changes the y coordinate from even to odd or vice versa. Traveling diagonally – as the light does here – does both at once, so the x and y coordinates of any points the light passes through must be both even, or both odd. This observation is more powerful than it seems. In particular, it means that we have a way to identify the kinds of points the light won’t ever go through If one of the coordinates is even and the other is odd, the light will miss them. That means it’ll miss the top two corners of the room, since those points have one even and one odd coordinate. The Southeast corner is the only option for the diffuser. And indeed, when that precious beam of sunlight enters the hall, it bounces between the walls and strikes the Southeast corner, spot on. The vampires, sensing the intrusion, burst from their coffins and turn to dust in the light. It was a “high stakes” test, and you passed with flying colors.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=673)

翻译人员: Jiayao Li 校对人员: Lipeng Chen一个吸血鬼猎人 能完成的最伟大的任务，就是把阳光带进吸血鬼的巢穴里。你已经偷偷地潜入了 吸血鬼的黑暗洞口，把一面一面的镜子按角度架起来。当外面的太阳升起到 一定角度的时候，一束阳光会被镜子折射到洞内，打到你准备好的聚光灯上，然后就可以照亮 吸血鬼们睡觉的大堂。你把最后一面镜子架好，然后偷偷潜入了大堂的一角。聚光灯只能被安在墙上，但几乎所有的墙附近 都有吸血鬼睡觉的棺材，所以你不敢去把他们吵醒。唯一可行的就是 大堂内的其它三个角落。这束阳光会从西南角 以45度方向进入，然后会在大堂内光滑的四壁折射，直到这束光打到 另外三个角中的其中一角。但是，到底哪一个角落会被击中呢?你知道这个大堂是一个 49米宽78米长的长方形。你估计可以这样慢慢找到答案：把大堂按比例画在纸上， 然后追寻光的轨迹，但是太阳马上就要升起了，你没法浪费时间。不过好在，还有另一种方法 可以解决这个难题，这种方法非常简洁明了。那现在让咱们看看， 到底在哪个角落放聚光灯才能成功杀死吸血鬼呢？如果你想自己思考答案， 可以现在暂停视频。离答案公布还有：2秒。1秒。想要解决这道题， 可以先看看小一点的房间，然后你会发现一些有意思的规律。有一个秘诀可以让你 迅速解决这道难题。让我们先把这个大堂 按比例画在图纸上，把西南角的坐标定为（0，0）这束阳光的轨迹射入的 坐标点都有一个共性：两坐标要么都是偶数， 要么都是奇数。即使这束光经过不同的墙壁 反射后也还是如此。换种方法解释，就是说：因为这束光是以45度角折射进入的，所以它只会沿着每一个方格的对角线走，横着移动1米等于在x轴上移一格，把偶数变成奇数，或者相反。竖着移动1米等于在y轴上移一格，把偶数变成奇数，或者相反。沿着对角线走就是横竖都移动，所以，这束光经过的任何一点，一定是两坐标全是偶数， 或者两坐标全是奇数。这就是我们解决这道题的关键。也就是说，我们找到了一个规律来区分光会经过的点和不会经过的点。如果一个点一个坐标是偶数，另一坐标是奇数那么光就不会经过。如此可以看出，这束光不会打到大堂的上两角因为这两个角的横纵坐标奇偶不同。也就是说，东南角是唯一 可以放聚光灯的地方。果然，当那束宝贵的阳光 打进大堂的时候，它沿着四壁折射，最后集中了东南角的聚光灯！这时，吸血鬼们发现了有入侵者，他们从棺材里爬出来， 但是被阳光化为灰烬。这是一道“高风险”的问题，恭喜你顺利过关！

**P674 2019-01-04 The myth of Pandora’s box - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=674)

Curiosity: a blessing, or a curse? The paradoxical nature of this trait was personified for the ancient Greeks in the mythical figure of Pandora. According to legend, she was the first mortal woman, whose blazing curiosity set a chain of earth-shattering events in motion. Pandora was breathed into being by Hephaestus, God of fire, who enlisted the help of his divine companions to make her extraordinary. From Aphrodite she received the capacity for deep emotion; from Hermes she gained mastery over language. Athena gave the gift of fine craftsmanship and attention to detail, and Hermes gave her her name. Finally, Zeus bestowed two gifts on Pandora. The first was the trait of curiosity, which settled in her spirit and sent her eagerly out into the world. The second was a heavy box, ornately curved, heavy to hold – and screwed tightly shut. But the contents, Zeus told her, were not for mortal eyes. She was not to open the box under any circumstance. On earth, Pandora met and fell in love with Epimetheus, a talented titan who had been given the task of designing the natural world by Zeus. He had worked alongside his brother Prometheus, who created the first humans but was eternally punished for giving them fire. Epimetheus missed his brother desperately, but in Pandora he found another fiery-hearted soul for companionship. Pandora brimmed with excitement at life on earth. She was also easily distracted and could be impatient, given her thirst for knowledge and desire to question her surroundings. Often, her mind wandered to the contents of the sealed box. What treasure was so great it could never be seen by human eyes, and why was it in her care? Her fingers itched to pry it open. Sometimes she was convinced she heard voices whispering and the contents rattling around inside, as if straining to be free. Its enigma became maddening. Over time, Pandora became more and more obsessed with the box. It seemed there was a force beyond her control that drew her to the contents, which echoed her name louder and louder. One day she could bear it no longer. Stealing away from Epimetheus, she stared at the mystifying box. She’d take one glance inside, then be able to rid her mind of it forever... But at the first crack of the lid, the box burst open. Monstrous creatures and horrendous sounds rushed out in a cloud of smoke and swirled around her, screeching and cackling. Filled with terror, Pandora clawed desperately at the air to direct them back into their prison. But the creatures surged out in a gruesome cloud. She felt a wave of foreboding as they billowed away. Zeus had used the box as a vessel for all the forces of evil and suffering he’d created – and once released, they were uncontainable. As she wept, Pandora became aware of a sound echoing from within the box. This was not the eerie whispering of demons, but a light tinkling that seemed to ease her anguish. When she once again lifted the lid and peered in, a warm beam of light rose out and fluttered away. As she watched it flickering in the wake of the evil she’d unleashed, Pandora’s pain was eased. She knew that opening the box was irreversible – but alongside the strife, she’d set hope forth to temper its effects. Today, Pandora’s Box suggests the extreme consequences of tampering with the unknown – but Pandora’s burning curiosity also suggests the duality that lies at the heart of human inquiry. Are we bound to investigate everything we don’t know, to mine the earth for more – or are there some mysteries that are better left unsolved?

**P674 2019-01-04 The myth of Pandora’s box - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=674)

翻译人员: Karen Xu 校对人员: Yinchun Rui好奇心：一个恩赐，还是一个诅咒?这种相互矛盾的特质被古希腊人给拟人化，成为了神话人物潘多拉。根据传说，她是第一个人类女子， 因为自己强烈的好奇心而给地球带来了一连串震撼的事件。潘多拉是因为火神赫菲斯托斯 吹了口气而诞生的，火神得到了众神的帮助， 使潘多拉变成了一个非凡的女子。从阿弗洛狄特那里， 她拥有了多愁善感的能力。从赫尔墨斯那里， 她获得了精通语言的天赋。雅典娜赐予了她精细的工艺技术 以及对细节的注意力，赫尔墨斯赐予了她名字。最后，宙斯授予了潘多拉两样礼物。第一个是好奇心，这个特质被安置在她的灵魂中， 令她迫切地想走向这个世界。第二个是一个很重的盒子， 上面有着过度华丽的装饰，且被螺丝紧紧拧住。但是宙斯对她说， 里面的东西是不能给凡人看的。她在任何情况下都不能打开盒子。在地球上，潘多拉遇到了一个 有才能的巨人埃皮米修斯，并与他相爱了。他被宙斯赋予了设计自然世界的任务。他之前一直和他的哥哥普罗米修斯一起工作。普罗米修斯创造了最初的人类，但最终因为给了他们火而受到惩罚。埃皮米修斯非常地想念他的哥哥，但在潘多拉身上，他找到了 另一个热情奔放的灵魂作为陪伴。潘多拉对地球上的生命感到无比的兴奋。她很容易被分心，很容易失去耐性，她迫切地想了解周围的一切， 并且有一大堆问题想问。她会经常想到那个被封住的盒子里的内容。什么东西这么珍贵， 以至于永远不能被人类的眼睛看到？又为什么要交给她来保管呢？她的手好痒，好想把盒子撬开来看看。有时候她深信自己听见了盒子中有低低细语，里面的东西在咔哒咔哒地发出响动，就像它用力想要挣脱盒子的束缚。这个谜使她抓狂。随着时间流失，潘多拉对盒子越来越着迷。好像有一股力量 促使她被盒子中的东西吸引，那个东西不断重复着她的名字，越来越响。有一天她终于忍不住了。她从埃皮米修斯那里偷走并且盯着这个让她感到神秘的盒子。她只要看一眼就好，然后就能再也不去想这件事了。但是当她刚打开一条缝，盒子便猛地开启了。一群怪物和恐怖的声音冲了出来，变成了一朵乌云围绕着她， 发出尖厉地咯咯笑声。潘多拉心中害怕极了，用手在空中不停地挥舞， 想把他们赶回他们的监狱里。但是这些东西蜂拥而出， 变成了一朵阴森恐怖的云。当他们翻腾着远去时， 她有一种不祥的预感。宙斯把这个盒子作为一个容器，用来装所有的邪恶力量 以及他创造出的苦难——一旦这些东西被释放出来，就再也不可收拾了。当潘多拉哭着的时候，她注意到有一个声音在盒子里回响着。那不是恶魔可怕的低语声，却是一束闪烁的光， 似乎缓解了她心中的痛苦。当她再次打开盒子往里看去，一束温暖的光飞出并飘向了远方。当潘多拉看着这束光 在她放出的魔鬼中闪烁着，她的痛苦减轻了。她知道一旦盒子打开便无法逆转，但是随着冲突一起，她带去了希望， 用以缓和这些负面影响。如今，潘多拉的魔盒告诉了我们胡乱摆弄未知事物的极端后果——但是潘多拉强烈的好奇心 同时也告诉了我们人类心中一探究竟的这种双面性。难道我们注定要去 调查一切我们不知道的事物，去了解地球上更多的事情——又或者有些谜团最好一直是未解之谜？

**P675 2019-01-04 Why should you read Flannery O’Connor - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=675)

A garrulous grandmother and a roaming bandit face off on a dirt road. A Bible salesman lures a one-legged philosopher into a barn. A traveling handyman teaches a deaf woman her first word on an old plantation. From her farm in rural Georgia, surrounded by a flock of pet birds, Flannery O’Connor scribbled tales of outcasts, intruders and misfits staged in the world she knew best: the American South. She published two novels, but is perhaps best known for her short stories, which explored small-town life with stinging language, offbeat humor, and delightfully unsavory scenarios. In her spare time O’Connor drew cartoons, and her writing is also brimming with caricature. In her stories, a mother has a face “as broad and innocent as a cabbage,” a man has as much drive as a “floor mop,” and one woman’s body is shaped like “a funeral urn.” The names of her characters are equally sly. Take the story “The Life You Save May be Your Own,” where the one-handed drifter Tom Shiftlet wanders into the lives of an old woman named Lucynell Crater and her deaf and mute daughter. Though Mrs. Crater is self-assured, her isolated home is falling apart. At first, we may be suspicious of Shiftlet’s motives when he offers to help around the house, but O’Connor soon reveals the old woman to be just as scheming as her unexpected guest– and rattles the reader’s presumptions about who has the upper hand. For O’Connor, no subject was off limits. Though she was a devout Catholic, she wasn’t afraid to explore the possibility of pious thought and unpious behavior co-existing in the same person. In her novel The Violent Bear it Away, the main character grapples with the choice to become a man of God – but also sets fires and commits murder. The book opens with the reluctant prophet in a particularly compromising position: “Francis Marion Tarwater’s uncle had been dead for only half a day when the boy got too drunk to finish digging his grave.” This leaves a passerby to “drag the body from the breakfast table where it was still sitting and bury it […] with enough dirt on top to keep the dogs from digging it up.” Though her own politics are still debated, O’Connor’s fiction could also be attuned to the racism of the South. In “Everything that Rises Must Converge,” she depicts a son raging at his mother’s bigotry. But the story reveals that he has his own blind spots and suggests that simply recognizing evil doesn’t exempt his character from scrutiny. Even as O’Connor probes the most unsavory aspects of humanity, she leaves the door to redemption open a crack. In “A Good Man is Hard to Find,” she redeems an insufferable grandmother for forgiving a hardened criminal, even as he closes in on her family. Though we might balk at the price the woman pays for this redemption, we’re forced to confront the nuance in moments we might otherwise consider purely violent or evil. O’Connor’s mastery of the grotesque and her explorations of the insularity and superstition of the South led her to be classified as a Southern Gothic writer. But her work pushed beyond the purely ridiculous and frightening characteristics associated with the genre to reveal the variety and nuance of human character. She knew some of this variety was uncomfortable, and that her stories could be an acquired taste – but she took pleasure in challenging her readers. O’Connor died of lupus at the age of 39, after the disease had mostly confined her to her farm in Georgia for twelve years. During those years, she penned much of her most imaginative work. Her ability to flit between revulsion and revelation continues to draw readers to her endlessly surprising fictional worlds. As her character Tom Shiftlet notes, the body is “like a house: it don’t go anywhere, but the spirit, lady, is like an automobile: always on the move.”

**P675 2019-01-04 Why should you read Flannery O’Connor - Iseult Gillespie**

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翻译人员: Carolina Zhang一位喋喋不休的祖母，和一位 流浪强盗在一起泥土路上对峙。一位圣经销售员引诱一位 单脚哲学家进入一个粮仓。一个旅行的杂工，在一个老农场上 教导着一位耳聋的女子她的第一个字。在位于格鲁吉亚乡村里的农村，被一群家禽鸟围绕着，弗兰纳里·奥康纳刻画的故事 讲的是被抛弃者，入侵者，以及无法融入者， 而都是她最熟知的世界：美国南方。她出版了两部小说，但最为所知的应该是 她的短篇故事，这些故事探讨小镇人物， 用尖酸，非传统的幽默，以及令人讨厌又愉快的情境来描写。在闲暇的时间， 奥康纳会画些漫画，她的写作中也充满着漫画手法。在她的故事中，一位母亲的脸孔 “和白菜一样宽，一样无辜”，一位男子开车的车程 和“拖把”一样多，一位女子的身体形状 和“骨灰坛”一样。她在设计角色名字时也同样淘气。以《你救的可能是 你自己的命》这个故事为例，故事中，单手的浪人汤姆一位老女人露西妮尔·克雷特及她的聋哑女儿的生命当中。虽然克雷特女士很有自信，但她那孤立的家正在四分五裂中。一开始，我们可能会怀疑 许佛特雷特愿意协助房子的杂物背后有什么动机，但奥康纳很快就揭露出这位老女人其实和她的不速之客同样奸诈——让读者感到不安， 无法推定到底谁站上风。对奥康纳而言，选主题没有禁忌，虽然她是虔诚的天主教徒,但她并不害怕去探索各种可能性，能将敬神的想法以及不敬神的行为在同一个人身上共存。在她的小说《暴取天国》中，主角努力的做出选择， 成为神的孩子，但却也会杀人放火。这本书的开场，是这位不情愿的 预言者处在一个特别妥协的位置上：“法兰西丝·玛莉安塔·华特的叔叔 半天前才刚刚过世，那时这个男孩喝的太醉了， 无法挖好坟墓。”这就导致一位路人要把 “还趴在早餐桌上的尸体拖下来，将他埋掉……用足够的沙土覆盖， 以确保狗不会挖出来。”虽然奥康纳自己的 政治立场还有争议，她的小说可被视为是 非常理解南方的种族主义。在《上升的一切必将汇合》中，她描述一个儿子 对于他母亲的偏执感到愤怒。但这个故事揭露出 她也有自己的盲点，说明了若仅仅只是辨识出邪恶，并不能让她的角色免受检视。即使当奥康纳在探究 人性不好的面向时，她也会让通往救赎的门 留下一道缝隙，不会关闭。在《好人难寻》中，她挽救了一位令讨厌的祖母， 让她宽恕一位强硬的罪犯，即使他渐渐逼近她的家人。既然我们这位女子为了 救赎和付出的代价不能得到赞同，我们仍然被迫去正视这些本来可能的被我们视为纯粹的暴力 或者邪恶的时刻，都不见得是如此。奥康纳精通怪异风格，且会探究南方的偏狭以及迷信，这些特性让她被归类为 南方的哥德风作家。但她的作品超越了这个类别常见的纯粹荒诞以及吓人角色，揭示出人类性格的 多样性和细微差别。她知道有些多样性会让人不舒服，而且她的故事要慢慢才能被欣赏——但她从挑战她的读者来得到乐趣。奥康纳在三十九岁时死于狼疮，这之前的十二年，这疾病使她 无法离开她在乔治亚的农场。在这些年中，她写下了她大部分充满想象的作品。她在现实和虚幻之间 灵活切换的能力持续吸引读者进入 她那惊喜不断的虚构世界中。如同她笔下的角色 汤姆·许佛特雷特提到的，身体就“像是一间房子：它不会移动，但女人的心就像是一台汽车：总是在移动着。”

**P676 2019-01-08 Why should you read Shakespeare’s “The Tempest” - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=676)

Claps of thunder and flashes of lightning illuminate a swelling sea, as a ship buckles beneath the waves. This is no ordinary storm, but a violent and vengeful tempest, and it sets the stage for Shakespeare’s most enigmatic play. As the skies clear, we are invited into a world that seems far removed from our own, but is rife with familiar concerns about freedom, power, and control. The Tempest is set on a desert island, exposed to the elements and ruled with magic and might by Prospero, the exiled Duke of Milan. Betrayed by his brother Antonio, Prospero has been marooned on the island for twelve years with his daughter Miranda and his beloved books. In this time he’s learned the magic of the island and uses it to harness its elementary spirits. He also rules over the island’s only earthly inhabitant, the dejected and demonized Caliban. But after years of plotting revenge, Prospero’s foe is finally in sight. With the help of the fluttering sprite Ariel, the magician destroys his brother’s ship and washes its sailors ashore. Prospero’s plotting even extends to his daughter’s love life, whom he plans to fall for stranded prince Ferdinand. And as Prospero and Ariel close in on Antonio, Caliban joins forces with some drunken sailors, who hatch a comic plot to take the island. The play strips society down to its basest desires, with each faction in hot pursuit of power- be it over the land, other people, or their own destiny. But Shakespeare knows that power is always a moving target; and as he reveals these characters’ dark histories, we begin to wonder if this vicious cycle will ever end. Although Prospero was wronged by Antonio, he has long inflicted his own abuses on the island, hoarding its magical properties and natural re-sources for himself. Caliban especially resents this takeover. The son of Sycorax, a witch who previously ruled the island, he initially helped the exiles find their footing. But he’s since become their slave, and rants with furious regret: “And then I loved thee,/ And showed thee all the qualities o’ th’ isle/ The fresh springs, brine pits, barren place and fertile./ Cursed be I that did so!” With his thunderous language and seething anger, Caliban constantly reminds Prospero of what came before: this island’s mine by Sycorax my mother, Which thou takest from me. Yet Sycorax also abused the island, and imprisoned Ariel until Prospero released him. Now Ariel spends the play hoping to repay his debt and earn his freedom, while Caliban is enslaved indefinitely, or at least as long as Prospero is in charge. For these reasons and many more, The Tempest has often been read as an exploration of colonialism, and the moral dilemmas that come with en-counters of “brave new world(s)." Questions of agency and justice hang over the play: is Caliban the rightful master of the land? Will Ariel flutter free? And is Prospero the mighty overseer- or is there some deeper magic at work, beyond any one character's grasp? Throughout the play, Ariel constantly reminds Prospero of the freedom he is owed. But the question lingers of whether the invader will be able to relinquish his grip. The question of ending one’s reign is particularly potent given that The Tempest is believed to be Shakespeare’s final play. In many ways Prospero’s actions echo that of the great entertainer him-self, who hatched elaborate plots, maneuvered those around him, and cast a spell over characters and audience alike. But by the end of his grand performance of power and control, Prospero’s final lines see him humbled by his audience - and the power that they hold over his creations. "With the help of your good hands./ Gentle breath of yours my sails/ Must fill or else my project fails,/ Which was to please." This evokes Shakespeare’s own role as the great entertainer who surrenders himself, ultimately, to our applause.

**P676 2019-01-08 Why should you read Shakespeare’s “The Tempest” - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=676)

翻译人员: Yichen Huang 校对人员: Ziyao Wang轰轰雷声和明灭的闪电 照亮了澎湃的海洋，一艘船在汹涌波涛中左右摇晃。这不是普通的风暴， 而是一场暴虐的复仇的暴风雨，为莎士比亚最神秘的剧本设下舞台。随着乌云散去，我们被邀请到 一个看似离我们很远的世界。但这个世界也充斥着 我们所在乎的熟悉事物，比如自由、权利和控制。《暴风雨》的背景是一个 饱受风吹雨打的荒岛，此岛被流放的米兰公爵普洛斯彼罗 用魔法与力量统治着。普洛斯彼罗被弟弟安东尼奥背叛后， 便一直隔离在这个岛上。他在这已经十二年了， 同他的女儿米兰达和他深爱的书一起。在这些时间里， 他学会了运用岛上的魔法，并用之征服了岛上的精灵。他同时也统治着这个岛上唯一的土著，沉闷丑陋的凯列班。但经历了数年的策划之后， 普洛斯彼罗的仇敌终于近在眼前。在缥缈的精灵爱丽儿的帮助下，魔法师摧毁了他弟弟的船只， 并把船员都冲上岸。普洛斯彼罗的计谋 甚至包括了它女儿的情感生活，他计划让女儿爱上 搁浅而困于岛上的王子腓迪南。当普洛斯彼罗和爱丽儿接近安东尼奥时，凯列班加入了一群醉酒的水手，他们想出了一个滑稽的计划， 要夺得小岛。《暴风雨》将社会拆解到了最底层的欲望，剧中每个阵营都一心追求权力：不管是要统治小岛，奴役他人， 还是掌控自己的命运。但莎士比亚知道权力不是一成不变的目标；当他揭露出角色们黑暗的过往时，我们渐渐怀疑这恶毒的循环是否会终结。虽然普洛斯彼罗被安东尼奥背叛，但他长久以来剥削小岛，为自己囤积岛上的魔力和自然资源。凯列班特别痛恨普洛斯彼罗的掌权。凯列班的母亲西考拉克斯是先前统治小岛的女巫，凯列班起初帮助流放者们安置下来，但在此后却成了他们的奴隶， 凯列班悔恨地悲吟：“那时我以为你是个好人，把岛上的一切富源都给你知道, 什么地方是清泉，盐井，什么地方是荒地和肥田。我真该死让你知道这一切！“带着这样雷鸣般的话语和怒火，凯列班一直提醒着普洛斯彼罗他到岛上之前的事：“这岛是我母亲西考拉克斯 传给我而被你夺了去的。“但西考拉克斯也剥削了小岛，她囚禁了爱丽儿直到普洛斯彼罗解放了他。剧中的爱丽儿期望还清 亏欠的人情，争得他的自由，而实际上只要掌权的是普洛斯彼罗， 凯列班就被无期限地奴役。因为许多诸如此类的原因，《暴风雨》常被当做是一场对殖民主义 和发现“新世界”所带来道德危机的探讨。对统治力量和正义的问题贯穿全剧：凯列班是小岛合法的主人吗？爱丽儿会重获自由吗？普洛斯彼罗是小岛强大的监管者——还是说在每一个角色之上， 都有一些深妙的魔力运作呢？在剧中，爱丽儿一直提醒着 普洛斯彼罗他被亏欠的自由。但这个入侵者是否会 让出他的权力，却值得怀疑。“终结一个人的统治”这个问题 在这里显得强有力因为《暴风雨》被认为 是莎士比亚最后的剧作。普洛斯彼罗的许多行动 和莎士比亚的行动相呼应，莎士比亚酝酿了 精妙的剧情并运用它们，如魔法般支配着 剧中的角色和剧外的观众。但当这场权利和控制的宏大演出落幕之时，普洛斯彼罗最后的台词 则印证着他为观众所败——显出了观众对于 他剧作的控制力量。“赖着你们善意殷勤地鼓掌相助， 再烦你们为我嘘出一口和风好让我们的船只鼓满帆蓬。 否则我的计划便落空。”这和莎士比亚作为大剧作家的身份共鸣，因为他，最终， 也屈服于我们的掌声。

**P677 2019-01-09 The wicked wit of Jane Austen - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=677)

Whether she’s describing bickering families, quiet declarations of love, or juicy gossip, Jane Austen’s writing often feels as though it was written just for you. Her dry wit and cheeky playfulness informs her heroines, whose conversational tone welcomes readers with a conspiratorial wink. It’s even been said that some readers feel like the author’s secret confidante, trading letters with their delightfully wicked friend Jane. But this unique brand of tongue-in-cheek humor is just one of the many feats found in her sly satires of society, civility, and sweeping romance. Written in the early nineteenth century, Austen's novels decode the sheltered lives of the upper classes in rural England. From resentment couched in pleasantries to arguing that masks attraction, her work explores the bewildering collision of emotions and etiquette. But while romance is a common thread in her work, Austen dismissed the sentimental style of writing so popular at the time. Instead of lofty love stories, her characters act naturally, and often awkwardly. They trade pragmatic advice, friendly jokes and not-so-friendly barbs about their arrogant peers. As they grapple with the endless rules of their society, Austen’s characters can usually find humor in all the hypocrisy, propriety, and small talk. As Mr. Bennet jokes to his favorite daughter, “For what do we live, but to make sport for our neighbors and laugh at them in our turn?” And though her heroines might ridicule senseless social mores, Austen fully understood the practical importance of maintaining appearances. At the time she was writing, a wealthy marriage was a financial necessity for most young women, and she often explores the tension between the mythical quest for love, and the economic benefits of making a match. The savvy socialite Mary Crawford sums this up in "Mansfield Park;" “I would have everybody marry if they can do it properly: I do not like to have people throw themselves away.” Unsurprisingly, these themes were also present in Austen’s personal life. Born in 1775, she lived in the social circles found in her novels. Jane's parents supported her education, and provided space for her to write and publish her work anonymously. But writing was hardly lucrative work. And although she had sparks of chemistry, she never married. Elements of her circumstances can be found in many of her characters; often intelligent women with witty, pragmatic personalities, and rich inner lives. These headstrong heroines provide an entertaining anchor for their tumultuous romantic narratives. Like the irreverent Elizabeth Bennet of "Pride and Prejudice," whose devotion to her sisters’ love lives blinds her to a clumsy suitor. Or the iron-willed Anne Elliot of "Persuasion," who chooses to remain unmarried after the disappearance of her first love. And Elinor Dashwood, who fiercely protects her family at the cost of her own desires in "Sense and Sensibility." These women all encounter difficult choices about romantic, filial, and financial stability, and they resolve them without sacrificing their values– or their sense of humor. Of course, these characters are far from perfect. They often think they have all the answers. And by telling the story from their perspective, Austen tricks the viewer into believing their heroine knows best– only to pull the rug out from under the protagonist and the reader. In "Emma," the titular character feels surrounded by dull neighbors, and friends who can’t hope to match her wit. As her guests prattle on and on about nothing, the reader begins to agree– Emma is the only exciting character in this quiet neighborhood. Yet despite her swelling ego, Emma may not be as in control as she thinks – in life or love. And Austen’s intimate use of perspective makes these revelations doubly surprising, blindsiding both Emma and her audience. But rather than diminishing her host of heroines, these flaws only confirm “the inconsistency of all human characters.” Their complexity has kept Austen prominent on stage and screen, and made her work easily adaptable for modern sensibilities. So hopefully, new readers will continue to find a friend in Ms. Austen for many years to come.

**P677 2019-01-09 The wicked wit of Jane Austen - Iseult Gillespie**

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翻译人员: Heze Ma 校对人员: Tianji (Homer) Li不论是在描述争吵的家人、爱的沉默宣言，或是生动有趣的八卦，简奥斯汀的作品通常都会让你 感觉到它根本是为你个人写的。她冷静的机智和大胆的玩笑， 让她的女主角很有特色，女主角的对谈语调，似乎在用 心有灵犀的方式来欢迎读者。甚至有人说，有些读者觉得 自己像是作者的秘密女知己，会和她们顽皮的朋友交换信件。但是这种独特的招牌， 也就是玩笑式的幽默，仅是她众多狡猾讽刺的技术之一，她会讽刺社会、礼仪， 以及彻底的浪漫。奥斯汀写小说的时期是十九世纪初，她的小说译解了英国乡村上层阶级中不为人知的生活。从客套中隐藏的怨恨，到掩饰吸引力的争执，她的作品探讨了情绪和礼节 抵触时，那让人困惑的冲突。但是虽然在她的作品中 浪漫爱情是常见的故事线，奥斯汀完全不考虑采用当时 很流行的多愁善感式写作风格。她不写高尚的爱情故事，她的角色行为 都很自然，甚至笨拙。他们会交换务实的建议、友善的玩笑，在谈论自大的同伙时， 也会用上不太友善地讽刺言语。当奥斯汀的角色在努力解决 他们社会中没完没了的规则时，他们通常都可以找到幽默，在各种伪善、得体举止， 和闲聊中都有着幽默。如同班奈特先生对他最爱的 女儿开玩笑时所说的：“我们人生的目的是什么？ 不就是捉弄我们的邻居，轮到我们时就嘲笑他们吗？”虽然她的女主角可能会 揶揄无力的社会习俗，但奥斯汀完全了解 维持外表的实际重要性。当她在写作的时期，在财务面来说，多数年轻女性 仍然觉得嫁个有钱人是必要的，她也常探讨追求梦幻爱情和考量经济利益而在一起 这两种选择之间的紧张关系。在《曼斯菲尔德庄园》中，精明的 社会名流玛丽克劳佛这样总结：“我会让每个人都能妥当地结婚的话， 我很乐见：我不喜欢让人们把自己浪费掉。”不意外，这些主题也出现在 奥斯汀自己的人生中。她生于1775年，在她的小说中能看到 她所生活的社交圈。简的父母资助她的教育，给她空间写作， 让她能匿名出版她的作品。但写作实在算不上是会赚大钱的工作。虽然她曾经有过恋爱的火花， 但她从来没有结婚。在她的许多角色身上都可以找到 她真实生活情景中的元素：通常这些角色是睿智的女性， 有着机智、务实的个性，以及充实的内在生活。这些任性的女主角 很有娱乐性，可以撑起她们那混乱又浪漫的故事。就像《傲慢与偏见》中 无理的伊丽莎白·班奈特，她太过投入她姐妹的爱情生活，让她看不见一位笨拙的追求者。或是《劝导》中意志坚强的 安妮·埃利奥特，在她的初恋对象消失之后， 她选择不要结婚。还有非常保护家人的埃利诺·道施伍德，在《理性与感性》中， 付出的代价是她自己的欲望。这些女性都遇到了困难的选择，关于爱情、孝道， 以及财务稳定的选择，且在解决时，她们也没有 牺牲自己的价值观——或自己的幽默感。当然，这些角色一点也不完美。她们通常都认为 自己有所有的答案。奥斯汀会从她们的角度来说故事，这样就能欺骗读者， 相信这些女主角是最懂的人——之后再釜底抽薪， 拆了主角和读者的台。在《爱玛》中的爱玛觉得 自己身边都是无趣的邻居，以及机智水平远比不上她的朋友。当她的客人闲扯半天 又吐不出象牙时，读者就会开始认同——在这安静的邻里中， 爱玛时唯一能让人兴奋的角色。但是尽管爱玛自我膨胀的很厉害，她可能没有自己想象的那么能掌控——不论是在人生还是爱情上。奥斯汀采用很亲近的视角，让这些真相被揭露时更让人吃惊，攻到爱玛以及读者的不备之处。但是这些瑕疵并没有 贬损她的女主角们，反而只是确认了 “所有人类角色的不一致性”。这些角色的复杂度，让奥斯汀 在舞台上和银幕上都很抢眼，让她的作品和现代感情也很相符。所以希望，在接下来的年代，新读者会持续将奥斯汀女士视为他们的朋友。

**P678 2019-01-15 Will there ever be a mile-high skyscraper - Stefan Al**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=678)

In 1956, architect Frank Lloyd Wright proposed a mile-high skyscraper. It was going to be the world’s tallest building, by a lot — five times as high as the Eiffel Tower. But many critics laughed at the architect, arguing that people would have to wait hours for an elevator, or worse, that the tower would collapse under its own weight. Most engineers agreed, and despite the publicity around the proposal, the titanic tower was never built. But today, bigger and bigger buildings are going up around the world. Firms are even planning skyscrapers more than a kilometer tall, like the Jeddah Tower in Saudi Arabia, three times the size of the Eiffel Tower. Very soon, Wright’s mile-high miracle may be a reality. So what exactly was stopping us from building these megastructures 70 years ago, and how do we build something a mile high today? In any construction project, each story of the structure needs to be able to support the stories on top of it. The higher we build, the higher the gravitational pressure from the upper stories on the lower ones. This principle has long dictated the shape of our buildings, leading ancient architects to favor pyramids with wide foundations that support lighter upper levels. But this solution doesn’t quite translate to a city skyline– a pyramid that tall would be roughly one-and-a-half miles wide, tough to squeeze into a city center. Fortunately, strong materials like concrete can avoid this impractical shape. And modern concrete blends are reinforced with steel-fibers for strength and water-reducing polymers to prevent cracking. The concrete in the world’s tallest tower, Dubai’s Burj Khalifa, can withstand about 8,000 tons of pressure per square meter– the weight of over 1,200 African elephants! Of course, even if a building supports itself, it still needs support from the ground. Without a foundation, buildings this heavy would sink, fall, or lean over. To prevent the roughly half a million ton tower from sinking, 192 concrete and steel supports called piles were buried over 50 meters deep. The friction between the piles and the ground keeps this sizable structure standing. Besides defeating gravity, which pushes the building down, a skyscraper also needs to overcome the blowing wind, which pushes from the side. On average days, wind can exert up to 17 pounds of force per square meter on a high-rise building– as heavy as a gust of bowling balls. Designing structures to be aerodynamic, like China’s sleek Shanghai Tower, can reduce that force by up to a quarter. And wind-bearing frames inside or outside the building can absorb the remaining wind force, such as in Seoul’s Lotte Tower. But even after all these measures, you could still find yourself swaying back and forth more than a meter on top floors during a hurricane. To prevent the wind from rocking tower tops, many skyscrapers employ a counterweight weighing hundreds of tons called a “tuned mass damper.” The Taipei 101, for instance, has suspended a giant metal orb above the 87th floor. When wind moves the building, this orb sways into action, absorbing the building’s kinetic energy. As its movements trail the tower’s, hydraulic cylinders between the ball and the building convert that kinetic energy into heat, and stabilize the swaying structure. With all these technologies in place, our mega-structures can stay standing and stable. But quickly traveling through buildings this large is a challenge in itself. In Wright’s age, the fastest elevators moved a mere 22 kilometers per hour. Thankfully, today’s elevators are much faster, traveling over 70 km per hour with future cabins potentially using frictionless magnetic rails for even higher speeds. And traffic management algorithms group riders by destination to get passengers and empty cabins where they need to be. Skyscrapers have come a long way since Wright proposed his mile-high tower. What were once considered impossible ideas have become architectural opportunities. Today it may just be a matter of time until one building goes the extra mile.

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翻译人员: Tianji (Homer) Li 校对人员: Hanlin Wang1956 年，建筑师弗兰克 · 劳埃德 · 怀特提议建造一座 1 英里（约 1.6 公里） 高的摩天大楼。它将比世界上其他任何建筑高都要出许多——它会是埃菲尔铁塔高度的五倍。但是许多评论家 嘲笑这位建筑师，因为人们将会花好几个小时等电梯。更甚，这座大厦将会 因无法承受自重而倒塌。大多数工程师赞同这一说法，尽管这个提议广为人知，但这项工程从未启动。但如今，世界各地的建筑越建越高。很多公司甚至在计划建造 超过 1 千米高的摩天大楼，比如，沙特阿拉伯的吉达大厦是埃菲尔铁塔的 3 倍高。在不久的将来，怀特那 1 英里高的建筑设想 也许就成真了。所以 70 年前到底是什么绊住了人们建造这些巨型建筑的脚步，而我们如今又是如何建成 一英里高的建筑的呢？在每项建筑工程中，每一层建筑都需支撑 它上层的部分。建筑越高，底层结构所承受的来自 上层的压力就越大。这个原理一直以来 限制了建筑的形状，因此古时候的建筑师们 偏爱地基宽阔的金字塔结构，它可以承受住 更轻的上层部分。但是这个方案并不能 很好地适应城市布局——一个近 1.5 英里宽的金字塔底座很难在城市中心安身。幸运的是，诸如混凝土这样坚实的材料 可以避免这种不切实际的形状。在新型混凝土中混入 钢纤维能加大强度，减水剂能避免建筑出现裂痕。世界上最高的塔， 迪拜的哈利法塔的混凝土可以承受每平米约 8000 吨的压力——这相当于 1200 头非洲象的重量！当然，即便一座建筑 可以自我支撑，它还需要地基的支持。没有地基，如此重的建筑就会 下陷、坍塌或者倾倒。为了防止这个约有 五十万吨重的塔下陷，192 个被称为桩的混凝土和钢筋支架 被埋进 50 米深的地下。地与桩之间的摩擦力可以使这座庞大的 建筑屹立不倒。除了可以将整栋楼推倒的 重力的威胁，一栋摩天大楼也需要 克服从大楼侧面吹来的风力。一般情况下，风能在高层建筑上施加 17 磅（约 7.7 千克）每平方米的力——相当于一堆保龄球的重力。设计的建筑结构要符合空气动力学，例如中国的地标建筑， 上海中心大厦，可以减少四分之一的风力。而建筑内或外的承风框架可以同化剩余的风力，例如首尔的乐天大厦。但即使采取了这些措施，在飓风来袭时，你仍然会发现自己在顶楼 左一米、右一米的摇晃。为了防止风摇动塔顶，许多摩天大楼采用了 一种重达数百吨的“调谐质量阻尼器”。例如台北 101 大楼在 87 层以上悬挂着 一个巨大的金属球体。当风吹过大楼时，这个球体开始摇摆，吸收大楼的动能。当它拖着上层楼摇摆时，球和建筑物之间的液压缸会将吸收的动能转化为热能，以此稳定摇摆的结构。当所有这些技术被加以应用时，我们的巨型建筑 才能够稳定站立。但是快速穿过如此庞大的建筑物 本身就是一项挑战。在怀特的那个年代里，最快的电梯仅以每小时 22 公里的速度运行。值得庆幸的是，如今的电梯速度快得多， 时速可超过 70 公里，未来的轿厢可能会 使用无摩擦的磁轨以实现更快的速度。交通管理算法根据 目的地将乘客分组，以确保乘客和空轿厢 被送到他们需要去的地方。自从怀特的“一英里摩天大楼”以来， 摩天大楼经历了许多变迁。曾经被认为是不可能的想法已成为建筑界的契机。让一栋楼多增高一英里，现在看来，很可能只是时间问题。

**P679 2019-01-23 'All the World's a Stage' by William Shakespeare**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=679)

“All the World’s a Stage” from "As You Like It" by William Shakespeare All the world’s a stage, And all the men and women merely players; They have their exits and their entrances; And one man in his time plays many parts, His acts being seven ages. At first the infant, Mewling and puking in the nurse’s arms; And then the whining school-boy, with his satchel And shining morning face, creeping like snail Unwillingly to school. And then the lover, Sighing like furnace, with a woeful ballad Made to his mistress’ eyebrow. Then a soldier, Full of strange oaths, and bearded like the pard, Jealous in honour, sudden and quick in quarrel, Seeking the bubble reputation Even in the cannon’s mouth. And then the justice, In fair round belly with good capon lin’d, With eyes severe and beard of formal cut, Full of wise saws and modern instances; And so he plays his part. The sixth age shifts Into the lean and slipper’d pantaloon, With spectacles on nose and pouch on side; His youthful hose, well sav’d, a world too wide For his shrunk shank; and his big manly voice, Turning again toward childish treble, pipes And whistles in his sound. Last scene of all, That ends this strange eventful history, Is second childishness and mere oblivion; Sans teeth, sans eyes, sans taste, sans everything.

**P679 2019-01-23 'All the World's a Stage' by William Shakespeare**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=679)

翻译人员: Sijia Chen 校对人员: Lipeng Chen《全世界是个舞台》取自《皆大欢喜》莎士比亚著全世界是个舞台，所有的男男女女不过是一些演员；他们都有下场的时候， 也都有上场的时候。一个人的一生中扮演着好几个角色，他的表演可以分为七个时期。最初是婴孩，在保姆的怀中啼哭呕吐。然后是背着书包、满脸红光的学童像蜗牛一样慢腾腾地拖着脚步，不情愿地呜咽着上学堂。然后是情人，像炉灶一样叹着气，写了一首悲哀的诗歌 咏着他恋人的眉毛。然后是一个军人，满口发着古怪的誓， 胡须长得像豹子一样，爱惜着名誉，动不动就要打架，在炮口上寻求着泡沫一样的荣名。然后是法官，胖胖圆圆的肚子塞满了阉鸡，凛然的眼光，整洁的胡须，满嘴都是格言和老生常谈；他这样扮了他的一个角色。第六个时期变成了精瘦的趿着拖鞋的龙钟老叟，鼻子上架着眼镜，腰边悬着钱袋；他那年轻时候节省下来的长袜子，套在他皱瘪的小腿上显得宽大异常；他那朗朗的男子的口音又变成了孩子似的尖声，像是吹着风笛和哨子。终结着这段古怪的多事的历史的最后一场，是孩提时代的再现，全然的遗忘，没有牙齿，没有眼睛， 没有口味，没有一切。想了解对这首诗的分析， 请观看此视频，或者查看本系列的下一首诗。

**P680 2019-01-23 'The Nutritionist' by Andrea Gibson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=680)

Hi I'm Andrea Gibson and this is my poem "The Nutritionist." The nutritionist said I should eat root vegetables Said if I could get down 13 turnips a day I would be grounded, rooted. Said my head would not keep flying away to where the darkness lives. The psychic told me my heart carries too much weight Said for 20 dollars she’d tell me what to do I handed her the twenty, she said “stop worrying darling, you will find a good man soon.” The first psychotherapist said I should spend 3 hours a day sitting in a dark closet with my eyes closed and my ears plugged. I tried it once but couldn’t stop thinking about how gay it was to be sitting in the closet. The yogi told me to stretch everything but truth, said focus on the outbreaths, said everyone finds happiness if they can care more about what they can give than what they get. The pharmacist said klonopin, lamictil, lithium, Xanax. The doctor said an antipsychotic might help me forget what the trauma said The trauma said don’t write this poem. Nobody wants to hear you cry about the grief inside your bones But my bones said “Tyler Clementi dove into the Hudson River convinced he was entirely alone.” My bones said “write the poem.” To the lamplight. Considering the river bed. To the chandelier of your fate hanging by a thread. To everyday you could not get out of bed. To the bulls eye of your wrist To anyone who has ever wanted to die. I have been told, sometimes, the most healing thing we can do- Is remind ourselves over and over and over Other people feel this too The tomorrow that has come and gone And it has not gotten better When you are half finished writing that letter to your mother that says “I swear to God I tried” But when I thought I hit bottom, it started hitting back There is no bruise like the bruise loneliness kicks into your spine So let me tell you I know there are days it looks like the whole world is dancing in the streets when you break down like the doors of their looted buildings You are not alone and wondering who will be convicted of the crime of insisting you keep loading your grief into the chamber of your shame You are not weak just because your heart feels so heavy I have never met a heavy heart that wasn’t a phone booth with a red cape inside Some people will never understand the kind of superpower it takes for some people to just walk outside Some days I know my smile looks like the gutter of a falling house But my hands are always holding tight to the ripchord of believing A life can be rich like the soil Make food of decay Turn wound into highway Pick me up in a truck with that bumper sticker that says “it is no measure of good health to be well adjusted to a sick society” I have never trusted anyone with the pulled back bow of my spine the way I trust the ones who come undone at the throat Screaming for their pulse to find the fight to pound Four nights before Tyler Clementi jumped from the George Washington bridge I was sitting in a hotel room in my own town Calculating exactly what I had to swallow to keep a bottle of sleeping pills down What I know about living is the pain is never just ours Every time I hurt I know the wound is an echo So I keep a listening for the moment when the grief becomes a window When I can see what I couldn’t see before, through the glass of my most battered dream, I watched a dandelion lose its mind in the wind and when it did, it scattered a thousand seeds. So the next time I tell you how easily I come out of my skin, don’t try to put me back in just say here we are together at the window aching for it to all get better but knowing there is a chance our hearts may have only just skinned their knees knowing there is a chance the worst day might still be coming let me say right now for the record, I’m still gonna be here asking this world to dance, even if it keeps stepping on my holy feet you- you stay here with me, okay? You stay here with me. Raising your bite against the bitter dark Your bright longing Your brilliant fists of loss Friend if the only thing we have to gain in staying is each other, my god that’s plenty my god that’s enough my god that is so so much for the light to give each of us at each other’s backs whispering over and over and over “Live” “Live” “Live”

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翻译人员: Bruce Sung 校对人员: Helen Chang嗨，我是安德烈·吉布森， 这是我的诗作《营养师》。营养师建议我多吃根菜，且告诉我，如果一天吃十三棵大头菜，我便会像种子一样深埋土壤，根系茁壮。我的思绪就不会飞向滋生黑暗的地方。通灵者说，有太多的重担压在我的心上，只需我付 20 美元，她便会替我指明方向。20 美元换来的答案则是：“放下忧虑亲爱的，你定会觅得如意君郎。”第一位心理治疗师建议我， 每天在漆黑的衣柜里，静坐三小时，闭上双睛，堵住耳朵。我尝试过一次，但总觉得坐在衣柜里有一种同性恋的感觉（出柜）。瑜伽师教我拉伸运动，却闭口不谈真相，让我将意念集中在呼气，还说人人都能找到幸福真谛，只要人人都心怀奉献，而不是索取。药剂师让我服用安眠药、镇静剂和抗抑郁药。医生说，抗精神病的药能帮你忘记心理创伤。不要写这首诗，我的创伤对我说到。你灵魂深处的哀痛，没有人想知道。我内心的声音却说，“泰勒·克莱门汀在哈德逊河自尽， 是因为他深信自己会孤老。”我内心的声音告诉我：“写下这首诗。”写给灯光。写给投河了结生命的痛苦灵魂。写给自己那脆弱但闪耀的灵魂。写给每天无法离开床榻的自己。写给你手腕上数不清的针眼。写给任何有过自杀念头的人。有人曾对我说，最治愈的事情——就是一遍遍提醒自己，还有其他人正经历同样的痛苦。日子一天天过去，但一切并未好转。那封给母亲的信，只写了一半，里面写道 “我发誓我尽力了。”但当我以为我坠到了生命谷底， 一切却开始好转。没有一种伤痛，会比孤独更深入骨髓。就让我来告诉你，我知道那种感觉，你觉得整个世界充满了欢乐，只有你无助瘫倒，一无所有。但你并不孤单，即使坚守希望仿佛是一种过错，你无尽地悔恨，用羞耻感将自己淹没。即便有着沉重的过去，你也并不脆弱，而沉重的过去也无法阻挡你的心跳。有些人永远不会明白， 这颗心脏有着怎样惊人的生命力，因为有些事情他们未曾经历。有时我的笑容看起来疲惫不堪，但我的双手始终紧握着信念的绳索：人生就像肥沃的土壤，淤泥里也能结出硕果，伤口转化为未来之路。这条路驶来一辆卡车，车尾的贴纸写着，“病态社会，何以知道谁才健康。”我从不相信落井下石之人，但我相信那些奄奄一息，或许只剩一线生机，却还在为生存呐喊和挣扎的人。在泰勒·克莱门汀跳下乔治·华盛顿桥的四天前，我坐在自己小镇的酒店房间里，我该用什么办法，才能吞下一整瓶安眠药。我所理解的生活，是每个人都有属于自己的痛苦，而每每受伤，新伤口都会唤起痛苦的记忆。我一直倾听等待着，当悲伤不再阻塞我的心灵之窗。我双目清明，看见从前忽略的事物，浓重的噩梦，也不再阻挡我的思绪。心灵之窗外，一株蒲公英随风飘散，散播出数千颗种子。而当我告诉你，走出这一切有多轻松，不要迫使我重回困境，你只需要说：我会陪你一起， 在这扇窗前分担痛苦，等你痊愈，但你也要明白，或许我们的心只是受了点擦伤，也或许，最坏的时刻尚未到来。但我想对你说，无论如何，我都会陪你，享受这个世界，学会与它共舞，即使不断受伤。也请你陪着我，好吗？留在我身边，陪我一起。武装起自己，对抗黑暗，渴求光明，勇敢地面对失去的一切。我的挚友，如果在陪伴中，我们唯一要争取的，就是彼此，那就已经很多了，那就已经足够了，神明啊，我们可以分享无尽的光明，就让我们互相鼓励，一遍遍轻声低吟：“活下去”“活下去”“活下去”

**P681 2019-01-23 'The Road Not Taken' by Robert Frost**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=681)

"The Road Not Taken" By Robert Frost Two roads diverged in a yellow wood, And sorry I could not travel both And be one traveler, long I stood and looked down one as far as I could To where it bent in the undergrowth; Then took the other, as just as fair, And having perhaps the better claim, Because it was grassy and wanted wear; Though as for that the passing there Had worn them really about the same, And both that morning equally lay In leaves no step had trodden black. Oh, I kept the first for another day! Yet knowing how way leads on to way, I doubted if I should ever come back. I shall be telling this with a sigh Somewhere ages and ages hence: Two roads diverged in a wood, and I— I took the one less traveled by, And that has made all the difference.

**P681 2019-01-23 'The Road Not Taken' by Robert Frost**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=681)

翻译人员: Xu Xingruo 校对人员: Cynthia Li《未选择的路》作者：罗伯特·弗罗斯特 （注：在此采用顾子欣先生的译本）黄色的树林里分出两条路，可惜我不能同时去涉足，我在那路口久久伫立，向着一条路极目望去，直到它消失在丛林深处。但我却选择了另外一条路。它荒草萋萋，十分幽寂， 显得更诱人、更美丽；虽然在这两条小路上， 都很少留下旅人的足迹；虽然那天清晨落叶满地， 两条路都未经脚印污染。呵，留下一条路等改日再见！ 但我知道路径绵延无尽头，恐怕我难以再回返。也许多少年后在某个地方，我将轻声叹息将往事回顾： 一片树林里分出两条路——而我选了人迹更少的一条， 从此决定了我一生的道路。

**P682 2019-01-23 'The Second Coming' by William Butler Yeats**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=682)

"The Second Coming" by William Butler Yeats Turning and turning in the widening gyre The falcon cannot hear the falconer; Things fall apart; the centre cannot hold; Mere anarchy is loosed upon the world, The blood-dimmed tide is loosed, and everywhere The ceremony of innocence is drowned; The best lack all conviction, while the worst Are full of passionate intensity. Surely some revelation is at hand; Surely the Second Coming is at hand. The Second Coming! Hardly are those words out When a vast image out of Spiritus Mundi Troubles my sight: somewhere in sands of the desert A shape with lion body and the head of a man, A gaze blank and pitiless as the sun, Is moving its slow thighs, while all about it Reel shadows of the indignant desert birds. The darkness drops again; but now I know That twenty centuries of stony sleep Were vexed to nightmare by a rocking cradle, And what rough beast, its hour come round at last, Slouches towards Bethlehem to be born?

**P682 2019-01-23 'The Second Coming' by William Butler Yeats**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=682)

翻译人员: Youyou Gu 校对人员: Yunjung Nam《二度圣临》 作者：威廉 · 巴特勒 · 叶芝盘旋复又继续猎鹰不闻人语；万物分崩离析； 中心难以维系；世间一片混乱，血色暗潮，漫溢四方，淹没善良纯真；善者无所依靠，恶人蠢蠢欲动。神谕昭然若揭；此乃二度圣临。此乃二度圣临！ 此言尚未成真便见灵兽蒙迪扰我视线：行于沙漠狮身人面，目光如炬，腿脚缓慢前行，愤怒鸟影环绕。夜幕再度降临； 此时我已知晓两千年的长眠已被噩梦惊扰，何种野兽， 终将到来，再度降临伯利恒？

**P683 2019-01-23 'Three Months After' by Cristin O'Keefe Aptowicz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=683)

I'm Cristin O'Keefe Aptowicz and this is "Three Months After." To want to disappear is different from wanting to die. To disappear and to not have to explain to anyone, to talk to anyone. To move to somewhere where no one knows you, where you don't have to look at a single laughing face. To elope with this grief who is not your enemy This grief who maybe now is your best friend. This grief who is your husband, the thing you curl into every night, falling asleep in its arms. Who wakes up early to make you your cold thankless breakfast. To go to that place where every surface is a blade. A sharp thing on which to hang your sorry flesh to feel something, anything, other than this.

**P683 2019-01-23 'Three Months After' by Cristin O'Keefe Aptowicz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=683)

翻译人员: 安 钊佚 校对人员: Yuchen Lu我是 Cristin O'Keefe Aptowicz， 这首诗名为《三个月后》。渴望从你现在的生活中消失 却并非渴望死亡消失而不需要与任何人解释 亦不需要对任何人提起去一个无人认识你的地方一个你不需要看到任何笑脸的地方你身负悲痛而潜逃这悲痛并非来自你的敌人却是因为你舍不得你最要好的朋友不愿离开你亲爱的丈夫你曾每晚钻进他的怀抱 枕着他的胳膊而眠他曾早早起床给你做早餐 你起床的时候却早已经放凉去一个所接触的现实 皆锋利似刀片的地方吧纵使它会伤到你的皮肤去经历真实的生活吧去经历除了眼下的宠爱与甜蜜 之外的一切吧

**P684 2019-01-23 What is consciousness - Michael S. A. Graziano**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=684)

Here are two images of a house. There’s one obvious difference, but to this patient, P.S., they looked completely identical. P.S. had suffered a stroke that damaged the right side of her brain, leaving her unaware of everything on her left side. But though she could discern no difference between the houses, when researchers asked her which she would prefer to live in, she chose the house that wasn’t burning— not once, but again and again. P.S.’s brain was still processing information from her whole field of vision. She could see both images and tell the difference between them, she just didn’t know it. If someone threw a ball at her left side, she might duck. But she wouldn’t have any awareness of the ball, or any idea why she ducked. P.S.’s condition, known as hemispatial neglect, reveals an important distinction between the brain’s processing of information and our experience of that processing. That experience is what we call consciousness. We are conscious of both the external world and our internal selves— we are aware of an image in much the same way we are aware of ourselves looking at an image, or our inner thoughts and emotions. But where does consciousness come from? Scientists, theologians, and philosophers have been trying to get to the bottom of this question for centuries— without reaching any consensus. One recent theory is that consciousness is the brain’s imperfect picture of its own activity. To understand this theory, it helps to have a clear idea of one important way the brain processes information from our senses. Based on sensory input, it builds models, which are continuously updating, simplified descriptions of objects and events in the world. Everything we know is based on these models. They never capture every detail of the things they describe, just enough for the brain to determine appropriate responses. For instance, one model built deep into the visual system codes white light as brightness without color. In reality, white light includes wavelengths that correspond to all the different colors we can see. Our perception of white light is wrong and oversimplified, but good enough for us to function. Likewise, the brain’s model of the physical body keeps track of the configuration of our limbs, but not of individual cells or even muscles, because that level of information isn’t needed to plan movement. If it didn’t have the model keeping track of the body’s size, shape, and how it is moving at any moment, we would quickly injure ourselves. The brain also needs models of itself. For example, the brain has the ability to pay attention to specific objects and events. It also controls that focus, shifting it from one thing to another, internal and external, according to our needs. Without the ability to direct our focus, we wouldn’t be able to assess threats, finish a meal, or function at all. To control focus effectively, the brain has to construct a model of its own attention. With 86 billion neurons constantly interacting with each other, there’s no way the brain’s model of its own information processing can be perfectly self-descriptive. But like the model of the body, or our conception of white light, it doesn’t have to be. Our certainty that we have a metaphysical, subjective experience may come from one of the brain’s models, a cut-corner description of what it means to process information in a focused and deep manner. Scientists have already begun trying to figure out how the brain creates that self model. MRI studies are a promising avenue for pinpointing the networks involved. These studies compare patterns of neural activation when someone is and isn’t conscious of a sensory stimulus, like an image. The results show that the areas needed for visual processing are activated whether or not the participant is aware of the image, but a whole additional network lights up only when they are conscious of seeing the image. Patients with hemispatial neglect, like P.S., typically have damage to one particular part of this network. More extensive damage to the network can sometimes lead to a vegetative state, with no sign of consciousness. Evidence like this brings us closer to understanding how consciousness is built into the brain, but there’s still much more to learn. For instance, the way neurons in the networks related to consciousness compute specific pieces of information is outside the scope of our current technology. As we approach questions of consciousness with science, we’ll open new lines of inquiry into human identity.

**P684 2019-01-23 What is consciousness - Michael S. A. Graziano**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=684)

翻译人员: Yuchen Lu 校对人员: Yuyang Zhao这里是同一间房子的两张图。他们有一个明显的区别，但对这个名叫P.S.的病人来说，它们看上去完全相同。P.S.曾经中风，并导致损伤了大脑右部，这使她对在她左侧的东西没有意识。虽然她识别不出这两间房子的区别，当研究人员问她 比较喜欢住哪一间的时候，她还是选了没有着火的那间。这不是一两次，是始终。P.S.的大脑仍然是根据她的整个视野来处理信息的。她是可以看见这两张图像并看出它们的区别的，她只是不知道。如果有人朝她的左边丢一个球，她也许会躲闪。但她并不会意识到有球向他飞来，也不明白为什么她会躲闪。P.S.的病症叫做半侧空间忽略症，它揭示了大脑处理信息和我们对于信息处理的经历的重要区别。这种经历我们称之为意识。我们对外在世界和自身内在有意识。我们意识到图像，和我们意识到自己 在看图像的方式差不多，这与意识到我们内在的思想感情， 基本是一样的。但意识是从何而来呢？科学家，神学家和哲学家们几个世纪以来一直致力于 解决这个问题，但都没有达成共识。近来，有理论称意识是大脑对其自身活动的不完美写照。理解这个理论之前，我们先来理清大脑是怎么根据我们的感知 来处理信息的。大脑会根据我们的感官输入建立模型，这些模型不断地更新形成对于世间事物的简化描述。我们所知的每件事物 都是基于这些模型。它们从不会抓住它所描述的事物的细节，但足以让大脑做出适当的反应。比如，视觉系统中的一个模型将白光编译为没有颜色的亮光。事实上，白光包含了所有不同颜色的可见光的波长。我们对于白光的感知是错的 而且是被过于简化的，但是足够我们用了。相同的，大脑中关于身体的模型会记录我们四肢的构型，但不会细致到记录单个细胞甚至肌肉，因为我们不需要这个层面的信息来活动。如果大脑没有一个追踪 身体尺寸，形状以及动作的模型，我们很快就会伤到自己。大脑也需要关于它自己的模型。例如，大脑有注意具体事物的能力。它还会根据我们的需要来控制这种专注，从一个东西转移到另外一个，从内在到外在。没有了转移注意的能力，我们就完全无法评定危险，无法吃饭，无法活动。为了有效控制注意力，大脑需要建立一个注意力模型。大脑中有860亿个神经元持续交互，大脑信息处理的模型无法完美地 记录描述自身的所有细节。但就像身体的模型一样，或者是我们对于白光的概念，这个模型并不需要是面面俱到的。我们确信我们有 形而上学的主观体验可能是因为某一个大脑模型。这个模型简易地描述了以集中而深入的方式 处理信息的意义。科学家们已在尝试研究大脑如何创造自我模型。核磁共振可以帮助我们查明关联的网络。这些研究对比当人是否意识到感官刺激时 （比如图像）不同的神经活跃模式。结果表明， 不论试验人员是否意识到图片大脑中视觉处理的区域都会被激活。但只有当他们有意识地看图像时，其他的网络才会全部活跃。患有半侧空间忽略症的病人， 比如P.S.,通常是在这个网络的 特定部位受损。对这一网络更严重的损伤 可能会造成植物状态，使人完全失去意识。类似这样的证据让我们进一步明白意识是怎样建立在大脑中的。但还有更多有待学习。比如，我们目前的技术无法知晓在这一网络中和意识有关的神经元是如何计算具体某段信息的。随着我们利用科学解决意识的问题，我们将会开启关于人类特性的新探究。

**P685 2019-01-24 The sexual deception of orchids - Anne Gaskett**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=685)

The world’s largest orchid grows several meters tall. The tiniest is practically invisible. Some bloom high up in trees, while others live underground. All in, there are around 28,000 species of orchid on earth – about as many as all the bird, mammal and reptile species combined. They grow all over the world, bearing every imaginable colour, shape, and pattern. And there’s a cunning purpose behind these elaborate displays: many orchids trick insects, sometimes even into having sex with them. Like other flowers, most orchids need to attract insects to gather their pollen and carry it between plants. But unlike most flowers, which attract a range of pollinators with sweet nectar, these masters of deception deploy other tactics– like pretending to be an insect’s mate, letting off alluring scents, and mimicking the appearance of other species. One of their most intriguing methods is sexual deception. Through a combination of sexy shapes and pheromones, orchids convince insects to mate with them. Take the bee orchid, whose petals look almost exactly like the velvety body of a bee. This disguise is so convincing that male bees land on the orchid and try to have sex with it, picking up pollen as they go. Other orchids have evolved contrasting colours and ultraviolet spots– invisible to humans but irresistible to insects. Still others have tactile ‘love-handles’ that ensure insects are positioned precisely for pollination. When a male wasp lands on the hammer orchid, for example, his enthusiastic mating motion flips a hinge in the flower, forcing his body into the pollen. At the next flower he visits, that same hinge pushes his pollen-covered body onto the stigma, fertilizing it. Some orchids make such convincing mates that insects even ejaculate on them, wasting valuable sperm. But the most vital component of sexual deception is scent: orchids mimic the precise scent of a single insect species. This is possible because many insects and flowers produce simple organic compounds called hydrocarbons, which form a layer that protects their bodies from drying out. The precise blend of compounds in this layer is species-specific. Its scent can double as a way for insects to attract potential mates, known as a sex pheromone. Over the course of many thousands of years, random compound combinations have given some orchid species precisely the same signature scent as particular insect species. This matching scent allows them to attract male pollinators who fall over and over again for the flowers masquerading as females of their own species. Sexual deception isn’t the only trick orchids have up their sleeves. Their oldest scam is mimicking the shapes and colours of other nectar-producing flowers— but without the sweet nectar. Some orchids also masquerade as places where insects lay their eggs. One species not only has the colour and appearance of rotting meat; it emits a scent of decay as well– drawing in flies who deposit their eggs on the flower and unwittingly pollinate the plant. Other orchids look and smell just like the fungi on which certain insects lay their eggs. Where do all these bizarre adaptations come from? Random genetic mutations in orchids may result in a trait– like a scent or a shape– that, by chance, matches the needs of a single insect species. The huge diversity within the insect world also increases the likelihood that an orchid will find a unique audience. Able to make more seeds and offspring with the help of its dedicated pollinators, the orchid successfully reproduces in isolation, and becomes a new species. But because of their dependence on sometimes just one pollinator species, orchids are also vulnerable, and many quickly go extinct. Over time, though, more orchid species have formed than died out, and orchids are some of the most diverse flowering plants. They have such exuberant and otherworldly shapes that they occasionally deceive human senses, too: In their petals we see what appear to be tiny, dancing people, monkey’s faces, spiders, and even birds in flight.

**P685 2019-01-24 The sexual deception of orchids - Anne Gaskett**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=685)

翻译人员: Cindy Huang 校对人员: Viviana Hu世界上最大的兰花可以长到几米高。最小的几乎看不见，有些长在树稍，有些生长在地底。全部加起来， 世界上有大约 28000 种兰花，大约是世界上所有鸟类， 哺乳动物和爬行动物数量的总和。它们生长在世界各地，有着每一种你可以想象到的 颜色，形状，和花纹。在这些精心的展示背后 隐藏着一个狡猾的目的：很多兰花会欺骗虫子，有时候甚至和它们发生性关系。和其他花朵一样，大部分的兰花需要吸引昆虫去收集它们的花粉 并传播给其他植物。但和用甜美花蜜吸引传粉媒介的大多数花朵不同，这些欺骗大师使用了其他的策略：比如冒充一个昆虫的伴侣，释放诱人的香味，并模仿其他物种的外形。它们最有趣的方法是性欺骗。通过一些性感的形状和信息素，兰花“说服”昆虫与他们交配。举个例子，蜜兰，它们的花瓣看起来几乎 和蜜蜂毛茸茸的身体一模一样。这种伪装能够轻易的骗过蜜蜂， 雄性蜜蜂会停留在它身上，并尝试和它发生性关系，离开的时候带走花粉。其他兰花进化出了 对比色和紫外线斑——人类看不见， 但是对昆虫来说无法抗拒。还有一些拥有触觉 “爱情之手”，确保昆虫停留在正确的位置授粉。举个例子，当一只雄性黄蜂 停留在锤兰上的时候，它们热烈的交配动作 会翻转花里的合页，迫使它的身体进入花粉。在它去的下一朵花上，合页将它满是花粉的身体 推到兰花的柱头上，使其受精。有些兰花是极具欺骗性的伴侣，一些昆虫甚至在它们身上射精，浪费了宝贵的精子。不过，在兰花的性欺骗中， 最重要的部分还是气味:兰花能够精准的模仿 一种昆虫的香味。这是可能的，因为很多昆虫和花能够生产一种叫做碳氢化合物的 简单有机化合物，形成一层保护层， 防止它们的身体变干。每个物种外层的化碳氢化合物 都是独一无二的。那些气味是昆虫吸引 潜在配偶的一种方式，被称为性信息素。经过了几千年的演变，一些兰花品种进化出了 随机的碳氢化合物成分，其香味和某些昆虫物种恰恰相同。这种匹配的气味使它们 能够吸引雄性传粉者，这些传粉者一次次被那些伪装成同物种雌性的花朵们迷倒。性欺骗并不是兰花拥有的唯一伎俩。它们最古老的骗局是模仿那些产花蜜的花朵的形状和颜色，尽管它们本身并不产花蜜。有些兰花伪装成了昆虫产卵的地方。一种兰花不仅有烂肉的颜色和外观，还会模仿并散发出腐烂的气味——吸引苍蝇在兰花身上产卵，并无意中为它们授粉。一些兰花的外观和气味 很像某些真菌，诱使昆虫在上面产卵。所有这些奇怪的特征是怎么来的？兰花的随机基因突变 可能改变它们的特征，比如气味和形状——纯粹偶然的， 正好符合一种昆虫的需求。昆虫世界的多样性也增加了兰花找到特定传粉者的可能。在其专门的传粉者的帮助下， 成功制造了更多种子和后代的兰花会在隔离的状态下进行繁殖，并成为一个新的物种。但是因为它们对（有时只有一种） 传粉昆虫的依赖，兰花也很脆弱，许多兰花很快就灭绝了。随着时间的推移，对比那些灭绝的兰花品种， 更多的兰花品种出现了。使得兰花成为了一种 最多样化的开花植物。它们拥有非常丰富 和超凡脱俗的形状，偶尔也会欺骗人类的感官：在它们的花瓣中， 我们看到了跳舞的小人，猴子的脸，蜘蛛，甚至还有飞行中的鸟类。

**P686 2019-01-25 Three ways the universe could end - Venus Keus**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=686)

We know about our universe’s past: the Big Bang theory predicts that all matter, time, and space began in an incredibly tiny, compact state about 14 billion years ago. And we know about the present: scientists’ observations of the movement of galaxies tell us that the universe is expanding at an accelerated rate. But what about the future? Do we know how our universe is going to end? Cosmologists have three possible answers for this question, called the Big Freeze, the Big Rip and the Big Crunch. To understand these three scenarios, imagine two objects representing galaxies. A short, tight rubber band is holding them together— that’s the attractive force of gravity. Meanwhile, two hooks are pulling them apart— that’s the repulsive force expanding the universe. Copy this system over and over again, and you have something approximating the real universe. The outcome of the battle between these two opposing forces determines how the end of the universe will play out. The Big Freeze scenario is what happens if the force pulling the objects apart is just strong enough to stretch the rubber band until it loses its elasticity. The expansion wouldn’t be able to accelerate anymore, but the universe would keep getting bigger. Clusters of galaxies would separate. The objects within the galaxies– suns, planets, and solar systems would move away from each other, until galaxies dissolved into lonely objects floating separately in the vast space. The light they emit would be redshifted to long wavelengths with very low, faint energies, and the gas emanating from them would be too thin to create new stars. The universe would become darker and colder, approaching a frozen state also known as the Big Chill, or the Heat Death of the Universe. But what if the repulsive force is so strong that it stretches the rubber band past its elastic limit, and actually tears it? If the expansion of the universe continues to accelerate, it will eventually overcome not only the gravitational force – tearing apart galaxies and solar systems– but also the electromagnetic, weak, and strong nuclear forces which hold atoms and nuclei together. As a result, the matter that makes up stars breaks into tiny pieces. Even atoms and subatomic particles will be destroyed. That’s the Big Rip. What about the third scenario, where the rubber band wins out? That corresponds to a possible future in which the force of gravity brings the universe’s expansion to a halt— and then reverses it. Galaxies would start rushing towards each other, and as they clumped together their gravitational pull would get even stronger. Stars too would hurtle together and collide. Temperatures would rise as space would get tighter and tighter. The size of the universe would plummet until everything compressed into such a small space that even atoms and subatomic particles would have to crunch together. The result would be an incredibly dense, hot, compact universe — a lot like the state that preceded the Big Bang. This is the Big Crunch. Could this tiny point of matter explode in another Big Bang? Could the universe expand and contract over and over again, repeating its entire history? The theory describing such a universe is known as the Big Bounce. In fact, there’s no way to tell how many bounces could’ve already happened— or how many might happen in the future. Each bounce would wipe away any record of the universe’s previous history. Which one of those scenarios will be the real one? The answer depends on the exact shape of the universe, the amount of dark energy it holds, and changes in its expansion rate. As of now, our observations suggest that we’re heading for a Big Freeze. But the good news is that we’ve probably got about 10 to the 100th power years before the chill sets in — so don’t start stocking up on mittens just yet.

**P686 2019-01-25 Three ways the universe could end - Venus Keus**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=686)

翻译人员: Yuchen Lu 校对人员: Lipeng Chen我们了解宇宙的过往：大爆炸原理预测了 所有的物质、时间和空间都始于140亿年前的极小极紧密的状态。我们了解宇宙的当下，科学家们对于银河运动的观察告诉我们宇宙正在加速扩张。但是未来呢？我们知道我们的宇宙将会如何终结吗？宇宙学家们关于这个问题有三种可能的回答：大冻结、大撕裂和大挤压。为了理解这三种设想，请想象一下两个物体代表银河。一根橡皮筋将它们定在一起——这就是引力。同时，两个钩子将它们分开——这就是扩展宇宙的斥力。如果这个系统复制下去，你就会得到一个近似宇宙的模型。这一对相反作用力的结果决定了宇宙的尽头在哪里。大冻结学说指的是这个拉力刚好大到让皮筋失去弹力。这样，宇宙的扩张就不会再加速，但宇宙还是会继续变大。银河系会散开。银河系中的物体——恒星、行星和星系会远离彼此，直到银河系彻底分解，漂浮在广阔的宇宙中。它们发出的光会被红移成长波，所含的能量很少，很模糊。它们放出的气体太薄， 无法让人看见星星。宇宙会变得黑暗寒冷，趋近于冰冻的状态，这也叫做宇宙大寒，或者热寂。但如果这对斥力非常强大呢？大到使皮筋超出弹力极限，然后拉断。如果宇宙的扩张继续加速，这个拉力最终不仅会克服重力影响——导致银河系和太阳系分离——还会克服强核力和弱核力，这两种力是保持原子和核子的。其结果是，形成星球的物质会变成细小的碎片。甚至于原子和亚原子颗粒都会被摧毁。这就是大撕裂。那第三种情况呢？如果是皮筋比较有力量会怎么样？这就对应了一个未来 可能会出现的情况——重力让宇宙的扩张停止，然后往回收。星系会开始互相靠拢。在它们凝结在一起的同时，它们的重力会变得更加强大。星球也会互相猛烈碰撞。温度会随着宇宙变小而升高。宇宙会骤然变小，直到所有东西都压缩成一个小空间。甚至原子和亚原子都会被压碎。宇宙最终会变得稠密，异常得热和紧密，这与大爆炸之前的状态很相似。这就是大挤压。这个点上的物质会不会又一次大爆炸？宇宙会不会重复地扩张和收缩，重演整段历史呢？描述上述现象的原理叫作大反弹。事实上，我们不知道宇宙 已经经过了几次反弹，或者将来会发生几次。每一次反弹都会清除宇宙之前的所有历史。这些情况中哪一个是真实的？答案取决于宇宙的准确形状，它含有的暗物质的数量，和它扩张率的变化。到现在为止，我们的观察显示 我们正往大冻结的方向前进。但好消息是还要过十的一百次方年，寒冷才会降临。所以，先别急着囤手套。

**P687 2019-01-25 'To Make Use of Water' by Safia Elhillo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=687)

My name is Safia Elhillo, and this poem is called "to make use of water." dilute i forget the arabic word for economy i forget the english word for عسل forget the arabic word for incense & english word for مسكين arabic word for sandwich english for صيدلية & مطعم & وله /stupid girl, atlantic got your tongue/ blur back home we are plagued by a politeness so dense even the doctors cannot call things what they are my grandfather’s left eye swirled thick with smoke what my new mouth can call glaucoma while the arabic still translates to the white water swim i want to go home dissolve i want to go home drown half don’t even make it out or across you get to be ungrateful you get to be homesick from safe inside your blue american passport do you even understand what was lost to bring you here

**P687 2019-01-25 'To Make Use of Water' by Safia Elhillo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=687)

翻译人员: Han Zheng 校对人员: GeGe Tan我的名字叫萨菲亚·艾海勒这首诗叫做《水之用》。稀释我记不起"经济"的阿拉伯文我记不起"蜜蜂"(عسل阿拉伯文,下同)的英文记不起"芳香"的阿拉伯文和"差劲"的英文"三明治"的阿拉伯文"餐厅"和"药店"的英文/傻姑娘，大西洋令你缄口不言/模糊在家中我们被客套重重包围连医生也说不清这是什么时疫我祖父的左眼冒出缕缕青烟我的新嘴巴说那是青光眼而阿拉伯语仍把它译成白水漂浮我想回家溶解我想回家溺亡有一半的人甚至没能出海，或没能上岸在蓝色美国护照的安全庇护之下你大可忘恩负义 你大可思乡成疾你是否明白带你来到这片土地的代价 究竟是什么

**P688 2019-01-28 Why should you read Sylvia Plath - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=688)

“From the tip of every branch, like a fat purple fig, a wonderful future beckoned and winked… but choosing one meant losing all the rest, and, as I sat there, unable to decide, the figs began to wrinkle and go black, and, one by one, they plopped to the ground at my feet.” In this passage from Sylvia Plath’s "The Bell Jar," a young woman imagines an uncertain future– and speaks to the universal fear of becoming paralyzed by the prospect of making the wrong choice. Although she considered other careers, Plath chose the artist’s way. Poetry was her calling. Under her shrewd eye and pen, everyday objects became haunting images: a “new statue in a drafty museum,” a shadow in a mirror, a slab of soap. Fiercely intelligent, penetrating and witty, Plath was also diagnosed with clinical depression. She used poetry to explore her own states of mind in the most intimate terms, and her breathtaking perspectives on emotion, nature and art continue to captivate and resonate. In her first collection of poems, "The Colossus," she wrote of a feeling of nothingness: "white: it is a complexion of the mind.” At the same time, she found solace in nature, from “a blue mist” “dragging the lake,” to white flowers that “tower and topple,” to blue mussels “clumped like bulbs.” After "The Colossus" she published "The Bell Jar," her only novel, which fictionalizes the time she spent working for Mademoiselle magazine in New York during college. The novel follows its heroine, Esther, as she slides into a severe depressive episode, but also includes wickedly funny and shrewd depictions of snobby fashion parties and dates with dull men. Shortly after the publication of "The Bell Jar," Plath died by suicide at age 30. Two years later, the collection of poems she wrote in a burst of creative energy during the months before her death was published under the title "Ariel." Widely considered her masterpiece, Ariel exemplifies the honesty and imagination Plath harnessed to capture her pain. In one of "Ariel's" most forceful poems, "Lady Lazarus," she explores her attempts to take her own life through Lazarus, the biblical figure who rose from the dead. She writes, “and I a smiling woman/ I am only thirty/ And like the cat I have nine times to die.” But the poem is also a testament to survival: “I rise with my red hair/ And I eat men like air.” This unflinching language has made Plath an important touchstone for countless other readers and writers who sought to break the silence surrounding issues of trauma, frustration, and sexuality. "Ariel" is also filled with moving meditations on heartbreak and creativity. The title poem begins “Stasis in darkness/ Then the substanceless blue/ Pour of tor and distances.” This sets the scene for a naked ride on horseback in the early morning— one of Plath’s most memorable expressions of the elation of creative freedom. But it is also full of foreboding imagery, such as “a child's cry” that “melts in the wall” and a “red/eye, the cauldron of morning.” This darkness is echoed throughout the collection, which includes controversial references to the holocaust and the Kamikazes. Even the relics of seemingly happier times are described as crucifying the author: “My husband and child smiling out of the family photo; Their smiles catch onto my skin, little smiling hooks.” Her domestic dissatisfaction and her husband’s mistreatment of her are constant themes in her later poetry. After her death, he inherited her estate, and has been accused of excluding some of her work from publication. Despite these possible omissions and her untimely death, what survives is one of the most extraordinary bodies of work by a twentieth century poet. While her work can be shocking in its rage and trauma, Plath casts her readers as witnesses– not only to the truth of her psychological life, but to her astounding ability to express what often remains inexpressible.

**P688 2019-01-28 Why should you read Sylvia Plath - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=688)

翻译人员: x Vicky 校对人员: Rong Chen“在每一个树枝上，就像硕大的紫色无花果一样，一个美好的未来在召唤和眨眼...但是选择一个就意味着 失去剩下的所有，并且，当我坐在这里 没办法做出决定的时候，无花果开始枯萎变黑，一个接一个地掉落在我的脚边。”在西尔维娅·普拉斯名为 《钟形罩》的文章中一个年轻女人想象着未知的未来——诉说着普遍的担心，即因为做出错误的选择而使自己陷入困境。即使她考虑了选择其他职业，普拉斯还是成为了艺术家。诗歌是她的使命。在她敏锐的眼睛和笔下，每天的事物都是她的灵感映像：“一座在透风博物馆的新雕像，”镜子中的阴影，一块肥皂。极度聪颖，敏锐机智，普拉斯却被确诊为临床抑郁症。用最暖心的说法， 她用诗歌探索自己的心境，她在情感、自然和艺术上惊人的视角吸引着人们，并让人们产生共鸣。在她第一版诗集中，《巨神像》她写下了一种虚无的感觉：“白色：它是一种心灵的肤色。”同时，她找到了大自然的慰籍，从“蓝色的薄雾”“摇曳地湖泊”，到“高耸并摇摇欲坠“的白色花朵，到“大片像球茎一样的”蓝贻贝。《巨神像》之后她出版了《钟形罩》，她唯一的小说，书中写出了她在纽约读大学时 为《淑女》杂志工作的经历。这部小说跟随着主人公埃斯特，此时她正陷入严重的抑郁期，但仍然包括着诙谐幽默和精明的描述：势力的时尚派对，与乏味的男人约会。《钟形罩》出版不久，普拉斯在30岁死于自杀。两年后，她充满创作活力地在去世前几个月写下的诗集，以《艾瑞尔》为名出版。作为一部被广泛认可的著作，《艾瑞尔》证明了普尔斯用诚实和想象力来捕捉她的痛苦。在《艾瑞尔》里最有影响力的一首诗中，《拉萨路夫人》，她通过拉萨路来结束自己的生命，就是圣经中由死复活地人物。她写道：“我这个笑容可掬的女人／我才三十岁。就像猫一样我有九条命。”但这首诗也是一种对生存的证明：“我生为红发／像呼吸空气一样吃人。”这种毫无畏惧的语言使得普拉斯成为无数读者和作家的试金石，那些想要打破身边围绕着创伤，沮丧和性问题沉默的人。《艾瑞尔》也充满了对心碎 和创造力的感人冥想。这首诗开头写道“黑暗中的静止／随后是无形的蓝／小石山与距离涌来。”这设置了一个在清晨裸体骑马的场景——普拉斯最令人难忘的 表达创意自由的喜悦之一。但它也充满了不详的意象，比如“融化在墙上”的“孩子的哭声”和“红色／眼睛，早晨的大汽锅”。黑暗贯穿了整部诗集，包括向大屠杀和 敢死队致敬的有争议的引用，甚至那些看起来是幸福时光 的产物也被描述为折磨作者:“我的丈夫和我的孩子 拿出全家合影的微笑，他们的微笑抓住我， 一些小小的微笑的钩子。”她对家庭的不满和丈夫的虐待成为她之后作品的不变主题。在她死后，她的丈夫继承了她的财产，并因为透露她未出版的作品受到指控。尽管有这些可能的疏漏和她的英年早逝，但幸存下来的是被一位20世纪诗人写下的 最杰出的作品。虽然会因为作品的愤怒和创伤感到震惊，普拉斯会把她的读者塑造成目击者——不仅是目击她心理生活的真相，也是目击她惊人的表达能力， 能够表达出常常不能表达出来的东西。

**P689 2019-01-30 How does the Rorschach inkblot test work - Damion Searls**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=689)

Take a look at this image. What might this be? A frightening monster? Two friendly bears? Or something else entirely? For nearly a century, ten inkblots like these have been used as what seems like an almost mystical personality test. Long kept confidential for psychologists and their patients, the mysterious images were said to draw out the workings of a person’s mind. But what can inkblots really tell us, and how does this test work? Invented in the early 20th century by Swiss psychiatrist Hermann Rorschach, the Rorschach Test is actually less about the specific things we see, and more about our general approach to perception. As an amateur artist Hermann was fascinated by how visual perception varies from person to person. He carried this interest to medical school, where he learned all our senses are deeply connected. He studied how our process of perception doesn’t just register sensory inputs, but transforms them. And when he started working at a mental hospital in eastern Switzerland, he began designing a series of puzzling images to gain new insight into this enigmatic process. Using his inkblot paintings, Rorschach began quizzing hundreds of healthy subjects and psychiatric patients with the same question: what might this be? However, it wasn’t what the test subjects saw that was most important to Rorschach, but rather, how they approached the task. Which parts of the image did they focus on or ignore? Did they see the image moving? Did the color on some inkblots help them give better answers, or distract and overwhelm them? He developed a system to code people’s responses, reducing the wide range of interpretations to a few manageable numbers. Now he had empirical measures to quantify all kinds of test takers: the creative and imaginative, the detail-oriented, the big-picture perceivers, and flexible participants able to adapt their approach. Some people would get stuck, offering the same answer for multiple blots. Others gave unusual and delightful descriptions. Responses were as varied as the inkblots, which offered different kinds of perceptual problems– some easier to interpret than others. But analyzing the test-taker’s overall approach yielded real insights into their psychology. And as Rorschach tested more and more people, patterns began to pile up. Healthy subjects with the same personalities often took remarkably similar approaches. Patients suffering from the same mental illnesses also performed similarly, making the test a reliable diagnostic tool. It could even diagnose some conditions difficult to pinpoint with other available methods. In 1921, Rorschach published his coding system alongside the ten blots he felt gave the most nuanced picture of people’s perceptual approach. Over the next several decades, the test became wildly popular in countries around the world. By the 1960s, it had been officially administered millions of times in the U.S. alone. Unfortunately, less than a year after publishing the test, Hermann Rorschach had died suddenly. Without its inventor to keep it on track, the test he had methodically gathered so much data to support began to be used in all sorts of speculative ways. Researchers gave the test to Nazi war criminals, hoping to unlock the psychological roots of mass murder. Anthropologists showed the images to remote communities as a sort of universal personality test. Employers made prejudiced hiring decisions based on reductive decoding charts. As the test left clinics and entered popular culture its reputation among medical professionals plummeted, and the blots began to fall out of clinical use. Today, the test is still controversial, and many people assume it has been disproven. But a massive 2013 review of all the existing Rorschach research showed that when administered properly the test yields valid results, which can help diagnose mental illness or round out a patient’s psychological profile. It’s hardly a stand-alone key to the human mind– no test is. But its visual approach and lack of any single right answer continue to help psychologists paint a more nuanced picture of how people see the world. Bringing us one step closer to understanding the patterns behind our perceptions.

**P689 2019-01-30 How does the Rorschach inkblot test work - Damion Searls**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=689)

翻译人员: Riley WANG 校对人员: Cissy Yun看看这张图，它画的是什么？是一个可怕的怪物吗？还是两只愉快的熊？或是其他完全不同的东西？在近一个世纪里，人们使用十张这样的墨迹图进行近乎神秘的人格测试。心理学家及其病患 长期将其作为机密，据说它们能够描绘出 一个人的大脑是如何工作的。但是墨迹图真正能够告诉我们什么？它又是如何工作的？墨迹图由瑞士心理医生 赫曼·罗夏于20世纪初发明。罗夏测试实际上 并不关注我们看到了什么，而是关注我们感知事物的方式。作为一名艺术业余爱好者，赫曼因人与人之间 视觉感知的巨大差异而着迷。他将这项兴趣带到了医学院，在此，他了解到所有的人类感官 都有很深的内在联系。他发现我们的感知过程 不只是获得感官输入，而是将其进行转化。在瑞士东部的一家心理诊所工作时，他开始设计一系列令人困惑的图像，以此深入了解谜一样的感知过程。通过使用墨迹图，罗夏向数百位 健康人和心理疾病患者提出同样的问题：这图片中画的可能是什么？但是，被测试者看到什么 并不是最重要的，他们如何完成这项任务 才是罗夏最关注的。他们是否关注或是忽略 图片中的某个部分？他们是否看到图像在动？墨迹图的颜色是否能帮助他们回答？还是说这些颜色会令他们分心 或产生巨大情绪反应？他开发了一个系统 来解读人们的回答，将大量的解读 缩小到一个可控的数字。这样他用实证方法 量化了被测试者的全部类型：富有创造力和想象力的人，关注细节或是关注宏观的人，随机应变调整方法的人。某些人看图时可能会卡住，面对不同的墨迹图时 会提供相同的回答。其他人可能给出 不同寻常或是有意思的描述。人们的反应依墨迹图的不同而不同，这表现出不同种类的感知问题——其中的某些问题比其他问题 更容易解释，但是通过分析 实验对象的大体的感知方式能够帮助深入了解其心理。随着参与罗夏测试的人数 不断扩大，一些模式也开始形成。对于健康的且拥有 相同个性的被测试者来说他们给出的答案 通常也惊人地相似。而患有相同心理疾病的病人通常也会有相似的表现，这使得罗夏测试 成为可靠的诊断工具。它甚至可以诊断出其他方法难以发现的病症。在1921年，罗夏发表了他的编码系统 以及十张墨迹图，他认为这十张墨迹图最能 展现感知过程的细微之处。在接下来的数十年中，这项测试在世界上各个国家广泛流行，截止到1960年代，仅在美国， 它就被正式使用了上百万次。不幸的是， 在发表测试一年之后，赫曼·罗夏突然离世。他曾运用科学方法 收集大量数据支持墨迹测试，现在没有了他正确的思路，这项测试开始 以各类试探性的方式使用。研究者给纳粹战犯做测试，希望能揭开大规模屠杀的心理根源。人类学家将图像展示给 偏远地区生活的人们，用来进行共性人格的测试。公司雇主依据简化的解读 做出带有偏见的用人决定。随着这项测试脱离医院 并进入流行文化，它的名声在医学专家眼中 直线下跌，墨迹图开始不再用于临床诊断。如今，这项测试仍然具有争议性，许多人认为它已经被证伪。但2013年一项大规模的研究 回顾了所有现存的罗夏研究，表明恰当进行测试能够产生有效的结果，它能够帮助诊断心理疾病，或是描绘病人的心理特征图。它并非开启人类大脑的唯一钥匙，没有任何测试能够这样。但是这种利用视觉、 不给出单一正确答案的方法继续帮助心理学家更细致地描绘人们如何看待世界的图像，这使我们更进一步，了解我们感知背后的模式。

**P690 2019-02-08 Notes of a native son - The world according to James Baldwin - Christ**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=690)

Over the course of the 1960s, the FBI amassed almost two thousand documents in an investigation into one of America’s most celebrated minds. The subject of this inquiry was a writer named James Baldwin. At the time, the FBI investigated many artists and thinkers, but most of their files were a fraction the size of Baldwin’s. During the years when the FBI hounded him, he became one of the best-selling black authors in the world. So what made James Baldwin loom so large in the imaginations of both the public and the authorities? Born in Harlem in 1924, he was the oldest of nine children. At age fourteen, he began to work as a preacher. By delivering sermons, he developed his voice as a writer, but also grew conflicted about the Church’s stance on racial inequality and homosexuality. After high school, he began writing novels and essays while taking a series of odd jobs. But the issues that had driven him away from the Church were still inescapable in his daily life. Constantly confronted with racism and homophobia, he was angry and disillusioned, and yearned for a less restricted life. So in 1948, at the age of 24, he moved to Paris on a writing fellowship. From France, he published his first novel, "Go Tell it on the Mountain," in 1953. Set in Harlem, the book explores the Church as a source of both repression and hope. It was popular with both black and white readers. As he earned acclaim for his fiction, Baldwin gathered his thoughts on race, class, culture and exile in his 1955 extended essay, "Notes of a Native Son." Meanwhile, the Civil Rights movement was gaining momentum in America. Black Americans were making incremental gains at registering to vote and voting, but were still denied basic dignities in schools, on buses, in the work force, and in the armed services. Though he lived primarily in France for the rest of his life, Baldwin was deeply invested in the movement, and keenly aware of his country’s unfulfilled promise. He had seen family, friends, and neighbors spiral into addiction, incarceration and suicide. He believed their fates originated from the constraints of a segregated society. In 1963, he published "The Fire Next Time," an arresting portrait of racial strife in which he held white America accountable, but he also went further, arguing that racism hurt white people too. In his view, everyone was inextricably enmeshed in the same social fabric. He had long believed that: “People are trapped in history and history is trapped in them.” Baldwin’s role in the Civil Rights movement went beyond observing and reporting. He also traveled through the American South attending rallies giving lectures of his own. He debated both white politicians and black activists, including Malcolm X, and served as a liaison between black activists and intellectuals and white establishment leaders like Robert Kennedy. Because of Baldwin’s unique ability to articulate the causes of social turbulence in a way that white audiences were willing to hear, Kennedy and others tended to see him as an ambassador for black Americans — a label Baldwin rejected. And at the same time, his faculty with words led the FBI to view him as a threat. Even within the Civil Rights movement, Baldwin could sometimes feel like an outsider for his choice to live abroad, as well as his sexuality, which he explored openly in his writing at a time when homophobia ran rampant. Throughout his life, Baldwin considered it his role to bear witness. Unlike many of his peers, he lived to see some of the victories of the Civil Rights movement, but the continuing racial inequalities in the United States weighed heavily on him. Though he may have felt trapped in his moment in history, his words have made generations of people feel known, while guiding them toward a more nuanced understanding of society’s most complex issues.

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翻译人员: Sijia Chen 校对人员: Yinchun Rui20 世纪 60 年代，在一项针对美国最负盛名的 一位人物的调查中，联邦调查局收集了将近两千份文件。这个调查案中的主角是 一位叫做詹姆斯·鲍德温的作家。在当时，联邦调查局调查了 许多艺术家和思想家，但是他们中大部分人的文件数量 比起鲍德温都是小巫见大巫。在联邦调查局追踪他的那些年里，他成为了世界上 最畅销的黑人作家之一。那么到底是什么使詹姆斯·鲍德温 在当时的公众和美国当局眼里变得如此显赫呢?1924 年，鲍德温出生在纽约哈莱姆，他是家里九个孩子中的长子。14 岁起，他开始从事传道士的工作。在布道过程中，他逐渐发展起了 自己作为作家的声音，但同时也与教会关于种族不平等和同性恋问题的立场产生了分歧。上完高中后，他在做一系列杂活儿的同时 开始创作小说和散文。但是那些驱使他远离教堂的问题 在日常生活中也仍然无法避免。不断面对种族歧视和对同性恋的憎恶，愤怒而失望的他 渴望一个少些束缚的生活。于是，在 1948 年，24 岁的他通过 一个写作奖学金去了巴黎。在法国，他于 1953 年发表了 自己的第一部小说《向苍天呼吁》。故事背景设置在哈莱姆，小说探索了教堂同时作为 压抑和希望来源的存在。它受到了黑人和白人读者的普遍欢迎。随着小说不断获得赞誉，鲍德温在他 1955 年发表的 随笔文集《一个土生子的札记》里集中表达了自己对于种族、 阶级、文化和流亡的想法。于此同时，民权运动在当时的美国势头愈发猛烈。越来越多的美国黑人 开始登记参与投票和选举。但是在学校内，在公交车上， 在工作中，在军队里，他们的基本尊严依旧得不到保障。虽然他余生的大部分时间 都在法国度过，但鲍德温还是坚定地 投入到了这场民权运动中。他深谙自己的祖国 有尚未兑现的诺言。他亲眼目睹过家人、朋友以及邻居陷入毒瘾、监狱和自杀的泥沼。他相信这些人的悲惨命运源于一个实行种族隔离社会的种种束缚。1963 年，他发表了短文集《下一次将是烈火》，醒目地揭示了美国种族纠纷问题。除了指出白人对此有不可推卸的责任，他更进一步地论证，种族歧视对白人同样造成了伤害。在他看来，所有人都无法避免地 被同一个社会肌理缠绕。他一直认为：“人们被困在历史中， 而历史被困在人们心中。”鲍德温在民权运动中所扮演的角色超越了观察者和报告者。他遍游美国南方，参加集会，发表演说。他既与白人政客，也与 包括马尔克姆· X 在内的黑人激进分子进行辩论。他同时还充当联络人的角色， 帮助黑人激进分子及知识分子与像罗伯特·肯尼迪这样的 掌权白人领袖进行沟通。鲍德温擅于以白人受众原意聆听的方式阐明社会动荡的原因，鉴于他的这个特殊才能，肯尼迪和其他一些人 往往把他看做是美国黑人的使者。但鲍德温本人则拒绝这个标签。而与此同时，他高超的语言文字能力也 使得联邦调查局将其视作威胁。由于旅居国外，加之自己的性取向，即使是在当时民权运动的圈子里，鲍德温也会不时觉得自己是个局外人。对此，他在自己的文字中 进行了公开的探讨，哪怕正值同性恋恐惧症猖獗之时。纵观其一生，鲍德温视自己的角色为见证者。与许多同时代的人不同，他有幸活着看到了 一些民权运动的胜利，但美国持续的种族不平等 依然沉甸甸地压在他的心上。虽说他可能感觉被困在了 属于自己的历史时刻里，但他的话引导了几代人，使得他们对最为复杂的社会问题 有了更加细致入微的了解，同时也使得他们自己 有了被了解的感觉。

**P691 2019-02-13 Harvey Milk's radical vision of equality - Lillian Faderman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=691)

By 1973, Harvey Milk had already been many things: naval officer, high school teacher, bit-part actor, and wandering hippie. But as he embarked on yet another life running a camera shop in San Francisco, he already found himself distracted. From the Watergate hearings on national news, to the teacher who had to rent a projector when her school couldn’t afford one, Harvey saw a desperate need for political reform. Milk strongly believed that tight knit neighborhoods were essential to the fabric of the city, and that government should solve those community’s most practical problems. From fixing potholes and putting up stop signs, to promoting a friendly culture of cooperation, Milk envisioned a more personal approach to local government. This philosophy led him to run for the city’s Board of Supervisors as the representative for his own district, which included the heart of American gay culture, the Castro. At this time, police brutality, discrimination and media stereotyping plagued the LGBT community, labeling Harvey and his supporters as political outsiders. But Milk refused to downplay his sexuality. He was sure that gay rights could never be won from the closet, and he saw the Castro as one of many minorities without representation in city politics. Milk was determined to bring these basic government services to all of San Francisco’s disenfranchised groups, regardless of race, age, or sexuality. But despite his flair for public speaking and open-hearted approach, voters couldn’t see Milk’s radical vision. In 1973, he lost his first bid for the Board of Supervisors. In 1975, he lost again. A year later, he ran for the California Assembly– and lost. Yet he tirelessly continued to support his district, befriending bartenders, construction unions, and local Chinese grocers. This earned him the affectionate title, the "mayor of Castro Street.” And when he ran his third campaign for the Board of Supervisors in 1977, Harvey finally won the seat– becoming one of the first openly gay public officials in US history. Elated, Milk arrived in office determined to make lasting change. He immediately introduced a bill outlawing discrimination on the grounds of sexuality and launched a major clean-up of the city. But not everyone was happy with this direction. Anti-gay sentiment was gaining national momentum, especially in the form of California’s Proposition 6. The proposition, which sought to make it illegal for homosexuals to work in Californian schools, would prove to be the biggest battle of Milk’s career. Supporters of Prop 6 attacked the LGBT community, calling them unfit to work with students. But Milk urged them not to hide in fear: “Come out to your relatives. Come out to your friends, if indeed they are your friends. Come out to your neighbors, to your fellow workers… break down the myths. Destroy the lies and distortions. For your sake. For their sake.” Alongside other activists, he ran an incandescent campaign against hate. On November 7, 1978, Prop 6 was defeated in a landslide. It was proof that Milk’s message was gaining traction. But just twenty days after this inspiring victory, he was assassinated at City Hall– killed alongside San Francisco Mayor George Moscone. Both men had been murdered by Dan White, a former fellow supervisor, who had positioned himself against those he called "radicals, social deviates and incorrigibles.” He had frequently clashed with Harvey at Board meetings, and resented the spirit of change which Milk personified for many. The night of Milk's murder, thousands marched by candlelight through the city. In the wake of this tragedy, yet another injustice arose. In a highly controversial verdict, White received a sentence of only seven years and eight months– a decision that sparked uproar throughout the city in what became known as the White Night Riots. But even after his death, Milk continued to preach his hopeful cause. He left his friends and followers a total of three different tapes to be played in the event of his assassination. They leave us with a call to action, and a reminder that everyone is welcome in the fight against injustice: "I ask for the movement to continue… and if a bullet should enter my brain, let that bullet destroy every closet door…”

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=691)

翻译人员: Yanwen Lu 校对人员: Yuelong Dai到1973年时，哈维·米尔克已经担任过很多职务：海军军官、高中老师、龙套演员以及流浪嬉皮士。但是当他在旧金山开相机店， 开始新生活的时候，他已经无法专心营业。从全国新闻上的水门事件听证会，到教师因为学校资金缺乏而租借投影仪，哈维感到政治改革亟待实现。若把城市比作布料， 他相信像针织一样紧密的邻里关系是一个城市的关键，政府应该解决社区最切实重要的问题。从填补路面坑洼和放置停止慢行标志，到促进友好协作的文化，哈维对地方政府有自己个人的理解。这样的哲学政治思想使他代表自己的选区参选了旧金山监督委员会委员。该选区包括了美国同性恋文化的中心——卡斯特罗街。当时，警察暴行，歧视和媒体的刻板印象困扰着LGBT群体，（LGBT指女同性恋、 男同性恋、双性恋和变性人群体）并且将哈维和他的支持者们当作政治上的局外人。但是哈维拒绝对自己的性倾向轻描淡写，他确信若同志们仍在柜子里， 同志们将永远不会赢得合法权利。他意识到卡斯特罗街成为了在城市政治里没有代表的少数群体中的一员。哈维决意将这些基本政治服务交还给所有旧金山被剥夺选举权的群体，无论种族，年龄或性性取向。尽管他善于演讲，坦诚相待，但是选民们感受不到哈维急于变革的愿景。在1973年，他首次竞选 旧金山监督委员会委员失败。在1975年，他再次竞选失败。一年后，他竞选加州众议员失败。但是他不知疲倦地支持自己的选区，把酒保，建筑工人工会和 当地的华裔食品杂货商当作朋友。这使得他得到了一个 满怀深情的称号“卡斯特罗街的市长”。在1977年，当他第三次 竞选旧金山监督委员会委员时，他最终获选，成为了美国历史上第一位 公开同性恋身份的政治人物。哈维高兴地下决心要对旧金山做出持久的改变。他立即提出一项法案， 禁止基于性取向的歧视。他还发起了城市大清扫活动。但并不是所有人都喜欢他的议案。全国的反同情绪不断高涨，尤其是1978年加州第6号提案。该提案企图让在加州的学校中，同志作为老师上课非法化，这是哈维政治生涯中最大的一战。该议案的支持者攻击LGBT群体，叫嚣着同志不适合当教师。但是哈维鼓励同志们不要因为害怕而躲避，“向你的亲戚出柜，向你的朋友出柜若他们是你真正的朋友，向你的邻居出柜， 向你的同事出柜...打击谣言，摧毁谎言和曲解，为你着想，为关心你的人着想。”他同其他社会活动家开始了对抗仇恨的活力四射的竞选。在1978年11月7日，1978年加州第6号提案被压倒性地驳回。这是哈维的理念得到响应的证明。但是在他激动人心胜利的20天后，他在市政厅被刺杀身亡，同他一起遇难的还有 旧金山市长乔治·莫斯科尼。他们两人均被丹·怀特杀害。丹·怀特是前旧金山监督委员会委员。他反对那些他认为 “激进的，偏离社会价值的，无可救药的”人。他曾与哈维在委员会会议上有频繁的争执，憎恨尤其体现在哈维身上的变革的精神。在哈维遇害的当晚，成千的人们提着烛火游行， 环绕着整个城市。在这场悲剧之后，另一个不公平出现了，在这个颇有争议的判决中，怀特只受到了7年8个月的刑罚。这个判决激起了整个城市的骚乱，这就是有名的1979年旧金山骚乱。但是在哈维死后，他的思想仍熠熠生辉。他给他的朋友和追随者 留下了三个不同的磁带，在他的刺杀纪念会上播放。他呼吁我们行动起来，提醒我们每个人都应该抗争不公。“我请求这个运动继续进行...如果一颗子弹应该进入我的大脑，那么就让这颗子弹摧毁每一扇锁着同志的柜门。”

**P693 2019-02-22 Can you solve the jail break riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=693)

Your timing made you and your partner the most infamous bank robbers in the west. Now, you’ll need to use that timing to help you break out of jail. At the appointed time, you’ll be walking in the yard near the electric fence. Your partner will flash you the signal, and exactly 45 seconds later, short out the fence circuit. It’ll automatically restart after a second or two, but as long as you move fast, you’ll be home free. And then you notice, to your horror, that your watch is broken, and there’s no time to fix it. The signal is coming, and if you make even a small mistake in counting off 45 seconds, you’ll get fried. Searching your pockets, you find something that might help: a lighter and two fuses you made earlier in the prison work program. Each fuse is a length of flammable twine, built to be lit on either end and burn for precisely one minute. The problem is that even though the fuses look uniform, they don’t burn evenly, so if you cut one in half, for example, one side might burn longer than the other. Your partner is going to give the signal any minute, and you’ll have to make your move. How can you use the fuses and lighter to time exactly 45 seconds? Pause the video to figure it out yourself. Answer in 3 Answer in 2 Answer in 1 The length of the fuse may not tell you anything, but you do know the fuses take exactly 60 seconds to burn from end to end. Here’s the key insight: If you start a fuse on one side and it burns for 30 seconds, there’ll still be 30 seconds of fuse left. If you had started it from the other end, it would’ve reached the exact same spot in thirty seconds. That means that if you lit it from both ends simultaneously, it would burn out in precisely 30 seconds. But how will you time the last fifteen? That’ll have to come from the second fuse. If it were a 30 second fuse, you’d be able to use that same trick again to double the burning speed and make it last exactly 15 seconds. And, you realize, you can shorten the second fuse by lighting one end of it at the same time as you light the first. At the moment the first burns out, you’ll be left with 30 seconds on the second fuse. Just when you’ve got this all figured out, you see the signal from your partner, and spring into action. You gather the four ends of the two fuses and light three of them. The moment the first burns out, you light the other end of the second fuse. When it flickers and dies, you know that exactly 45 seconds have passed, and the electric fence is dead. By the time it hiccups back to life, you’re over the fence and home free.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=693)

翻译人员: x Vicky 校对人员: Alex Liu你的时机把控让你和你的搭档成为了西方最臭名昭著的银行劫匪。现在，你要等待时机越狱。在约定的时间， 你要走到院子的带电栅栏旁。你的搭档将会给你发出信号，并且在45秒后电栅栏将会短路。再过一两秒， 电栅栏的电路又会自动重启，但是只要你动作迅速，你就可以越狱成功。之后，你惊恐的发现你的手表坏了，也没有时间去修它。但是信号来了，如果你在数这45秒的时候 只要犯了一点小小的错误你将会被电焦。翻了一下口袋，你发现了一些可能帮助到你的东西：你在之前监狱劳改中做的 一个打火机和两条保险丝。每一节保险丝都是一段易燃的线，可以在点燃任何一端的情况下燃烧一分钟。但问题是，即使这些保险丝看起来很均匀，但它们并不能均匀地燃烧。所以如果你把它剪成两段，一段可能会比另一段燃烧地时间长。你的搭档会在任何时间给你信号，你不得不行动。你怎么能用打火机和 保险丝准确地计算45秒呢？请先暂停视频， 自己思考一下答案答案3秒后出现答案2秒后出现答案1秒后出现保险丝的长度并不会 帮助你解决任何问题，但你知道保险丝从一段 燃烧到另一段正好是60秒，这是解决问题的关键，如果你点燃保险丝的一段并且燃烧了30秒，那么剩余的保险丝也会燃烧30秒。如果你从另一段点燃，那么在30秒的时候将会到达和刚才一样的点。这就意味着如果你 同时点燃保险丝的两端，这条保险丝将会准确地 在30秒的时候燃烧完。但是剩下的15秒怎么办？这就要用到第二条保险丝了，如果这是一条30秒就能燃烧完的保险丝，你可以用同样的方法，两头点燃就是正好地15秒。并且你发现你可以缩短第二条保险丝，在你点燃第一条保险丝的时候 就点燃第二条的一端。当第一条燃尽的时候，你会剩下一条可以在30秒烧完的保险丝。正好在你解决了问题的时候，你看到了搭档的信号，开始行动。你把两条保险丝的三头点燃，当第一条烧尽的时候，再点燃第二条保险丝的另一头。当第二条也烧尽时，正好45秒过去了，此时电栅栏停止供电。当它再次通电时，你已经越过了栅栏并且越狱成功。

**P694 2019-02-22 How to grow a glacier - M Jackson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=694)

In the 13th Century, Genghis Khan embarked on a mission to take over Eurasia, swiftly conquering countries and drawing them into his expanding Mongol Empire. With his vast armies he became almost unstoppable. But, legend has it that there was one obstacle that even the impressive Khan couldn’t overcome: A towering wall of ice, grown by locals across a mountain pass to stop the Khan’s armies from invading their territory. No one knows how historically accurate that particular story is, but remarkably, it draws on fact: For centuries, in the Karakoram and Himalayan mountain ranges, people have been growing glaciers and using these homemade bodies of ice as sources of drinking water and irrigation for their crops. But before we get to that fascinating phenomenon, it’s important to understand the difference between glaciers that grow in the wild, and those that humans create. In the wild, glaciers require three conditions to grow: Snowfall, cold temperatures, and time. First, a great deal of snow falls and accumulates. Cold temperatures then ensure that the stacked up snow persists throughout the winter, spring, summer, and fall. Over the following years, decades, and centuries, the pressure of the accumulated snow transforms layers into highly compacted glacial ice. Artificially growing a glacier, however, is completely different. At the confluence of three great mountain ranges, the Himalayas, Karakoram, and Hindu Kush, some local cultures have believed for centuries that glaciers are alive. And what’s more, that certain glaciers can have different genders including male and female. Local Glacier Growers ‘breed’ new glaciers by grafting together—or marrying— fragments of ice from male and female glaciers, then covering them with charcoal, wheat husks, cloths, or willow branches so they can reproduce. Under their protective coverings, these glacierets transform into fully active glaciers that grow each year with additional snowfall. Those then serve as lasting reserves of water that farmers can use to irrigate their crops. These practices have spread to other cultures, where people are creating their own versions of glaciers and applying them to solve serious modern challenges around water supplies. Take Ladakh, a high-altitude desert region in northern India. It sits in the rain shadow of the Himalayas and receives on average fewer than ten centimeters of rain per year. As local glaciers shrink because of climate change, regional water scarcity is increasing. And so, local people have started growing their own glaciers as insurance against this uncertainty. These glaciers come in two types: horizontal, and vertical. Horizontal glaciers are formed when farmers redirect glacier meltwater into channels and pipes, then carefully siphon it off into a series of basins made from stones and earth. Villagers minutely control the release of water into these reservoirs, waiting for each new layer to freeze before filling the basin with another wave. In early spring, these frozen pools begin to melt, supplying villagers with irrigation for their fields. Local people make vertical glaciers using the meltwater from already-existing glaciers high above their villages. The meltwater enters channels that run downhill, flowing until it reaches a crop site where it bursts forth from a pipe pointing straight into the air. When winter temperatures dip, this water freezes as it arcs out of the pipe, ultimately forming a 50 meter ice sculpture called a stupa, shaped like an upside-down ice cream cone. This inverted form minimizes the amount of surface area it exposes to the sun in the spring and summer. That ensures that the mini-glacier melts slowly and provides a reliable supply of water to feed the farmers’ crops. These methods may be ancient, but they’re becoming more relevant as climate change takes its toll on our planet. In fact, people are now growing their own glaciers in many regions beyond Ladakh. Swiss people, utilizing modern glacier growing technology, created their first stupa in 2016 in the Swiss Alps. There are plans for over 100 more in villages in Pakistan, Kazakhstan, and Kyrgyzstan. Perhaps one day we’ll be able to harness our homegrown glaciers well enough to build whole walls of ice– this time not for keeping people out, but to enable life in some of the planet’s harshest landscapes.

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翻译人员: Yue Zhang 校对人员: Lipeng Chen十三世纪，成吉思汗开启了他统治欧亚大陆的宏图大业，他迅速攻占了各个国家， 并将它们纳入蒙古帝国的扩张版图中。他率领百万雄兵，势不可挡。然而，相传即使是令人生畏的成吉思汗，也有一个无法攻克的障碍：一堵高耸的冰墙，由当地人所建，横跨山口，阻止了成吉思汗部队的入侵。无人知晓这样一个故事在历史中是否准确，然而，此故事显然基于一个事实：数世纪以来，在喀拉昆仑山脉和喜马拉雅山脉中，人们都会培育冰川，把这些自制的冰块作为饮用水和农作物灌溉的源泉。但在我们具体了解这一神奇的现象之前，很重要的一点则是理解自然形成的冰川和人造冰川有何不同。在自然中，冰川的形成需要三个条件：降雪、低温和时间。首先，大量的雪花降落并堆积。接着，低温确保了雪能堆积起来，在冬季、春季、夏季以及秋季都不融化。在接下来的数年、数十年、数世纪，积雪的压力将积雪层转变为密实的冰川冰。然而，人工制造的冰川，却大为不同。在喜马拉雅、喀拉昆仑和兴都库什这三大山脉的交汇处，数世纪来，一些当地的文化都相信冰川是有生命的。不仅如此，某些冰川会有不同的性别，包括雄性和雌性。当地冰川培育者在制造新的冰川时，则是将雄性和雌性冰川的成分嫁接在一起 ——或者说让它们“结婚”，随后用木炭、麦壳、布或柳树枝将它们覆盖，让它们可以繁殖。在它们的保护层之下，这些冰川转变成完全活跃的冰川，每年随着额外的降雪而增长。那些冰川于是被用作持续的储备水源，农夫可用来灌溉他们的庄稼。这些方法已传播到其他文化之中，那些地方的人创造出了自己独特的冰川版本，并运用它们来应对现代供水的难题。以拉达克为例，拉达克是 印度北部的一个高海拔沙漠地区。它位于喜马拉雅山脉的雨影区，每年的平均降雨量少雨十厘米。气候变化造成当地的冰川缩小，区域水资源匮乏日趋严重。因此，当地居民开始培育他们自己的冰川，作为应对不确定因素的确保措施。这些冰川有两种形态：水平的和垂直的。水平冰川的形成方式，是由农夫将冰川融水重新引人进渠道和管道中，再用虹吸管小心地将水吸至 一连串由石头和泥土制成的水池中。村民随时监控着进入到这些蓄水池中的水流量，需等到每一个新的冰层冻结起来，才能对水池蓄下一波水。早春时节，这些冻结的池子开始融化，为村民提供水源灌溉农田。当地居民采用融水来制造垂直冰川，融水来自他们村庄之上的一些既有的冰川。融水进入渠道，继而流向山下，最终流到庄稼地，融水通过管道喷向空中。冬天气温下降时，融水从管道中呈弧形喷出，水冻结起来，最终形成一个五十米高的冰雕，名为冰塔，形状类似于倒置的冰淇淋蛋卷筒。这一倒置的形状最大化地减少了春夏季冰塔与太阳光的接触面积。这样就能确保这个迷你冰川慢慢融化，并能提供可靠的水源来灌溉庄稼。这些方法也许很古老，但是随着气候变化对我们的地球产生恶劣影响，这些方法也变得越发重要。事实上，除拉达克之外， 很多地区的人正在培育他们自己的冰川。瑞士人利用现代的冰川培育技术，于2016年在瑞士阿尔卑斯山脉 创造出了他们的第一座冰塔。此外，还有计划要在巴基斯坦、 哈萨克斯坦和吉尔吉斯斯坦的村落中制造超过一包百座冰塔。也许有一天，我们足以利用自己培育的冰川来修筑冰墙——而这次，并不是为了将敌人阻挡在外，而是为了让生命在地球上 一些最为严酷的地方得以存续。

**P695 2019-02-22 Why should you read sci-fi superstar Octavia E. Butler - Ayana Jamies**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=695)

Following a devastating nuclear war, Lilith Iyapo awakens after 250 years of stasis to find herself surrounded by a group of aliens called the Oankali. These highly evolved beings want to trade DNA by breeding with humans so that each species’ genes can diversify and fortify the other. The only alternative they offer is sterilization of the entire human race. Should humanity take the leap into the biological unknown, or hold on to its identity and perish? Questions like this haunt Octavia Butler’s "Dawn," the first in her trilogy "Lilith’s Brood." A visionary storyteller who upended science fiction, Butler built stunning worlds throughout her work– and explored dilemmas that keep us awake at night. Born in 1947, Butler grew up shy and introverted in Pasadena, California. She dreamt up stories from an early age, and was soon scribbling these scenarios on paper. At twelve, she begged her mother for a typewriter after enduring a campy science fiction film called "Devil Girl From Mars." Unimpressed with what she saw, Butler knew she could tell a better story. Much science fiction features white male heroes who blast aliens or become saviors of brown people. Butler wanted to write diverse characters for diverse audiences. She brought nuance and depth to the representation of their experiences. For Butler, imagination was not only for planting the seeds of science fiction– but also a strategy for surviving an unjust world on one’s own terms. Her work often takes troubling features of the world such as discrimination on the basis of race, gender, class, or ability, and invites the reader to contemplate them in new contexts. One of her most beloved novels, the "Parable of the Sower," follows this pattern. It tells the story of Lauren Oya Olamina as she makes her way through a near-future California, ruined by corporate greed, inequality, and environmental destruction. As she struggles with hyperempathy, or a condition in the novel that causes her to feel others’ pain, and less often, their pleasure. Lauren embarks on a quest with a group of refugees to find a place to thrive. There, they seek to live in accordance with Lauren’s found religion, Earthseed, which is based on the principle that humans must adapt to an ever-changing world. Lauren’s quest had roots in a real life event– California Prop 187, which attempted to deny undocumented immigrants fundamental human rights, before it was deemed unconstitutional. Butler frequently incorporated contemporary news into her writing. In her 1998 sequel to "The Parable of the Sower," "Parable of the Talents," she wrote of a presidential candidate who controls Americans with virtual reality and “shock collars.” His slogan? “Make America great again.” While people have noted her prescience, Butler was also interested in re-examining history. For instance, "Kindred" tells the story of a woman who is repeatedly pulled back in time to the Maryland plantation of her ancestors. Early on, she learns that her mission is to save the life of the white man who will rape her great grandmother. If she doesn’t save him, she herself will cease to exist. This grim dilemma forces Dana to confront the ongoing trauma of slavery and sexual violence against Black women. With her stories of women founding new societies, time travelers overcoming historical strife, and interspecies bonding, Butler had a profound influence on the growing popularity of Afrofuturism. That’s a cultural movement where Black writers and artists who are inspired by the past, present and future, produce works that incorporate magic, history, technology and much more. As Lauren comes to learn in "Parable of the Sower," "All that you touch you Change. All that you Change Changes you. The only lasting truth is Change.”

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翻译人员: Lipeng Chen 校对人员: Tianji (Homer) Li在一场摧毁性的核战之后，莉莉丝·里亚波在两百五十年的 休眠沉睡之后醒来，发现她自己被一群叫做 欧万卡利的外星人包围。这些高度进化的生物 想要交易DNA，通过和人类繁殖，来让每一种基因都能 更多样化、更强化。如果不照做， 他们就会消灭全人类。人类应该要放手一搏， 进入生物的未知领域？还是为了坚持自己的身份到死？类似这样的问题萦绕在 奥克塔维娅·巴特勒的《黎明》中，该作是她的三部曲 《莉莉丝的后代》中的第一部。巴特勒是位有远见的小说家， 她颠覆了科幻小说界。她在她的作品中建立起了 惊人的世界——并探究那些让我们 难以入眠的两难问题。生于1947年，巴特勒在加州的帕萨迪纳 以害羞和内向的性格长大。她从很小的时候就会幻想故事，很快就开始将这些情境写在纸上。十二岁时，她在看了一部很奇怪的 科幻电影《来自火星的恶魔女孩》之后，她恳求妈妈给她一台打字机。她为这部电影毫不所动，因为她知道她能讲出更好的故事。大部分的科幻小说 都用白人男性来当主角，他们打败外星人 或成为原住民的救星。巴特勒想要写多元化的角色， 给多元化的读者看。她把主人公的经验呈现得 更加细致、更有深度。对巴特勒来说，想像不只是 为科幻小说种下种子——也是在不公平的世界中用自己 喜好的方式求得生存的一种策略。她的作品通常会谈到 世界上让人不安的特征，比如根据种族、性别、阶级 或能力来进行歧视，她也启发读者在新的 情境中思考这些问题。她最被人喜爱的小说之一《播种者的寓言》就是依循这个模式。它讲述的是劳伦·欧亚·欧拉米亚的故事，时间是不远的将来， 她在加州求生存，那里已经被企业的贪婪、 不平等以及环境毁灭给摧毁。她饱受超级同理心所苦，在该书中，这是一种病症， 会让她感受到他人的痛苦，但很少感受到他们的愉悦。劳伦和一群难民展开了 一段追寻之旅。他们寻找能生存的场所， 在那里，他们遵循劳伦成立的宗教“地球种子”来求生存，其信条是人类必须要 适应不断改变的世界。劳伦的追寻之旅其实 源自真实的事件——《加州187提案》，它试图拒绝无证移民的 基本人权，后来才被认为违宪。巴特勒常常会把时事 整合到她的作品中。她1998年的作品《天赋者的寓言》 是《播种者的寓言》的续集，内容是一位总统候选人利用虚拟实境和“电击衣领” 来控制美国人。他的口号是“让美国再次伟大”。虽然大家已经注意到 她的先见之明，巴特勒也对于重新 检视历史很感兴趣。比如，《亲属》谈的故事就是一位女子不断被拉回到过去，回到她祖先的马里兰州农场早些时候，她得知她的任务 是要拯救一个白人的性命，而这个白人将来会 强奸她的曾祖母。如果她不救他， 她自己也不会存在。这无情的两难局面 强迫戴娜去正视黑人女性因为奴役制度 和性暴力正在受到的创伤。通过这些女性找到新社会的故事，时空旅人克服历史冲突的故事，以及物种间结合的故事，巴特勒带来了深远的影响， 让非洲未来主义越来越受欢迎。那是一项文化运动，灵感来自过去、现在， 及未来的黑人作家和艺术家产出整合了魔法、历史、科技 及许多其他元素的作品。如同劳伦在《播种者的寓言》中领悟到的：“你触碰的一切被你改变。你改变的一切会改变你。唯一永恒的真相就是改变。”

**P696 2019-02-26 The chaotic brilliance of artist Jean-Michel Basquiat - Jordana Moore**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=696)

A sky blue canvas ripped open by an enormous skull. Teeth bared through visceral slashes of oil and spray-paint. In 2017, this untitled artwork was auctioned off for over 110 million dollars. But it’s not the work of some old master. These strokes of genius belong to 21 year old black Brooklynite Jean-Michel Basquiat – one of America’s most charismatic painters, and currently, its highest sold. Born in 1960 to a Haitian father and a Puerto Rican mother, Basquiat spent his childhood making art and mischief in Boerum Hill. While he never attended art school, he learned by wandering through New York galleries, and listening to the music his father played at home. He drew inspiration from unexpected places, scribbling his own versions of cartoons, comic books and biblical scenes on scrap paper from his father’s office. But it was a medical encyclopedia that arguably exerted the most powerful influence on Basquiat. When young Jean-Michael was hit by a car, his mother brought a copy of "Grey’s Anatomy" to his hospital bed. It ignited a lifelong fascination with anatomy that manifested in the skulls, sinew and guts of his later work – which frequently explores both the power and vulnerability of marginalized bodies. By 17, he launched his first foray into the art world with his friend Al Diaz. They spray painted cryptic statements and symbols all over Lower Manhattan, signed with the mysterious moniker SAMO. These humorous, profound, and rebellious declarations were strategically scattered throughout Soho’s art scene. And after revealing himself as the artist, Basquiat leveraged SAMO’s success to enter the scene himself; selling postcards, playing clubs with his avant-garde band, and boldly seeking out his heroes. By 21, he’d turned to painting full time. His process was a sort of calculated improvisation. Like Beat writers who composed their work by shredding and reassembling scraps of writing, Basquiat used similar cut-up techniques to remix his materials. When he couldn't afford canvases, he fashioned them out of discarded wood he found on the street. He used oil stick, crayons, spray paint and pencil and pulled quotes from the menus, comic books and textbooks he kept open on the studio floor. He kept these sources open on his studio floor, often working on multiple projects at once. Pulling in splintered anatomy, reimagined historical scenes, and skulls transplanted from classical still-lives, Basquiat repurposed both present day experiences and art history into an inventive visual language. He worked as if inserting himself into the legacy of artists he borrowed from, producing collages that were just as much in conversation with art history as they were with each other. For instance, "Toussaint L’Overture versus Savonarola" and "Undiscovered Genius of the Mississippi Delta" offer two distinct visions of Basquiat’s historical and contemporary concerns. But they echo each other in the details, such as the reappearing head that also resurfaces in "PPCD." All these pieces form a network that offers physical evidence of Basquiat’s restless and prolific mind. These chaotic canvases won rapid acclaim and attention. But despite his increasingly mainstream audience, Basquiat insisted on depicting challenging themes of identity and oppression. Marginalized figures take center stage, such as prisoners, cooks and janitors. His obsession with bodies, history, and representation can be found in works evoking the Atlantic slave trade and African history, as well as pieces focusing on contemporary race relations. In less than a decade, Basquiat made thousands of paintings and drawings- along with sculpture, fragments of poetry and music. His output accelerated alongside his meteoric rise to fame, but his life and work were cut tragically short when he died from a drug overdose at the age of 27. After his death, Basquiat’s work only increased in value- but the energy and flair of his pieces have impacted much more than their financial worth. Today, his influence swirls around us in music, poetry, fashion and film- and his art retains the power to shock, inspire, and get under our skin.

**P696 2019-02-26 The chaotic brilliance of artist Jean-Michel Basquiat - Jordana Moore**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=696)

翻译人员: Melody Chen 校对人员: Lipeng Chen一张天蓝色的画布 被一只巨大的骷髅撕开。油墨和喷漆用震撼人心的斜线条 勾勒出裸露的獠牙。在2017年，这幅无题的画作被以超过 一千一百万美元的高价拍出。但是这并不是哪个经典艺术大师的画作。这幅震撼的创作属于一个名叫布鲁克林·琼-米歇尔·巴斯奎特 的21岁黑人男子——美国最具魅力的画家之一，也是目前为止，作品成交量最高的一位。他出生于1960年，父亲是海地人， 母亲是波多黎各人，在波伦山，巴斯奎特的童年 在艺术创作和顽皮捣蛋中度过。虽然他从没有在艺术学院进修过，但是他通过徜徉于纽约艺术画廊，和听他父亲在家里弹奏音乐学习艺术。他常从意想不到的地方汲取灵感，随心所欲地涂鸦他个人版本的卡通， 漫画书和《圣经》中的场景就画在从他父亲办公室拿来的草稿纸上。但有证据显示是一本医药百科全书给了巴斯奎特最有力的影响。当年幼的琼-米歇尔遭遇了车祸，他的母亲借来一本《格雷解剖学》 放在他的病床边。这点燃了他一生对解剖学的狂热探求，这表现在他日后作品中刻画的 头骨，肌腱和器官上——它们频繁地发掘出那些 被边缘化躯体的力量与脆弱性。到17岁时，他和朋友艾·迪亚兹共同发动了 对艺术世界的第一次“突袭”。他们用喷漆在曼哈顿下城区 勾勒令人费解的标语和符号，落款是神秘的绰号“SAMO”。这些幽默而不失深意， 充满叛逆气息的宣言被战略性地大量引进了Soho的艺术镜头。在他公布自己艺术家的身份之后，他借由SAMO的成功将自己也纳入镜头中；卖明信片，和他前卫派的乐队混迹于酒吧中，同时大胆地寻找他心目中的英雄。在21岁时，他成为了一个全职画家。他的创作过程是一种 精密计算过的即兴发挥。就像摇滚写手一样，他们以撕碎并重组稿纸的方式进行创作，巴斯奎特使用类似的剪裁手段 来对素材进行重新整合。当他买不起画布时，他就用在街上找到的废弃木板代替。他用油画棒，蜡笔，喷漆和铅笔作画，从菜单，连环画甚至课本上截取片段而这些书就被打开在他工作室的地板上。他一直都把这些信息源打开放在地板上，常常同时进行好几个工作项目的创作。融合了分裂解剖学和历史镜头的重现，还有从长盛不衰的经典作品中 “移植”下来的骷髅，巴斯奎特将当代生活经历与艺术史化为一种别具一格的视觉语言。他工作时就好像将自己代入了 他所借鉴的那些艺术家的遗赠中，创作出那些像能和艺术史对话一样也能互相对话的拼贴作品。比如说，这幅 《杜桑·卢维杜尔与萨佛纳罗拉》和《未被发现的 密西西比三角洲天才》显示出巴斯奎特的 两种独特的历史和当代观念。但是它们在细节上互相呼应，比如这个重复出现的头颅 也重复出现在“PPCD”中。所有这些作品里的细节 构成了一张能够证明巴斯奎特永不停息又丰富多产头脑的网络这些看似混乱不堪的画布 迅速赢得了称赞与关注。但即使他的主流受众正加速扩展，巴斯奎特坚持描绘极富挑战性的有关身份与压抑的场景。被边缘化的人物形象占据画面中心， 比如囚犯，厨师和看门人。他对于身体，历史和表现手法的执迷从他唤醒大西洋奴隶贸易 和非洲历史记忆的作品中可见一斑，他聚焦现代种族关系的作品 也同样能很好地印证这一点。在不到十年的时间里，巴斯奎特创作了成千上万的油画和画作还有雕塑，诗歌片段和音乐。他的加速产出伴随着 昙花一现般的知名度激增，但他的生命和工作被无情地中断了，他在27岁时即死于吸毒过量。在他死后，巴斯奎特的作品价值有增无减但他作品中洋溢的那种活力与天赋比起它们的经济价值来说 具有更深远的影响力。直到今天，他的影响依然以音乐，诗歌， 时装和电影的形式萦绕在我们身边而他的艺术作品依然保持着给予我们 震撼，启迪，直击我们心灵深处的力量。

**P697 2019-02-27 Can you solve the unstoppable blob riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=697)

A shooting star crashes on Earth, and a hideous blob emerges. It creeps and leaps, it glides and slides. It’s also unstoppable: weapons, fire, extreme temperatures… no matter what you throw at it, it just regrows and continues its rampage. Its expansion is breathtaking; it doubles in size every hour. But there’s one opportunity: after each hour, it goes to sleep, forming itself into a flat triangle and resting for a few minutes before it begins eating and growing again. Your only chance to save the planet involves a satellite-mounted nano-fission ray that can cut through the blob. When the blog is active it heals itself within seconds. However, when you break the sleeping blob into two triangles, you make a critical discovery. The acute triangle portion, with all angles less than 90 degrees, is inert. It never “wakes up.” The obtuse triangle, which has an angle greater than 90 degrees, wakes up as usual and keeps growing. Similar experiments show that all shapes other than acute triangles, including right triangles, will also wake up. For the next few minutes, the blob is sleeping in its obtuse triangle form. You can make clean, straight-line cuts between any two points on or inside the triangle. But you’ll only have time to make 7 cuts while the satellite is above you. By the time it completes its orbit and returns, the blob will have consumed the entire world, if even a single portion that will wake up remains. How can you cut the blob entirely into acute triangles and stop it from destroying the planet? Pause the video now to figure out for yourself Answer in 3 Answer in 2 Answer in 1 While this seems doable at first, there’s a hidden difficulty when it comes to avoiding obtuse and right angles. Every time you make a cut that reaches an edge, it either makes an acute and an obtuse angle, or two right angles. That makes it seems like you’re doomed to keep creating obtuse angles. But as with so many of life’s problems, we can look to pizza for inspiration. Imagine squaring off the outside of a pizza, so that instead of a circle, it’s an octagon. When we cut it into slices, each of the eight triangles is acute. This works with larger polygons too. Importantly, it also works for some polygons with fewer sides, including heptagons, hexagons, and pentagons. That’s good news, because if you cut off the sharp corners of the blob triangle, a pentagon is exactly what you’ll be left with. And just like a pizza, you can cut the blob pentagon into five acute triangles. That’s 7 cuts, and it renders the blob completely inert. You’ve saved the day! Now you just need to figure out what to do with all of these giant, practically indestructible triangles.

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翻译人员: 진영 윤 校对人员: Lipeng Chen一颗流星撞上了地球，出现了一只可怕的粘液怪物。它会爬行、会跳跃； 它会滑动、会滑行。它也所向无敌：武器、火、极端温度……不论你用什么方式攻击它，它总会再生并继续制造暴乱。它的扩展能力十分惊人；每小时，它的大小就会增大一倍。但有一个机会：每小时之后，它就会进入睡眠，让它自己的形状变成扁平三角形，休息几分钟，接着又会开始吃东西成长。你只有一个机会能拯救地球，要用到装在卫星上的 纳米分裂光束来将它切成两半。当怪物在活动时，只要几秒钟时间它就会愈合。然而，当你把在睡觉中的 怪物切成两个三角形时，你有了重大的发现。锐角三角形的部分也就是所有角都小于90°的 三角形，不再有生命力它不再醒来至于钝角三角形，也就是有一个角大于90°的三角形，还是一样会醒来并继续成长。类似的实验结果显示， 除了锐角三角形之外的所有形状，包括直角三角形，都还是会醒来。接下来的几分钟，怪物会以扁平三角形的 形式进入睡眠。你可以针对三角形上 或三角形内指定的任两个点做到精确的直线分割。但当卫星在你上方可以 进行切割的时间只够你切七次。当卫星完成绕行再回来时，就已经来不及阻止怪物 把整个世界吞噬了，即使只剩下怪物的一小部分也是如此。你要如何把怪物切割成锐角三角形，阻止它摧毁地球？如果你希望自己 尝试解题，请在此暂停。答案即将公布：3答案即将公布：2答案即将公布：1虽然一开始会觉得这个方法可行其实若想避免钝角和直角三角形， 会碰到一个隐藏的困难处。每当你做的切割有接触到边缘，就会制造出一个锐角三角形和一个钝角三角形， 不然就是两个直角三角形。看起来似乎你注定会 一直制造出钝角三角形。但是，就像许多人生难题一样，我们都能从披萨上找到灵感。想象一下，把披萨的外缘切平，披萨现在变成八角形，不再是个圆。当我们把它切片，这8个三角形都是锐角三角形对于边数更多的多边形， 这招也一样可以。重要的是，对于边数 更少的多边形仍然可行，包括七角形，六角形，五角形。那是好消息，因为如果你把怪物 三角形的尖角切除，你就会得到一个五角形。就像披萨一样，你可以把怪物五角形 切成五个锐角三角形。一共要切七次，结果是 怪物完全不再有生命。你拯救了世界！现在，你只要想办法处理这些巨大且刀枪不入的三角形了。

**P698 2019-02-28 Frida Kahlo - The woman behind the legend - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=698)

In 1925, Frida Kahlo was on her way home from school in Mexico City when the bus she was riding collided with a streetcar. She suffered near-fatal injuries to her spine, pelvis and hips, and was bedridden for months afterward. During her recovery, she had a special easel attached to her bed so she could practice painting techniques. When she set to work, she began to paint the world according to her own singular vision. Over the course of her life, she would establish herself as the creator and muse behind extraordinary art. Though you may have met Kahlo's gaze before, her work provides an opportunity to see the world through her eyes. She painted friends and family, still lives and spiritual scenes; but it was her mesmerizing self-portraits which first caught the world’s attention. In an early work, "Self Portrait with Velvet Dress," the focus is on her strong brows, facial hair, long neck and formidable stare. Such features remained, but Kahlo soon began to present herself in more unusual ways. For example, "The Broken Column" uses symbolism, religious imagery and a ruptured landscape to reveal her physical and mental state. In 1928, Kahlo started dating fellow painter Diego Rivera. They became lifelong partners and cultivated an eccentric celebrity. Together, they traveled the world and dedicated themselves to art, Communist politics and Mexican nationalism. Kahlo and Rivera shared a deep affinity with Mexicanidad, a movement which celebrated indigenous culture after the Revolution. In her daily life, Kahlo wore traditional Tehuana dress and immersed herself in native spirituality. And in her work, she constantly referenced Mexican folk painting, incorporating its bright colors and references to death, religion and nature. With her imagery of giant floating flowers, undulating landscapes, transplanted body parts and billowing clouds of demons, Kahlo has often been associated with Surrealism. But while surrealists used dreamlike images to explore the unconscious mind, Kahlo used them to represent her physical body and life experiences. Two of her most-explored experiences were her physical disabilities and her marriage. As a result of the bus accident, she experienced life-long health complications and endured many hospitalizations. She often contemplated the physical and psychological effects of disability in her work; painting herself in agony, recuperating from operations, or including objects such as her back brace and wheelchair. Meanwhile, her relationship with Rivera was tempestuous, marked by infidelity on both sides. At one point they even divorced, then remarried a year later. During this period, she painted the double self-portrait "The Two Fridas," which speaks to the anguish of loss and a splintered sense of self. The Frida to the left has a broken heart, which drips blood onto her old-fashioned Victorian dress. She symbolizes a version of the artist who is wounded by the past– but is also connected by an artery to a second self. This Frida is dressed in Tehuana attire– and although she remembers Diego with the tiny portrait in her hand, her heart remains intact. Together, the two suggest a position caught between past and present, individuality and dependency. Kahlo died in 1954 at the age of 47. In the years after her death, she experienced a surge in popularity that has lasted to this day. And although her image has proliferated, Kahlo’s body of work reminds us that there are no simple truths about the life, work and legacy of the woman behind the icon. Rather, she put multiple versions of her reality on display– and provided us with a few entry-ways into the contents of her soul.

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翻译人员: Mugai Hsiung 校对人员: Carol Wang1925年，墨西哥城的弗里达·卡罗 放学回家路上，她乘坐的公交与一辆有轨电车相撞。她的脊柱、骨盆和髋关节 遭受了近乎致命的损伤，随后卧床数月。在康复期间，她的床边挂有一个特殊的画板，借此她可以练习绘画技巧。当她重新开始工作时，她开始以自己的视角 借助画笔来描绘这个世界。在其生命历程中，她将自己塑造为 卓越艺术背后的创造者和缪斯。虽然你以前看过 卡罗画像的注视目光，但是她的作品提供了一个 以卡罗的眼睛看世界的机会。她画作的主题包括朋友和家人、静物和有灵性的场景。然而她那些迷人的自画像才是吸引全世界目光的作品。在她的早期作品《丝绒装扮自画像》中，关注点在她的浓眉、唇上薄薄的髭、 修长的脖子和让人生畏的注视。这些特色保留了下来，但是不久后，卡罗开始用一种 更加不寻常的方式呈现自己，例如，《断裂的脊柱》用到象征主义、宗教意象、以及破损的景观 来揭示她的身心状态。1928年，卡罗开始 和同为画家的迭戈·里维拉约会。他们结为终身伴侣， 并获得了古怪的名声。他们一起环游世界并投身于艺术、共产主义政治运动、 以及墨西哥民族主义。卡罗和里维拉都是 “墨西哥文化认同运动”的支持者，该运动在革命后提倡原住民文化 （1920-1940的文化革新运动）。在日常生活中， 卡罗身着传统特瓦纳服饰，并且将自己沉浸于民族精神中。在她的作品中，她也常参考墨西哥民间绘画，并将其明丽的颜色和死亡、宗教、大自然结合起来。由于用到的意象 包括漂浮的巨型花朵，起伏的景色、移植的身体部位 以及游荡的恶魔，人们提到卡罗，常常将她 与超现实主义联系在一起。但是由于超现实主义者会使用 梦境般的意象来探索潜意识，卡罗却用这些来代表 她的身体和人生经历。卡罗最广为人道的经历是她的身体残疾和她的婚姻。由于公交车事故，她一生经历了健康方面的并发症，还要忍受多次的住院治疗。在她的作品中，她也常常思考残疾带来的身心影响。她将自己描绘成身处痛苦、正从手术中恢复的形象，又或是作品包括背部夹板 和轮椅这些物件。同时，她同里维拉的关系 也跌宕起伏，双方都有过不忠行为。他们一曾度离婚，一年后又复婚。在她离婚的这段时间里，她画了双重自画像《两个弗里达》，诉说了她失去的痛苦 和分裂的自我意识。左边的弗里达心碎了，流下的血滴在了她的 旧式的维多利亚裙上。这个弗里达代表了 被过往深深伤害的艺术家——但同时也由动脉 与第二个弗里达连接着，这个弗里达穿着特瓦纳服饰——尽管她手中的小画像 代表她忘不掉迭戈，但她的心是完整无缺的。两个弗里达一起 表现了她被困在现在与过去、独立与依赖这几者之间。1954年卡罗去世，享年47岁。在她去世之后，她名气高涨，直至今日。尽管她的形象广为流传，但是卡罗的作品提醒我们，对于这个偶像背后的女人，与之有关的人生、作品和遗产 从没有什么简单的真相。然而，她将自己 呈现给大家的数个版本——让我们得以从数个角度， 能够窥探得到她的灵魂。

**P699 2019-02-28 How tall can a tree grow - Valentin Hammoudi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=699)

Reaching heights of over 100 meters, Californian sequoias tower over Earth’s other estimated 60,000 tree species. Growing in the misty Sierra Nevada mountains, their massive trunks support the tallest known trees in the world. But even these behemoths seem to have their limits. No sequoia on record has been able to grow taller than 130 meters – and many researchers say these trees won’t beat that cap even if they live for thousands of years to come. So what exactly is stopping these trees from growing taller, forever? It all comes down to sap. In order for trees to grow, they need to bring sugars obtained from photosynthesis and nutrients brought in through the root system to wherever growth is happening. And just like blood circulates in the human body, trees are designed to circulate two kinds of sap throughout their bodies – carrying all the substances a tree’s cells need to live. The first is phloem sap. Containing the sugars generated in leaves during photosynthesis, phloem sap is thick, like honey, and flows down the plant’s phloem tissue to distribute sugar throughout the tree. By the end of its journey, the phloem sap has thinned into a watery substance, pooling at the base of the tree. Right beside the phloem is the tree’s other tissue type: the xylem. This tissue is packed with nutrients and ions like calcium, potassium, and iron, which the tree has absorbed through its roots. Here at the tree’s base, there are more of these particles in one tissue than the other, so the water from the phloem sap is absorbed into the xylem to correct the balance. This process, called osmotic movement, creates nutrient-rich xylem sap, which will then travel up the trunk to spread those nutrients through the tree. But this journey faces a formidable obstacle: gravity. To accomplish this herculean task, the xylem relies on three forces: transpiration, capillary action, and root pressure. As part of photosynthesis, leaves open and close pores called stomata. These openings allow oxygen and carbon dioxide in and out of the leaf, but they also create an opening through which water evaporates. This evaporation, called transpiration, creates negative pressure in the xylem, pulling watery xylem sap up the tree. This pull is aided by a fundamental property of water called capillary action. In narrow tubes, the attraction between water molecules and the adhesive forces between the water and its environment can beat out gravity. This capillary motion is in full effect in xylem filaments thinner than human hair. And where these two forces pull the sap, the osmotic movement at the tree’s base creates root pressure, pushing fresh xylem sap up the trunk. Together these forces launch sap to dizzying heights, distributing nutrients, and growing new leaves to photosynthesize – far above the tree’s roots. But despite these sophisticated systems, every centimeter is a fight against gravity. As trees grow taller and taller, the supply of these vital fluids begins to dwindle. At a certain height, trees can no longer afford the lost water that evaporates during photosynthesis. And without the photosynthesis needed to support additional growth, the tree instead turns its resources towards existing branches. This model, known as the “hydraulic limitation hypothesis,” is currently our best explanation for why trees have limited heights, even in perfect growing conditions. And using this model alongside growth rates and known needs for nutrients and photosynthesis, researchers have been able to propose height limits for specific species. So far these limits have held up – even the world’s tallest tree still falls about fifteen meters below the cap. Researchers are still investigating the possible explanations for this limit, and there may not be one universal reason why trees stop growing. But until we learn more, the height of trees is yet another way that gravity, literally, shapes life on Earth.

**P699 2019-02-28 How tall can a tree grow - Valentin Hammoudi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=699)

翻译人员: Tony Yu 校对人员: Lipeng Chen高达100多米，加利福利亚红杉比地球上 其它6万多的树种都要高。生长在雾蒙蒙的内华达山脉群山中，它们巨大的树干，支撑着 世界上最高的已知树种。但是，即使这些庞然大物 高度似乎也有极限。在现有记录上，没有红杉高过130米——很多研究者说，它们不可能超过这个高度即使它们再生长上千年。那么，到底是什么阻止它们的生长， 不能一直长上去呢？这一切都跟树液有关。树木要生长，它们要把光合作用产生的糖和根茎系统吸收的营养 送到生长的地方。就像血液在人体循环一样，树木本身需要有两种树液通体循环——带着树细胞生长需要的所有物质。第一种是韧皮树液。包含树叶光合作用产生的糖分，韧皮树液很稠，像蜂蜜，沿着植物的韧皮组织向下流动 把糖份送到树的各个部分。这个旅程的最后，韧皮树液变成很稀， 类似水一样的物质，聚集在树的底部。就在韧皮的旁边是树的 另外一种组织叫木质。这种组织充满了营养素和 像钙、钾、铁之类的离子，由树通过它的根部吸收。在树的根部，这些组织里的微粒分布不均匀，因此，韧皮树液中的水分 被吸收到木质中，来调节平衡。这个过程，叫做渗透运动，会产生营养丰富的木质树液，这些树液会沿着树干向上 把营养传送到整棵树。但是，这项任务面临着 一个巨大的障碍：重力。要完成这样艰巨的任务， 木质要依赖于三种力量：蒸腾作用，毛细作用和根压。作为光合作用的一部分，树叶会 打开和关闭它上面的细孔——叫气孔。这些气孔让氧气和二氧化碳 从叶子进出，水分也通过这些气孔蒸发。这种蒸发，叫作蒸腾作用，在木质中产生一种负压， 把液体的木质树液往树上方拉。这种拉力还得到水的一种基本特征—— 毛细作用的帮助。在微小的管道里，水分子间的吸引力和水与周边物质的粘结力 加起来超过重力的作用。在木质纤维中毛细作用无处不在，这些木质纤维比人的头发还细。这两种力量推动树液向上，树根部的渗透作用也产生树压，把新鲜的木质树液推上树干。所有这些力量一起把树液推到惊人的高度，进行营养分配，促进新叶子生长 进行光合作用——在远远高出树根的地方。尽管有这么精密的系统，树木的每一厘米增长 都要和重力做斗争。随着树越来越高，这种生命之液也越来越少。到了一定的高度，树再也提供不了 光合作用所蒸发的水分。没有了再生长所需的光合作用，树就把它的营养送到现有的枝叶上了。这种理论，被叫做 “液压限制假定”，是目前最好的解释，为什么树的高度有限，即使在最理想的生长环境中。利用这个理论，加上生长率以及已知营养及光合作用的需求量，研究人员已经能推断出 一些树种的极限高度。到目前为止，这些极限都很准确——虽说世界上最高的树仍然 低于极限15米。研究人员还在试图解释 这些极限的原因，树木停止长高也许不会有统一的原因。在我们了解更多之前，树的高度应该是地球引力的 又一种表现，基本上，它在界定地球生命的形态。

**P700 2019-02-28 The historic women’s suffrage march on Washington - Michelle Mehrtens**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=700)

On March 3, 1913, protesters parted for the woman in white: dressed in a flowing cape and sitting astride a white horse, the activist Inez Milholland was hard to miss. She was riding at the helm of the Women’s Suffrage Parade- the first mass protest for a woman’s right to vote on a national scale. After months of strategic planning and controversy, thousands of women gathered in Washington D.C. Here, they called for a constitutional amendment granting them the right to vote. By 1913, women’s rights activists had been campaigning for decades. As a disenfranchised group, women had no voice in the laws that affected their– or anyone else’s– lives. However, they were struggling to secure broader support for political equality. They’d achieved no major victories since 1896, when Utah and Idaho enfranchised women. That brought the total number of states which recognized a women’s right to vote to four. A new, media-savvy spirit arrived in the form of Alice Paul. She was inspired by the British suffragettes, who went on hunger strikes and endured imprisonment in the early 1900s. Rather than conduct costly campaigns on a state-by-state basis, Paul sought the long-lasting impact of a constitutional amendment, which would protect women’s voting rights nationwide. As a member of the National American Women Suffrage Association, Paul proposed a massive pageant to whip up support and rejuvenate the movement. Washington authorities initially rejected her plan- and then tried to relegate the march to side streets. But Paul got those decisions overturned and confirmed a parade for the day before the presidential inauguration of Woodrow Wilson. This would maximize media coverage and grab the attention of the crowds who would be in town. However, in planning the parade, Paul mainly focused on appealing to white women from all backgrounds, including those who were racist. She actively discouraged African American activists and organizations from participating- and stated that those who did so should march in the back. But black women would not be made invisible in a national movement they helped shape. On the day of the march, Ida B. Wells-Barnett, a ground-breaking investigative journalist and anti-lynching advocate, refused to move to the back and proudly marched under the Illinois banner. The co-founder of the NAACP, Mary Church Terrell, joined the parade with the 22 founders of the Delta Sigma Theta Sorority, an organization created by female students from Howard University. In these ways and more, black women persevered despite deep hostility from white women in the movement, and at great political and physical risk. On the day of the parade, suffragists assembled to create a powerful exhibition. The surging sections of the procession included international suffragists, artists, performers and business-owners. Floats came in the form of golden chariots; an enormous Liberty Bell; and a map of enfranchised countries. On the steps of the Treasury Building, performers acted out the historical achievements of women to a live orchestra. The marchers carried on even as a mob blocked the route, hurling insults and spitting at women, tossing cigars, and physically assaulting participants. The police did not intervene, and in the end, over 100 women were hospitalized. Their mistreatment, widely reported throughout the country, catapulted the parade into the public eye— and garnered suffragists greater sympathy. National newspapers lambasted the police, and Congressional hearings investigated their actions during the parade. After the protest, the "Women’s Journal" declared, “Washington has been disgraced. Equal suffrage has scored a great victory." In this way, the march initiated a surge of support for women’s voting rights that endured in the coming years. Suffragists kept up steady pressure on their representatives, attended rallies, and petitioned the White House. Inez Milholland, the woman on the white horse, campaigned constantly throughout the United States, despite suffering from chronic health problems. She did not live to see her efforts come to fruition. In 1916, she collapsed while giving a suffrage speech and died soon after. According to popular reports, her last words were, “Mr. President, how long must women wait for liberty?” Though full voting inclusion would take decades, in 1920, Congress ratified the 19th amendment, finally granting women the right to vote.

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翻译人员: Rong Chen 校对人员: Yuelong Dai1913年3月3日，抗议者们为白衣女让路；肩披斗篷，脚踏白马的激进家伊内兹·米尔霍兰格外显眼。她领导着第一次大规模——女性争取全国选举权的游行。在经过数月的战略筹备与争议后，数以千计的妇女们聚集在华盛顿特区呼吁修改宪法来赋予她们选举权。截止1913年，女权主义者们 已经奋斗了几十年。作为一个没有权利的群体，妇女对影响她们或任何其他人 生活的法律没有发言权。但是，她们很难取得政治平等的广泛支持。她们在1896年犹他州和爱达荷州赋予女性权利后就没有再取得重大胜利。那时候全国已有四个州承认女性的选举权。一个新的，非常懂得利用媒体的人 爱丽丝·保罗出现了。她深受英国妇女参政论者激励，那些妇女在20世纪初进行绝食抗议 并忍受牢狱之灾。保罗没有一州一州的组织昂贵的活动，而是需求修正宪法的长久力量，以此保护全国范围的女性的选举权。作为美国国家妇女选举权协会的一员，保罗建议组织一个盛大的游行 来支持并为活动重新赋予活力。华盛顿当局一开始拒绝了她的计划——后来又试图把游行安排到小巷里。但保罗设法推翻了那些决定，取得批准在总统伍德罗·威尔逊 就职典礼前一天举行游行。这会保证最大的新闻报道，并引起在城里的人们的注意力。但是，在筹划游行的时候，保罗主要的注意力是在 召唤各阶层甚至种族歧视者的白种女性。她积极的抵制非洲裔美国人组织并参与活动——并且声称她们如果参加 就应该站在队伍后面。但黑人妇女是不会在她们帮助组织 的这种全国性运动中被忽视的。在游行的那一天，艾达·B·威尔斯-巴尼特，一位开创性的调查记者和反私刑倡导者，拒绝站在队伍后面 并伊利诺斯州的旗帜下自豪地前行。全国有色人种协进会的联合创始人 玛丽·丘吉尔·特勒尔，和德尔塔-西格玛-塞塔姐妹会的 22个创始人加入了游行队伍，这个姐妹会是由哈佛大学的女生建立的。通过这些以及更到的方式，黑人女性坚韧不懈，尽管面临着运动中白人女性的深切敌意，以及巨大的政治和人身风险。游行当天，妇女政权者聚集一起组建了一个强力的展示。游行队伍中激增的部分 包括国际妇女政权论者、艺术家、表演家和商人。花车包括金色战车；一个巨大的自由钟； 和一个平权国家的地图。在财政部大楼的台阶上，表演者在现场管弦乐队的配合下， 将历史上女性的成就表演出来。游行坚持继续，尽管有一群暴徒挡路，对妇女辱骂吐吐沫，投掷烟头和暴力殴打。警察没有出来干预，最后，100多名女性住院治疗。全国广为报道她们所受到的不公正待遇使游行进入公众视野——为女权争取者们赢得了更多的同情。全国性报纸严斥了警察，议会听证会调查他们在这次游行活动中的表现。《女性周刊》在抗议后宣布“这是华盛顿的耻辱。 平权取得了重大胜利。”就这样，游行激发了持续多年的对女性选举权的支持大潮。平权者继续向代表试压，参加集会，请愿白宫脚踏白马的伊内兹·米尔霍兰女士在全美持续抗争，尽管忍受病痛折磨，她没能在健在时看到成功的结果。1916年，她在发表妇女参政演讲时倒下， 不久便与世长辞。根据流行报道，她说的最后一句话是，“总统先生，女性自由还得等多久？”尽管取得完全的投票权还要等几十年，1920年，议会通过了第十九次修正案，最终赋予了女性的选举权。

**P701 2019-03-06 A brief history of dogs - David Ian Howe**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=701)

Since their emergence over 200,000 years ago, modern humans have established homes and communities all over the planet. But they didn’t do it alone. Whatever corner of the globe you find homo sapiens in today, you’re likely to find another species nearby: Canis lupus familiaris. Whether they’re herding, hunting, sledding, or slouching the sheer variety of domestic dogs is staggering. But what makes the story of man’s best friend so surprising is that they all evolved from a creature often seen as one of our oldest rivals: Canis lupus, or the gray wolf. When our Paleolithic ancestors first settled Eurasia roughly 100,000 years ago, wolves were one of their main rivals at the top of the food chain. Able to exert over 300 lbs. of pressure in one bone-crushing bite and sniff out prey more than a mile away, these formidable predators didn’t have much competition. Much like human hunter-gatherers, they lived and hunted in complex social groups consisting of a few nuclear families, and used their social skills to cooperatively take down larger creatures. Using these group tactics, they operated as effective persistence hunters, relying not on outrunning their prey, but pursuing it to the point of exhaustion. But when pitted against the similar strengths of their invasive new neighbors, wolves found themselves at a crossroads. For most packs, these bourgeoning bipeds represented a serious threat to their territory. But for some wolves, especially those without a pack, human camps offered new opportunities. Wolves that showed less aggression towards humans could come closer to their encampments, feeding on leftovers. And as these more docile scavengers outlasted their aggressive brethren, their genetic traits were passed on, gradually breeding tamer wolves in areas near human populations. Over time humans found a multitude of uses for these docile wolves. They helped to track and hunt prey, and might have served as sentinels to guard camps and warn of approaching enemies. Their similar social structure made it easy to integrate with human families and learn to understand their commands. Eventually they moved from the fringes of our communities into our homes, becoming humanity’s first domesticated animal. The earliest of these Proto-Dogs or Wolf-Dogs, seem to have appeared around 33,000 years ago, and would not have looked all that different from their wild cousins. They were primarily distinguished by their smaller size and a shorter snout full of comparatively smaller teeth. But as human cultures and occupations became more diverse and specialized, so did our friends. Short stocky dogs to herd livestock by nipping their heels; elongated dogs to flush badgers and foxes out of burrows; thin and sleek dogs for racing; and large, muscular dogs for guard duty. With the emergence of kennel clubs and dog shows during England’s Victorian era, these dog types were standardized into breeds, with many new ones bred purely for appearance. Sadly, while all dog breeds are the product of artificial selection, some are healthier than others. Many of these aesthetic characteristics come with congenital health problems, such as difficulty breathing or being prone to spinal injuries. Humanity’s longest experiment in controlled evolution has had other side effects as well. Generations of selection for tameness have favored more juvenile and submissive traits that were pleasing to humans. This phenomenon of selecting traits associated with youth is known as neoteny, and can be seen in many domestic animals. Thousands of years of co-evolution may even have bonded us chemically. Not only can canines understand our emotions and body language, but when dogs and humans interact, both our bodies release oxytocin; a hormone commonly associated with feelings of love and protectiveness. It might be difficult to fathom how every Pomeranian, Chihuahua, and Poodle are descended from fierce wolves. But the diversity of breeds today is the result of a relationship that precedes cities, agriculture, and even the disappearance of our Neanderthal cousins. And it’s heartening to know that given enough time, even our most dangerous rivals can become our fiercest friends.

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翻译人员: Hongyi Jiang 校对人员: Lipeng Chen自从他们在20万年前出现，现代人类逐渐在这个星球上 建立起了自己的家园。然而他们并非是独自完成这项壮举的。如今不管你在地球的 哪个角落找到人类，你极有可能找到另外一个物种：狗。不管它们是在放牧、打猎、 拉雪橇或是偷懒坐着，狗的多样性是令人震惊的。但让人类最好的朋友最神奇的是它们都从一个物种进化而来，而这个物种经常被认为 是我们最古老的敌人之一：狼，或者说灰狼。10万年前，当我们旧石器时代的祖先 在第一次在欧洲定居时，狼是人在食物链顶端的 几个主要敌人之一。在一次足以碎骨的咬合中， 它能够施加超过300磅（136kg）的压力，并在一英里（1.6km ）以外嗅到猎物，这些强大的捕食者没有太多的竞争者。就像人类猎人们一样,它们以一个复杂的团体来生活，捕猎。其中有一些核心家庭组成,一起合作互助捕到更大的猎物。使用这些团队策略，它们作为持久型的猎人，不依靠跑过猎物，而是追到它们筋疲力尽。但当遇到有相似能力 并具有侵略性的新邻居时，狼就处于了一个两难的情况。对于大多数狼来说，这些不断发展的两脚兽意味着 对它们领地的严重威胁。但对有些狼来说，特别是那些远离族群的，人类营地提供了新的机会。那些对人类不那么有攻击性的狼，能够接近人类的营地，吃一些剩菜剩饭。这些更温顺的食腐者 比它们的暴躁老哥活得更久，它们的基因特征遗传了下去。于是在人类附近 逐渐繁衍出更温顺的狼。久而久之，人们发现了 这些温顺的狼的很多用处，它们可以追踪和捕捉猎物。并且能作为哨兵来守卫营地，还能警告接近的敌人。它们与人类接近的社会结构 让它们能轻易融入人类家庭，并学会理解收到的指令。最终它们从社会边缘进到我们家里，成为第一种被人类驯服的动物。这些原始狗或者狼狗最早出现于约三万三千年前，而且不会和它们的野生同胞有太大差异。它们的主要差异就是它们更小的体型，和更短的嘴里更小的牙齿。然而随着人类文明和领地 变得多样化、特殊化。我们的伙伴也变了，矮壮结实的可以 通过咬牲畜的后脚跟来放牧，身体长的可以把獾和狐狸赶出洞来，纤细光滑的可以赛跑，大的强壮的可以当守卫。随着在维多利亚时期的养狗俱乐部和狗展，这些不同的狗被分为不同的犬种。还有很多只是为了外观产生的犬种。可怜的是，当所有犬种都成了人工育种的结果，有些犬种比其他的要更健康。很多这些可爱的特征 伴随着一些先天健康问题，比如说呼吸困难或是容易受脊椎损伤。作为人类史上耗时最长的人工育种实验，伴随着很多副作用。一代一代地为了驯化的选择保留了很多幼嫩而温顺的特征来取悦人们。这种选择幼小特征的现象叫幼态延续，很多驯养的动物都有这种情况。几千年来的共同地进化 甚至把我们在化学层面上连结在一起，不只是狗们能理解 我们的感情和肢体语言，而且当人和狗互动时，我们的身体都会释放催产素，一种跟爱和保护欲有关的荷尔蒙。也许很难相信每一个博美犬、吉娃娃和贵宾犬都是从凶狠的狼的子孙。但是造成这种多样性的特殊关系，超越了聚落，农作，甚至高于我们的近亲尼安德特人的消失。这实在是振奋人心，只要有足够的时间，即使是我们最危险的敌人 也会变成我们最好的朋友。

**P702 2019-03-07 Why are earthquakes so hard to predict - Jean-Baptiste P. Koehl**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=702)

In 132 CE, Chinese polymath Zhang Heng presented the Han court with his latest invention. This large vase, he claimed, could tell them whenever an earthquake occurred in their kingdom– including the direction they should send aid. The court was somewhat skeptical, especially when the device triggered on a seemingly quiet afternoon. But when messengers came for help days later, their doubts turned to gratitude. Today, we no longer rely on pots to identify seismic events, but earthquakes still offer a unique challenge to those trying to track them. So why are earthquakes so hard to anticipate, and how could we get better at predicting them? To answer that, we need to understand some theories behind how earthquakes occur. Earth’s crust is made from several vast, jagged slabs of rock called tectonic plates, each riding on a hot, partially molten layer of Earth’s mantle. This causes the plates to spread very slowly, at anywhere from 1 to 20 centimeters per year. But these tiny movements are powerful enough to cause deep cracks in the interacting plates. And in unstable zones, the intensifying pressure may ultimately trigger an earthquake. It’s hard enough to monitor these miniscule movements, but the factors that turn shifts into seismic events are far more varied. Different fault lines juxtapose different rocks– some of which are stronger–or weaker– under pressure. Diverse rocks also react differently to friction and high temperatures. Some partially melt, and can release lubricating fluids made of superheated minerals that reduce fault line friction. But some are left dry, prone to dangerous build-ups of pressure. And all these faults are subject to varying gravitational forces, as well as the currents of hot rocks moving throughout Earth’s mantle. So which of these hidden variables should we be analyzing, and how do they fit into our growing prediction toolkit? Because some of these forces occur at largely constant rates, the behavior of the plates is somewhat cyclical. Today, many of our most reliable clues come from long-term forecasting, related to when and where earthquakes have previously occurred. At the scale of millennia, this allows us to make predictions about when highly active faults, like the San Andreas, are overdue for a massive earthquake. But due to the many variables involved, this method can only predict very loose timeframes. To predict more imminent events, researchers have investigated the vibrations Earth elicits before a quake. Geologists have long used seismometers to track and map these tiny shifts in the earth’s crust. And today, most smartphones are also capable of recording primary seismic waves. With a network of phones around the globe, scientists could potentially crowdsource a rich, detailed warning system that alerts people to incoming quakes. Unfortunately, phones might not be able to provide the advance notice needed to enact safety protocols. But such detailed readings would still be useful for prediction tools like NASA’s Quakesim software, which can use a rigorous blend of geological data to identify regions at risk. However, recent studies indicate the most telling signs of a quake might be invisible to all these sensors. In 2011, just before an earthquake struck the east coast of Japan, nearby researchers recorded surprisingly high concentrations of the radioactive isotope pair: radon and thoron. As stress builds up in the crust right before an earthquake, microfractures allow these gases to escape to the surface. These scientists think that if we built a vast network of radon-thoron detectors in earthquake-prone areas, it could become a promising warning system– potentially predicting quakes a week in advance. Of course, none of these technologies would be as helpful as simply looking deep inside the earth itself. With a deeper view we might be able to track and predict large-scale geological changes in real time, possibly saving tens of thousands of lives a year. But for now, these technologies can help us prepare and respond quickly to areas in need– without waiting for directions from a vase.

**P702 2019-03-07 Why are earthquakes so hard to predict - Jean-Baptiste P. Koehl**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=702)

翻译人员: Jasper Han 校对人员: Tianji (Homer) Li在公元 132 年，中国的博学家张衡向汉朝宫廷展示了 他的最新发明。他声称，这个巨大的地动仪能够感知到任何时候 发生在中国的地震——并且指明哪里需要救助。朝廷有些怀疑，特别是在一个看上去安静的下午， 这个装置被触发了。但当几天后，信使 带来求援的消息时，他们的疑虑变为了感谢。今天，我们不再依靠地动仪 来辨别地震的发生，但是捕获到地震的发生任然是 一件独具挑战的事情。所以，为什么地震 如此难被预测呢？并且，我们怎样才能 更好的预测地震呢？为了回答这些问题，我们需要了解一些 地震背后的理论知识。地球的地壳被许多巨大、 不规则地岩石构成，这些岩石被叫做构造板块，每一个板块浮在炙热、 熔化的地幔层上。这也使得板块地运动非常缓慢，每年移动 1 到 20 厘米。但即使是很微小地运动， 也会释放巨大能量造成相互作用地板块 间形成巨大裂缝。并且，在不稳定地区域，板块间不断增加地 压力会引发一次地震。监控这个微小运动 是一件很难得事，但是转变为地震的事件 因素更加多样化。不同的断裂线将 不同的岩石分开面对压力有的很坚硬， 有的很松软。不同的岩石对摩擦与 高温有不同的反应。一部分岩石被融化， 并释放由超热的矿物质构成的润滑液，这减少了断裂线之间的摩擦。但是一些是干燥的，容易形成危险的内在压力。所有这些断层受到 不同重力作用，以及流经地幔的热溶岩。所以，哪些隐含的参数 需要我们去分析？并且，如何使得它们适应 不断更新的预测工具？由于其中的一部分力 有固定的发生机率，板块的行为具有周期性。今天，我们的许多可靠 线索来自长期预测，与之前发生地震的 时间与地点有关。几千年来，这种方法使得我们能够 预测何时断层高度活跃，就像圣安东列亚斯，这种活跃是大地震的前兆。但是由于太多的参数被考虑，这种方法只能预测出 很模糊的时间表。为了预测更加准确的时间，研究人员调查地震前 地球产生的振动。地质学家长期使用地震仪，来捕捉并绘制出地球 地壳中的微小变化。今天，大多智能手机也能记录主要的地震波。使用遍布全球的手机网络，科学家能够融合这些丰富信息，并研制出警告人们地震即将 来临的详细预警系统。不幸的是手机并不能提供 人们所需要的预告信息，来制定安全的方案。但是一些详细的数据仍然有用，对于像美国宇航局的 Quakesim 软件一样的预测工具，它可以使用严谨的地址数据组合来识别有风险的区域。然而，最近的研究表明所有这些传感器也可能 无法察觉到最明显的地震信号。在 2011 年，就在日本东海岸发生地震前，附近的研究人员记录到 惊人的高浓度的同位素对：氡和钍。当地震前地壳内压力增加时，这些气体通过微小裂痕溢出到地表。一些科学家认为如果 我们在地震多发地区建造一个巨大的氡钍探测器网络，它将成为一个有前景的预警系统可能提前一周预报地震。当然，所有这些技术都无法和直接观察地球内部相比。一个深入的观点，我们可能可以实时记录和预测地质变化，每年有可能会拯救数万条生命。但是对于现在，这些技术能够帮助我们快速 准备与响应有需要的地区不用等待地动仪的指示。

**P703 2019-03-08 The physics of surfing - Nick Pizzo**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=703)

Whether or not you realize it, as a surfer you’re a master of complicated physics. The science of surfing begins as soon as you and your board first hit the water. The board’s size and light construction help it displace a lot of water. In turn, a buoyant force equal to the weight of the displaced water pushes up, counteracting you and your board’s weight. This lets you stay afloat while you wait to paddle for a wave. And what exactly are you waiting for? The perfect wave, of course. Like other waves in physics, ocean waves represent a transfer of energy. Wind blowing across the ocean accelerates water particles near the surface, leading to the growth of ripples that become waves. These deviations from the flat surface are acted upon by gravity, which tries to restore the surface to its original flat state. As the waves then move through the water, particles push and pull on their neighbors through the wave induced pressure, and this motion propagates energy through the water in unison with the wave motion. The motion of these particles is much more limited than the overall motion of the waves. Near the shore, the shallower seafloor constrains the motion of the waves to occur in a more limited region than out at sea, concentrating the wave energy near the surface. If the topography of the shoreline is even and smooth, this will refract the waves to become more parallel to the shore as they approach. This is the crucial moment. As the wave gets near, you quickly pivot your board in the same direction as the wave and paddle to match its speed. Your board forms an angle with the water, and this creates a dynamic pressure on the bottom of it, forcing you and your board out of the water, to skim along the surface. At the same time, your increased forward momentum makes you more stable, allowing you to stand up and surf along the wave. Now you’ve caught the wave, and are riding along its front face parallel to the shoreline. Fins on the surfboard allow you to alter your speed and direction by repositioning your weight. Above you is the wave’s crest, where the water particles are undergoing their greatest acceleration. That forces them to move faster than the underlying wave, so they shoot ahead before falling under gravity’s influence. This forms the waves’ characteristic curls, or jets, as they break along the shore. Sometimes, the curl might completely enclose part of the wave, forming a moving tube of water known as the barrel. Because of irregularities in the seafloor and the swell itself, few barrels last as long as the legendary 27-second ride off the coast of Namibia. But many who manage to get barreled have said they feel time passing differently inside, making it one of the most magical experiences a surfer can have. Of course, not all beaches are created equal. Offshore underwater canyons or rock formations in certain locations like Nazare, Portugal or Mavericks, California refract the incoming wave energy into a single spot, creating massive waves sought by surfers worldwide. And some of these waves travel for more than a week, with swells originating more than 10,000 kilometers away from shore. Waves surfed in sunny California may have originated in the stormy seas near New Zealand. So while you may not be thinking about weather patterns in the South Pacific, tectonic geology, or fluid mechanics, the art of catching the perfect wave relies on all these things and more. And the waves we surf, created by wind, are just one visible part of the continuous oscillation of energy that has shaped our universe since its very beginning.

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翻译人员: Aimee Zhou 校对人员: shuping Lai不管你是否意识到，身为冲浪者，你实际是 一位精通复杂物理学的大师。冲浪的科学始于你和冲浪板触碰到水的一瞬间。冲浪板的面积和较轻的材质 能够使大量的水产生位移。产生一股向上推起的浮力，与发生位移的水重量均等，可以抵消掉你与冲浪板的重量。这使你在等待海浪的时候能够一直浮于海面。那么你等待的究竟是什么呢？当然是完美的海浪。与物理学中其他的波浪一样， 海洋的波浪代表能量的转移。海风加速了水表的移动，产生波纹，最终形成海浪。不再平静的海面会受到重力作用，重力试图让海面恢复到原本的水平状态。当海浪在不断移动，水粒子互相挤压引起海浪内部的压力，而这种运动通过水与波浪的同步运动传递能量。水粒子的运动，相比波浪的整体运动是很受限的。靠近岸边，相较于广阔的大海，浅海区域海浪的运动在一定范围内受限，将波浪的能量集中在表面。如果海岸线的地形平整光滑，海浪会发生折射，在靠近海岸时与海岸线更平行。关键的时刻来了。 当海浪逐渐靠近，你朝着与海浪相同的方向调转冲浪板，尽力划动，赶上海浪的速度。你的冲浪板与水形成一个角度，在底部产生压力，使得你和冲浪板离开水面，在表面飞快行进。同时，不断增强的前进动力使你更稳定，让你能够站起，随波逐浪滑行。现在你已追到了浪，开始沿着与海岸线平行的方向前行。冲浪板的舵通过重置你的着力点，让你可以改变速度和方向。在你的上方，是波峰，波峰处的水粒子在以它们最大速度运动，迫使它们比下方的海浪移动得更快，在受到重力影响掉落之前，它们飞速向前。这形成了海浪的特征，卷浪，或称喷浪，因为它们会沿着海岸溃散。有时，这种卷浪会完全围住一些海浪，使水形成运动中的管道，形状像桶一样，由于海底的不规则构造和高低起伏，几乎没有比纳米比亚海岸 那次传奇的27秒更持久的卷浪。但有不少驾驭过卷浪的人，他们描述到，身处于浪之中， 感觉时间流逝的速度都发生了变化，这是冲浪者专属的最神奇的体验之一。当然，海滩不尽相同。一些地方的沿岸海底的岩石和峡谷地形构造，比如葡萄牙的纳扎尔、加利福尼亚州的半月湾，能够将海浪的能量折射到一个单点上，造就全世界冲浪者心向往之的巨大海浪。有些海浪的旅程长达一星期，到达一万公里以外的地方。在加州的阳光海岸冲的浪，可能来自于新西兰海域的汹涌波涛。你可能根本不会关心南太平洋的天气状况、构造地质学或流体力学，但完美的冲浪艺术 确实依赖于这些及其他的因素。风造就了使我们冲浪的海浪，仅仅是能量的其中一个可见部分而已，能量振动持续塑造着我们的宇宙，从开始到现在。

**P704 2019-03-15 The wild world of carnivorous plants - Kenny Coogan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=704)

Little do they know it, but these six creatures are each about to experience a very unusual death. One-by-one, they will fall prey to the remarkable, predatory antics of... a carnivorous plant. Around the world there are more than 600 plant species that supplement a regular diet of sunlight, water, and soil with insects, microbes, or even frogs and rats. Scientists believe that carnivory in plants evolved separately at least six times on our planet, suggesting that this flesh-munching adaptation holds a major benefit for plants. Carnivorous plants tend to grow in places with highly acidic soil, which is poor in crucial nutrients like nitrogen, phosphorus, and potassium. In these hostile conditions, plants that are able to lure, trap, and digest prey have an advantage over those that rely on soil for their nutrients. Take this inhospitable bog, where pitcher plants reign supreme. Drawn to the pitcher’s vivid colors and alluring scent, the fly closes in and slurps its nectar. But this pitcher species has an ingredient called coniine in its nectar, a powerful narcotic to insects. As the coniine takes effect, the fly grows sluggish, stumbles, and falls down the funnel into a pool of liquid at the base, where he drowns. Enzymes and bacteria in the liquid slowly break his body down into microscopic particles the pitcher plant can consume through its leaves. Occasionally, larger prey also tumbles into the fatal funnel of the pitcher plant. The second victim faces off with the sticky sundew plant. The sundew’s tiny leaves are equipped with a viscous secretion called mucilage. The ant is swiftly trapped in this goo. As she struggles, enzymes begin to digest her body. Special tentacles sense her movement and curl around her, clenching her in their suffocating grip. Once she asphyxiates, which can happen in under an hour, the tentacles unfurl again to snare their next victim. Two down, four to go. The next target meets his end underground, in the coils of the corkscrew plant. He enters the roots through a tiny slit in search of food. But inside, he quickly loses his way through the tangled labyrinth. A forest of curved hairs prevents his escape, guiding him into a central chamber with flesh-digesting enzymes and deadly low levels of oxygen. In the murky depths of a nearby pond, a tadpole unwittingly swims into the path of the bladderwort, the speediest of all carnivorous plants. She treads on the bladderwort’s trigger, and in milliseconds, a trapdoor swings open and sucks her in. Trapped half in and half out, she struggles to free herself while the part of her body inside the plant gets digested. Over the next few hours, her writhing sets the trap off repeatedly, each time bringing her deeper into the plant to be digested alive bit by bit. Meanwhile, this beetle is bewitched by sweet-smelling nectar. The scent draws him closer and closer until he lands on the leaves of the world’s most infamous carnivorous plant. His landing triggers tiny hairs on the surface of the leaves, and the jaws of the venus fly trap snap shut around him. The spikes interlock to seal his fate. Once closed, the leaves act like an external stomach that digests the beetle’s soft tissues. When they open again a few days later, only the dry husk of his exoskeleton remains. The mayfly is the last creature standing. As she approaches the butterwort plant, she heads for the flowers that wave high above the plant’s globs of adhesive goo. She alights on the petals, drinks the nectar, and takes off unscathed. These long flower stalks keep certain insects away from the carnivore’s traps— a way of separating pollinators from food. Off the mayfly buzzes to live a long and fruitful life– oh.

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翻译人员: Carol Wang 校对人员: GeGe Tan尽管它们毫无察觉，但这六种生物都将以一种 十分不寻常的方式死亡。一个接着一个，它们将成为奇特猎食者的盘中餐……食肉植物。全世界有多于 600 种植物除了需要阳光、 水和土壤这些常规“饮食”外，还“吃”昆虫、微生物、 甚至青蛙和老鼠。科学家们相信，地球上 植物的食肉性的进化独立上演过至少六次，这说明这种食肉的适应性为植物提供了极大益处。食肉植物常生长在强酸性土壤处，这种土壤缺乏如氮、磷、钾等重要养分。在这种恶劣的环境中，能吸引、捕杀和消化猎物的植物比单纯依赖土壤的植物更具优势。以这片荒凉的沼泽地为例，猪笼草在这里生长茂盛。这只苍蝇被猪笼草的艳丽颜色 和诱人气味所吸引，它靠近猪笼草并啜饮其花蜜。但这种猪笼草的花蜜中 含有一种成分叫毒芹碱，是一种强大的昆虫麻醉剂。当毒芹碱生效时，苍蝇变得迟钝、蹒跚，跌入捕虫笼底部的一池液体，最后淹死于此。液体中的酶和细菌 慢慢将它的身体分解成猪笼草的叶子可以吸收的微观颗粒。偶尔地，也有较大猎物坠入 猪笼草那致命的捕虫笼中。第二个受害者遇到了黏黏的茅膏菜。茅膏菜的小叶上 带有黏分泌物：粘液。这只蚂蚁很快被粘性物困住了。当她挣扎的时候， 酶已开始消化她的身体。独特的触须感知到其活动， 并在她周身缠绕收紧，令人窒息地挤压着她。一小时内，一旦她窒息后，这些触须再次松开， 以便诱捕下一个受害者。已经牺牲 2 个，还剩 4 个。下一个目标将死于长在地下螺旋植物的缠绕中。他为找食物而钻入根部小切口，但很快便迷失在那错综复杂的迷宫里。密集的卷毛让他无法逃走，将他引至中心腔室， 里面有消化血肉的酶，且那里氧气水平非常低。在附近池塘的阴暗深处，一只蝌蚪不知不觉地 游进了狸藻的地盘，狸藻是食肉植物中消化最快的。她触及到狸藻的触须，仅在几毫秒内，活板门打开，她被吸了进去。身体一半困在里面，一半在外，她努力想挣脱，但她在植物内的身体已被消化。在接下来的几个小时里，她的扭动反复地打开活板门，每次都让更多的身体进入，一点一点地活着被消化掉了。与此同时，这只甲虫 被甜美的花蜜所迷惑。气味吸引他越来越靠近，直到他落在世上最臭名昭著的 食肉植物的叶子上。他的降落触发了叶表的微小毛发，捕蝇草的捕虫夹在他周围快速闭合，刺毛互锁决定了他的命运。一旦闭合，叶子就像一个外部胃， 消化掉甲虫的软组织。当几天后叶子再次打开时，只剩下他干枯的外骨骼外壳。最后的生物是蜉蝣。当她靠近捕虫堇时，她飞向了团团粘液上方、 高高摇曳的花朵。她落在花瓣上，喝完花蜜， 毫发无伤地飞走了。这些长花茎使某些昆虫 远离食肉植物的陷阱——一种将授粉者与猎物分开的方法。蜉蝣翁嗡飞走了， 去过漫长而多姿的一生——噢！

**P705 2019-03-18 The Chinese myth of the immortal white snake - Shunan Teng**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=705)

The talented young herbalist named Xu Xian was in trouble. It should have been a victorious moment– he had just opened his very own medicine shop. But he bought his supplies from his former employer, and the resentful man sold him rotten herbs. As Xu Xian wondered what to do with this useless inventory, patients flooded into his shop. A plague had stricken the city, and he had nothing to treat them. Just as he was starting to panic, his wife, Bai Su Zhen, produced a recipe to use the rotten herbs as medicine. Her remedy cured all the plague-afflicted citizens immediately. Xu Xian’s former boss even had to buy back some of the rotten herbs to treat his own family. Shortly after, a monk named Fa Hai approached Xu Xian, warning him that there was a demon in his house. The demon, he said, was Bai Su Zhen. Xu Xian laughed. His kindhearted, resourceful wife was not a demon. Fa Hai insisted. He told Xu Xian to serve his wife realgar wine on the 5th day of the 5th month, when demons’ powers are weakest. If she wasn’t a demon, he explained, it wouldn’t hurt her. Xu Xian dismissed the monk politely, with no intention of serving Bai Su Zhen the wine. But as the day approached, he decided to try it. As soon as the wine touched Bai Su Zhen’s lips, she ran to the bedroom, claiming she wasn’t feeling well. Xu Xian prepared some medicine and went to check on her. But instead of his wife, he found a giant white serpent with a bloody forked tongue in the bed. He collapsed, killed by the shock. When Bai Su Zhen opened her eyes, she realized immediately what must have happened. The truth was that Bai Su Zhen was an immortal snake with formidable magical powers. She had used her powers to take a human form and improve her and her husband’s fortunes. Her magic couldn’t revive Xu Xian, but she had one more idea to save him: an herb that could grant longevity and even bring the dead back to life, guarded by the Old Man of the South Pole in the forbidden peaks of the Kun Lun Mountains. She rode to the mountains on a cloud, then continued on foot passed gateways and arches until she reached one marked “beyond mortals” hanging over a silver bridge. On the other side, two of the Old Man’s disciples guarded the herb. Bai Su Zhen disguised herself as a monk and told them she’d come to invite the Old Man to a gathering of the gods. While they relayed her message, she plucked some leaves from the herb and ran. The servants realized they had been tricked and chased her. Bai Su Zhen coughed up a magic ball and threw it at one. As the other closed in on her, she put the herb under her tongue for safekeeping, but its magic forced both of them into their true forms. As the crane’s long beak clamped around her, the Old Man appeared. Why, he asked, would she risk her life to steal his herb when she was already immortal? Bai Su Zhen explained her love for Xu Xian. Even if he didn’t want to be with her now that he knew she was a demon, she was determined to bring him back to life. The two had a karmic connection dating back more than a thousand years. When Bai Su Zhen was a small snake, a beggar was about to kill her, but a kind passerby rescued her. Her rescuer was Xu Xian in a past life. Touched by her willingness to risk her life for him, the Old Man permitted her to leave the mountain with the immortal herb. Bai Su Zhen returned home to revive Xu Xian. When he opened his eyes, the terrified look frozen on his face became a smile. Demon or not, he was still happy to see his wife.

**P705 2019-03-18 The Chinese myth of the immortal white snake - Shunan Teng**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=705)

翻译人员: Carol Wang 校对人员: Tianji (Homer) Li一名有才的年轻草药医生 叫许仙，遇上麻烦事儿了。这本该是一件大喜事儿的——他自己的中药铺刚刚开张。但他从以前的老板那里进的货，而那个可恶的人呢， 却把腐烂的中药材卖给了许仙。当许仙对这些没用的 药材一筹莫展时，病人一下子挤满了他的铺子。原来，一场瘟疫席卷了整个城市，而他手头却 没有草药去医治他们。正当他惊慌失措时，他的夫人白素贞发明了一个药方， 配方药正是那些腐烂的中草药。她的方剂立刻治好了 饱受瘟疫之苦的市民，就连许仙的前老板 也来到铺子里，买回些腐烂的草药去治疗家人。不久，一位叫法海的 和尚找到许仙，警告说他家里有妖孽，而那妖孽正是白素贞！许仙大笑起来，他那善良、机智的 夫人才不是妖孽呢！法海坚持他的说法。他告诉许仙，五月端午 给他夫人喝点雄黄酒，那天妖孽的法力最弱。他还解释说，若她非妖孽， 雄黄酒根本伤不到她。许仙礼貌地让和尚走了，没打算让白素贞喝那雄黄酒。但五月端午到来的那天， 他决定试一试。白素贞的嘴唇一碰到雄黄酒，她就声称不舒服，冲进了卧室。许仙弄了点药，去看看她怎样了。但床上没有妻子，他看到的是一条吐着 血红信子的巨大白蛇。他立刻瘫倒在地，吓死了。当白素贞睁开双眼，立刻意识到发生了什么。其实，白素贞是一条蛇精，法力强大。她用法力变成人形，并帮助自己和丈夫发家致富。她的法力无法救活许仙，但她知道有个救他的法子：一棵让人长生不老、 甚至起死回生的仙草，这仙草长在昆仑山极顶禁地，由南极仙翁看守。她驾起祥云来到昆仑山，然后步行，穿越关卡和拱门，一路来到一座银桥前，桥上写着“隔凡桥”二字。桥的另一边，南极仙翁的二位童子 看守着仙草。白素贞摇身变成一位和尚，告诉童子说，她来邀请 南极仙翁去参加神仙大会。趁二位童子报信的功夫，她趁机摘了一些 仙草叶子，跑走了。童子发现被骗，转身去追她。白素贞咳出魔球，扔向其中一位。当另一位童子已近前攻击她时，安全起见，她把仙草含到舌下，而仙草的法力把她和 童子打回了动物原形。正当仙鹤用长喙啄咬她时，南极仙翁出现了。他问她，你已是长生不老之身，为何冒生命之险盗仙草？白素贞解释了她对许仙的爱。即便现在他知道她是妖孽， 不想和她在一起了，她还是决心要救活他。一千多年前， 他俩有一段业缘。那时，白素贞还是一条小蛇，一个乞丐正要杀死她时，一位善良的过路人救了她。救她的人正是许仙的前世。仙翁被她冒死救 许仙的行为感动，准许她带着仙草下山。白素贞回到家，救活了许仙。当他睁开眼睛，他脸上原来的惊恐 表情化作了笑容，管她是不是妖孽，看到妻子，他依然特别开心。

**P706 2019-03-21 The surprising reason our muscles get tired - Christian Moro**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=706)

You're lifting weights. The first time feels easy, but each lift takes more and more effort until you can’t continue. Inside your arms, the muscles responsible for the lifting have become unable to contract. Why do our muscles get fatigued? We often blame lactic acid or running out of energy, but these factors alone don’t account for muscle fatigue. There’s another major contributor: the muscle’s ability to respond to signals from the brain. To understand the roots of muscle fatigue, it helps to know how a muscle contracts in response to a signal from a nerve. These signals travel from the brain to the muscles in a fraction of a second via long, thin cells called motor neurons. The motor neuron and the muscle cell are separated by a tiny gap, and the exchange of particles across this gap enables the contraction. On one side of the gap, the motor neuron contains a neurotransmitter called acetylcholine. On the other side, charged particles, or ions, line the muscle cell’s membrane: potassium on the inside, and sodium on the outside. In response to a signal from the brain, the motor neuron releases acetylcholine, which triggers pores on the muscle cell membrane to open. Sodium flows in, and potassium flows out. The flux of these charged particles is a crucial step for muscle contraction: the change in charge creates an electrical signal called an action potential that spreads through the muscle cell, stimulating the release of calcium that’s stored inside it. This flood of calcium causes the muscle to contract by enabling proteins buried in the muscle fibers to lock together and ratchet towards each other, pulling the muscle tight. The energy used to power the contraction comes from a molecule called ATP. ATP also helps pump the ions back across the membrane afterward, resetting the balance of sodium and potassium on either side. This whole process repeats every time a muscle contracts. With each contraction, energy in the form of ATP gets used up, waste products like lactic acid are generated, and some ions drift away from the muscle’s cell membrane, leaving a smaller and smaller group behind. Though muscle cells use up ATP as they contract repeatedly, they are always making more, so most of the time even heavily fatigued muscles still have not depleted this energy source. And though many waste products are acidic, fatigued muscles still maintain pH within normal limits, indicating that the tissue is effectively clearing these wastes. But eventually, over the course of repeated contractions there may not be sufficient concentrations of potassium, sodium or calcium ions immediately available near the muscle cell membrane to reset the system properly. So even if the brain sends a signal, the muscle cell can’t generate the action potential necessary to contract. Even when ions like sodium, potassium or calcium are depleted in or around the muscle cell, these ions are plentiful elsewhere in the body. With a little time, they will flow back to the areas where they’re needed, sometimes with the help of active sodium and potassium pumps. So if you pause and rest, muscle fatigue will subside as these ions replenish throughout the muscle. The more regularly you exercise, the longer it takes for muscle fatigue to set in each time. That’s because the stronger you are, the fewer times this cycle of nerve signal from the brain to contraction in the muscle has to be repeated to lift a certain amount of weight. Fewer cycles means slower ion depletion, so as your physical fitness improves, you can exercise for longer at the same intensity. Many muscles grow with exercise, and larger muscles also have bigger stores of ATP and a higher capacity to clear waste, pushing fatigue even farther into the future.

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翻译人员: Hanlin Wang 校对人员: Liu Qi当你举重的时候，第一次感觉很容易，但一次比一次费劲， 直到你再也无法继续。在你的胳膊里，负责举重的肌肉已经无法收缩。为什么我们的肌肉会感到疲劳？我们常把原因归咎于 乳酸或者能量耗尽，但这些并不是肌肉疲劳的全部原因。还有另外一个主要因素：肌肉对大脑信号做出反应的能力。为了理解肌肉疲劳的根本原因，首先要了解在接到神经信号后， 肌肉是如何收缩的。这些信号在不到一秒钟的时间内通过细长的运动神经元 从大脑传递至肌肉。运动神经元和肌肉细胞 被很小的间隙隔开，粒子通过这个间隙交换， 从而实现肌肉收缩。在间隙的一侧，运动神经元含有一种叫做 乙酰胆碱的神经递质。在间隙的另一侧，带电粒子，或者离子，排列在肌肉细胞膜上：钾离子在内，钠离子在外。接收到大脑传来的信号后，运动神经元释放乙酰胆碱，使肌肉细胞膜上的孔隙张开。钠离子流入，钾离子流出。这些带电粒子的流动 是肌肉收缩至关重要的一步：电荷的变化产生了一种 叫作动作电位的电信号，这种电信号通过肌肉细胞传播，刺激储存在其中的钙离子的释放。大量地钙离子将使肌肉收缩，通过让埋藏在肌肉纤维里的 蛋白质锁在一起，相互拉紧，从而使肌肉拉紧。肌肉收缩的能量来自 一种名为ATP酶的分子。之后，ATP酶也有助于 将离子泵回到膜上，重新恢复钾钠离子 在两侧的平衡。每次肌肉收缩都要重复这个过程。肌肉每收缩一次，ATP酶形式的能量将被用尽，产生乳酸等废物，部分离子从肌肉细胞膜上流失，残留的离子越来越少。尽管肌肉细胞反复收缩会耗尽ATP酶，但肌肉细胞一直不断产生新的ATP酶,所以大部分情况下，即便是非常疲累的肌肉 也不会完全耗尽ATP酶。即便产生的很多废物都是酸性的，但疲劳的肌肉始终把酸碱度 保持在正常范围，这说明组织正在高效地清理这些废物。但是最终，随着肌肉反复收缩，肌肉细胞膜附近可用的钾、钠、钙离子的浓度可能不足以使整个系统恢复正常。所以即便大脑传来了信号，肌肉细胞仍然因不能产生 动作电位而无法收缩。即使肌肉细胞内部及其周围的钾、钠、钙离子被耗光，在身体的其他部位 这些离子仍然十分丰富，只需要一点点时间，它们就可以流回到需要的地方，有时这个过程需要 活性钠钾泵的帮助。所以如果你停下来歇一会儿的话，当这些离子补充至整个肌肉， 肌肉疲劳会消退。锻炼越规律，肌肉达到疲劳状态的时间便会越慢。这是因为你越是强壮，举重时，神经信号从大脑至肌肉收缩的循环所需重复的次数就越少。次数越少意味着离子消耗越慢，所以随着身体素质的提升，同样强度的运动可以持续更长时间。很多肌肉在锻炼中增长，而越大的肌肉拥有越大的ATP酶储备，更强的废物清洁能力，使疲劳感的出现越来越晚。

**P707 2019-03-21 What “Machiavellian” really means - Pazit Cahlon and Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=707)

From Shakespeare’s plays to modern TV dramas, the unscrupulous schemer for whom the ends always justify the means has become a familiar character type we love to hate. So familiar, in fact, that for centuries we’ve had a single word to describe such characters: Machiavellian. But is it possible that we’ve been using that word wrong this whole time? The early 16th century statesman Niccoló Machiavelli wrote many works of history, philosophy, and drama. But his lasting notoriety comes from a brief political essay known as The Prince, framed as advice to current and future monarchs. Machiavelli wasn’t the first to do this– in fact there was an entire tradition of works known as “mirrors for princes” going back to antiquity. But unlike his predecessors, Machiavelli didn’t try to describe an ideal government or exhort his audience to rule justly and virtuously. Instead, he focused on the question of power– how to acquire it, and how to keep it. And in the decades after it was published, The Prince gained a diabolical reputation. During the European Wars of Religion, both Catholics and Protestants blamed Machiavelli for inspiring acts of violence and tyranny committed by their opponents. By the end of the century, Shakespeare was using “Machiavel” to denote an amoral opportunist, leading directly to our popular use of “Machiavellian” as a synonym for manipulative villainy. At first glance, The Prince’s reputation as a manual for tyranny seems well-deserved. Throughout, Machiavelli appears entirely unconcerned with morality, except insofar as it’s helpful or harmful to maintaining power. For instance, princes are told to consider all the atrocities necessary to seize power, and to commit them in a single stroke to ensure future stability. Attacking neighboring territories and oppressing religious minorities are mentioned as effective ways of occupying the public. Regarding a prince’s personal behavior, Machiavelli advises keeping up the appearance of virtues such as honesty or generosity, but being ready to abandon them as soon as one’s interests are threatened. Most famously, he notes that for a ruler, “it is much safer to be feared than loved.” The tract even ends with an appeal to Lorenzo de’ Medici, the recently installed ruler of Florence, urging him to unite the fragmented city-states of Italy under his rule. Many have justified Machiavelli as motivated by unsentimental realism and a desire for peace in an Italy torn by internal and external conflict. According to this view, Machiavelli was the first to understand a difficult truth: the greater good of political stability is worth whatever unsavory tactics are needed to attain it. The philosopher Isaiah Berlin suggested that rather than being amoral, The Prince hearkens back to ancient Greek morality, placing the glory of the state above the Christian ideal of individual salvation. But what we know about Machiavelli might not fit this picture. The author had served in his native Florence for 14 years as a diplomat, staunchly defending its elected republican government against would-be monarchs. When the Medici family seized power, he not only lost his position, but was even tortured and banished. With this in mind, it’s possible to read the pamphlet he wrote from exile not as a defense of princely rule, but a scathing description of how it operates. Indeed, Enlightenment figures like Spinoza saw it as warning free citizens of the various ways in which they can be subjugated by aspiring rulers. In fact, both readings might be true. Machiavelli may have written a manual for tyrannical rulers, but by sharing it, he also revealed the cards to those who would be ruled. In doing so, he revolutionized political philosophy, laying the foundations for Hobbes and future thinkers to study human affairs based on their concrete realities rather than preconceived ideals. Through his brutal and shocking honesty, Machiavelli sought to shatter popular delusions about what power really entails. And as he wrote to a friend shortly before his death, he hoped that people would “learn the way to Hell in order to flee from it."

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翻译人员: Lipeng Chen 校对人员: Tianji (Homer) Li从莎士比亚的戏剧到现代电视剧，总是用最终目的来为 其行为辩解的无耻阴谋家已经成为我们既爱又恨的 熟悉的角色类型。事实上，我们对其如此熟悉， 以至于几世纪以来我们都用一个词来描述 这样的人物：马基雅维利主义者。但我们有没有可能 一直用错这个词？16世纪初的政治家 尼科尔·马基雅维利写过许多历史、哲学和戏剧作品。但他持久的声誉来自一篇 被称为《王子》的简短政治文章，这篇文章包含对当前和 未来君主的建议。马基雅维利不是第一个 这样做的人——事实上，有一个完整的作品体系， 被称为“王子的镜子”，可以追溯到远古。但与他的前任不同，马基雅维利没有试图 描述一个理想的政府或者劝诫他的听众公正 而有道德地统治。相反，他专注于权力问题——如何获得它，如何维持它。在《王子》出版后的几十年里，这本书收获了糟糕的名声。在欧洲宗教战争期间，天主教徒和新教徒都 指责马基雅维利因为他给他们对手的暴力 和暴政提供了灵感。世纪末，莎士比亚用“马基雅维尔”来表示 一个不道德的机会主义者，直接导致我们对“马基雅维利主义者” 的广泛使用作为操纵性恶行的同义词。乍一看，《王子》作为暴政指南的 名声似乎是应得的。总的来说，马基雅维利 似乎完全不关心道德，除非对维持权力有益或有害。例如，王子们被告知要 考虑所有必要的暴行来夺取政权，然后一次性的实施暴行以确保未来的稳定。攻击邻国领土和压迫 宗教少数民族被认为是占领公众的有效途径。关于王子的个人行为，马基雅维利建议保持美德的外表，比如诚实或慷慨，但一旦利益受到威胁， 就要准备放弃它们。最著名的是，他指出， 作为一个统治者，“让人害怕比让人爱戴更安全。”这一段甚至以对 洛伦佐·德·梅迪奇的陈词结尾，最近才成为佛罗伦萨的统治者，敦促他在自己的统治下 把支离破碎的意大利城邦联合起来。许多人认为马基雅维利是 受非感性的现实主义以及在一个被内外冲突所撕裂的 意大利寻求和平的愿望所鼓动。根据这个观点，马基雅维利是第一个 了解艰难的真相的人：政治稳定的更大好处值得采取任何令人讨厌的 策略来实现它。哲学家以赛亚·柏林认为， 与其说是非道德的，《王子》贯穿了古希腊的道德观，把国家的荣耀放在基督 个人拯救的理想之上。但我们对马基雅维利的了解 可能与这种观点相左。作者在他的家乡佛罗伦萨 当了14年外交官，坚定捍卫其民选共和政府，反对未来的君主制。当美第奇家族夺取政权时，他不仅失去了职位，甚至被折磨和流放。考虑到这一点，有可能读他从流亡国外写的小册子不是为了捍卫君主统治，而是对其运作方式的尖锐描述。事实上，像斯宾诺莎 这样的启蒙式人物把《王子》看作是警告自由公民他们可能会以各种各样的方式 被有抱负的统治者征服。事实上，两个说法都可能是真的。马基雅维利可能为暴君写了一本手册，但通过分享，他也向那些 将被统治的人透露了这些东西。这样做，他彻底改变了政治哲学，为霍布斯和未来思想家 奠定基础，从人的具体实际 出发研究人的事务而不是基于先入为主的理想。通过他残酷而令人震惊的诚实，马基雅维利试图粉碎大众对 权力真正赋予了什么的幻想。他死前不久给一个朋友写信，他希望人们能“学会下地狱的方法， 以便逃离地狱”。

**P708 2019-03-22 How to spot a pyramid scheme - Stacie Bosley**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=708)

In 2004, a new company called Vemma Nutrition started offering a life-changing opportunity to earn full time income for part time work. Vemma’s offer was open to everybody, regardless of prior experience or education. There were only two steps to start get started earning: purchase a $500-600 kit of their liquid nutrition products, and recruit two more members to do the same. Vemma Nutrition Company grew quickly, becoming a global operation that brought in 30,000 new members per month at its peak. There was just one problem— while the company generated $200 million of annual revenue by 2013, the vast majority of participants earned less than they paid in. Vemma was eventually charged with operating a pyramid scheme: a common type of fraud where members make money by recruiting more people to buy in. Typically, the founder solicits an initial group of people to buy in and promote the scheme. They are then encouraged to recruit others and promised part of the money those people invest, while the founder also takes a share. The pattern repeats for each group of new participants, with money from recent arrivals funneled to those who recruited them. This differs from a Ponzi scheme, where the founders recruit new members and secretly use their fees to pay existing members, who think the payments come from a legitimate investment. As a pyramid scheme grows, it becomes increasingly difficult for new recruits to make money. That’s because the number of participants expands exponentially. Take a structure where each person has to recruit six more to earn a profit. The founder recruits six people to start, and each of them recruits six more. There are 36 people in that second round of recruits, who then each recruit 6 people— a total of 216 new recruits. By the twelfth round of recruiting, the 2.1 billion newest members would have to recruit over 13 billion more people total to make money– more than the entire world population. In this scenario, the most recent recruits, over 80% of the scheme’s participants, lose all the money they paid in. And in real life, many earlier joiners lose out too. Pyramid schemes are illegal in most countries, but they can be difficult to detect. They are presented as many different things, including gifting groups, investment clubs, and multi-level marketing businesses. The distinction between pyramid schemes and legitimate multi-level marketing can be particularly hazy. In theory, the difference is that the members of the multi-level marketing companies primarily earn compensation from selling a particular product or a service to retail customers, while pyramid schemes primarily compensate members for recruitment of new sellers. In practice, though, many multi-level marketing companies make it all but impossible for members to profit purely through sales. And many pyramid schemes, like Vemma Nutrition, disguise themselves as legal multi-level marketing businesses, using a product or service to hide the pay-and-recruit structure. Many pyramid schemes also capitalize on already existing trust within churches, immigrant communities, or other tightly knit groups. The first few members are encouraged to report a good experience before they actually start making a profit. Others in their network follow their example, and the schemes balloon in size before it comes clear that most members aren’t actually profiting. Often, the victims are embarrassed into silence. Pyramid schemes entice people with the promise of opportunity and empowerment. So when members don’t end up making money, they can blame themselves rather than the scheme, thinking they weren’t tenacious enough to earn the returns promised. Some victims keep trying, investing in multiple schemes, and losing money each time. In spite of all these factors, there are ways to spot a pyramid scheme. Time pressure is one red flag— be wary of directives to “act now or miss a once-in-a-lifetime opportunity.” Promises of large, life-altering amounts of income are also suspect. And finally, a legitimate multi-level marketing business shouldn’t require members to pay for the opportunity to sell a product or service. Pyramid schemes can be incredibly destructive to individuals, communities, and even entire countries. But you can fight fire with fire by sending this video to three people you know, and encouraging them to do the same.

**P708 2019-03-22 How to spot a pyramid scheme - Stacie Bosley**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=708)

翻译人员: shuping Lai 校对人员: Ziyao Wang2004年，一家名为Vemma营养的公司开始提供一个改变人生的机会，只需要做兼职即可获得全职报酬。Vemma的这个职位向所有人敞开，不论你是否有工作经验或教育背景。只要两步即可开始赚钱：购买一份500到600美元的 该公司营养饮料产品的装备，并招募再两名成员也来做这件事。这家公司成长迅速，并在国际范围内运转，最高时每月能招募 30000名新成员。这其中只有一个问题--当这家公司在2013年 达到年利润达到2亿美元时，大部分的参与者 赚的没有投入的多。Vemma最终被以层压式推销 （也就是金字塔骗局）起诉：这是一种常见的骗局，参与者们通过招来更多的人投资来赚钱。创始人一般说服 起始的小团队投资并宣传他们的计划。接着鼓励他们招募新人并允诺回报他们投资的那部分钱财，同时创始人也捞上一笔。这一模式在新的参与者中重复，最后新投资人的钱汇总回馈给招募者。这和庞氏骗局不同，庞氏骗局的创始者招募新人并私底下用新投资者的钱 回馈现存的老投资者，老投资者们认为回馈是来自合法的投资。当金字塔骗局壮大时，新投资人很难再赚到钱。因为加入者的数量呈指数型递增。就拿一个需要招募六人 来实现盈利的结构来说。创始人招募六个人来开始计划，每一个人再招募六个人。完成第二轮招募就有36个人，他们再每人招募6人----总共216个新投资者在第12轮招募过后，将有21亿人在这个团伙中， 亟需招募新人，总共130亿人参与盈利--超过整个世界人口。这个情况下，最新加入的投资者，即整个骗局的80%，将会失去他们投入的全部钱。在现实生活中，许多老投资者也会亏本。金字塔骗局在大多数国家是非法的，但它们很难被察觉。他们以很多种外表呈现，包括礼品销售团队，投资俱乐部，多层营销公司。合法的分级营销和 金字塔骗局有区别，但界线非常模糊。理论上，它们的区别在于，分级营销公司的员工主要通过销售特定商品或服务得到报酬，且卖给零售消费者，而金字塔骗局主要通过 招揽新投资人给老投资人报酬。实际上，许多分级营销公司让员工 通过单纯销售而可能获得盈利。而像Vemma这样的层压式推销组织，通过所谓的产品或服务 掩盖招募-回馈的架构，把自己伪装成合法的分级营销产业。许多层压式推销组织还利用教堂，移民社区或其他紧密联结的团体 成员之间的信任。最先加入的投资者 在真的开始获取利润之前被要求说自己体验良好。团体中的其他人也效仿这种做法，在大多数人意识到 他们并未赚到钱之前骗局像气球一样不断膨胀。通常骗局的受害者会羞于启齿。层压式推销组织还利用机会 和授权的口头保证诱骗人们。所以当投资者没有赚到钱时，他们会责怪自己而非这个组织，他们认为自己不够顽强， 所以赚不到事先保证的收益。一些受害者受骗后会继续尝试，在多个金字塔骗局中投资，但每次都无功而返。尽管有上述因素，还是有办法能识别金字塔骗局。“时间紧迫性”是一个警告--一定要警惕“现在入手 否则错失人生良机”的指示。一些诸如“巨大的，改变人生 数额的收益”的承诺也很可疑。最后，合法的分级营销不应该要求员工为销售 该组织产品的机会付款。金字塔骗局对个体， 团体，甚至整个国家，是毁灭性的。但你可以以毒攻毒，把这个视频发送给你认识的三个人，也让他们继续转发下去。

**P709 2019-03-25 What is a butt tuba and why is it in medieval art - Michelle Brown**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=709)

A rabbit attempts to play a church organ, while a knight fights a giant snail and a naked man blows a trumpet with his rear end. Painted with squirrel-hair brushes on vellum or parchment by monks, nuns, and urban craftspeople, these bizarre images populate the margins of the most prized books from the Middle Ages. Their illustrations often tell a second story as rich as the text itself. Some images appear in many different illuminated manuscripts, and often reinforce the religious content of the books they decorated. For example, a porcupine picking up fruit on its spines could represent the devil stealing the fruits of faith-- or Christ taking up the sins of mankind. Medieval lore stated that a hunter could only capture a unicorn when it lay its horn in the lap of a virgin, so a unicorn could symbolize either sexual temptation or Christ being captured by his enemies. Rabbits, meanwhile, could represent human’s lustful natures— and could redeem themselves through attempts to make sacred music despite their failings. All of these references would have been familiar to medieval Europeans from other art forms and oral tradition, though some have grown more mysterious over the centuries. Today, no one can say for sure what the common motif of a knight fighting a snail means— or why the knight so often appears to be losing. The snail might be a symbol of the inevitability of death, which defeats even the strongest knights. Or it could represent humility, and a knight’s need to vanquish his own pride. Many illuminated manuscripts were copies of religious or classical texts, and the bookmakers incorporated their own ideas and opinions in illustrations. The butt tuba, for example, was likely shorthand to express disapproval with-- or add an ironic spin to-- the action in the text. Illuminations could also be used to make subversive political commentary. The text of the "Smithfield Decretals" details the Church’s laws and punishments for lawbreakers. But the margins show a fox being hanged by geese, a possible allusion to the common people turning on their powerful oppressors. In the "Chronica Majora," Matthew Paris summarized a scandal of his day, in which the Welsh prince Griffin plummeted to his death from the tower of London. Some believed the prince fell, Paris wrote, while others thought he was pushed. He added his own take in the margins, which show the prince falling to his death while trying to escape on a rope made of bed-sheets. Some margins told stories of a more personal nature. "The Luttrell Psalter," a book of psalms and prayers commissioned by Sir Geoffrey Luttrell, shows a young woman having her hair done, while a young man catches a bird in a net. The shaved patch on his head is growing out, indicating that he is a clergyman neglecting his duties. This alludes to a family scandal where a young cleric ran away with Sir Geoffrey’s daughter Elizabeth. The family’s personal spiritual advisor likely painted it into the book to remind his clients of their failings and encourage their spiritual development. Some artists even painted themselves into the manuscripts. The opening image of Christine de Pisan’s collected works shows de Pisan presenting the book to the Queen of France. The queen was so impressed by de Pisan's previous work that she commissioned her own copy. Such royal patronage enabled her to establish her own publishing house in Paris. The tradition of illuminated manuscripts lasted for over a thousand years. The books were created by individuals or teams for uses as wide-ranging as private prayer aids, service books in churches, textbooks, and protective talismans to take into battle. Across all this variation, those tricky little drawings in the margins are a unique window into the minds of medieval artists.

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翻译人员: yiming ma 校对人员: Xiaoli JIANG一只兔子试图演奏教堂的风琴，骑士在和巨大的蜗牛搏斗，而一个裸男用他的臀部吹响了喇叭。这些由修道士、修女和城市工匠 用松鼠毛笔画在牛皮纸和羊皮纸上的离奇图案，从中世纪开始便常常出现在最珍贵的书的空白处。这些插图常常讲述了和正文 一样精彩的另一个故事。一些图案出现在不同的 泥金装饰手绘本里，它们可以增强书本的宗教色彩。例如，一只豪猪用刺叉起水果可能象征着恶魔偷窃了信念的果实，或是耶稣承担了人类的罪恶。在中世纪的传说里，猎人 只有可能在独角兽把角枕在处女膝盖上时才能抓住它，独角兽意味着性的诱惑，或是被敌人俘虏的耶稣。而兔子象征着人类好色的天性，虽然它们有缺点，但可以通过谱写神圣的音乐而得到救赎。中世纪的欧洲人通过其他艺术形式和口头传统已经熟悉了上述的例子，尽管当中的一些随着时间流逝 变得更诡谲了。如今，没人可以肯定地说出 骑士大战蜗牛的共同主题是什么，或者为什么骑士总是会输。蜗牛或许代表着无法避免的死亡，强壮如骑士也会被它击败。或者它代表着谦逊， 骑士需要克服自己的骄傲。许多泥金装饰本是 宗教或古典文本的复本，书籍的制作人会把自己的想法和 观念融入在插图里。例如，屁股大号可能是简单地表达不赞同，或是讽刺文章中的做法。这些图案也可被用于作出 颠覆性的政治评论。《史密斯菲尔德法令》的文本详细地记载了教会法 和对违法者的惩罚。但是空白处却画着狐狸被鹅吊死的图，可能暗示平民反抗强大的压迫者。在《英国编年史》里，马修 · 帕瑞斯（Matthew Paris）写了 那个时代的一桩丑闻，威尔士亲王格瑞芬从伦敦塔上坠落而死。一些人认为王子是失足， 帕瑞斯写道，但其他人觉得他是被推下去的。他在空白处加上了自己的想法，他认为王子之所以会坠亡，是由于他试图用床单做成绳子逃跑。还有一些书本的页边讲述了个人的故事，《中世纪奇幻生物》是受杰弗里 · 卢特雷尔爵士（Sir Geoffrey Luttrell）委托 而制作的一本关于赞美诗和祝祷文的书，书中一个年轻女人刚做好头发，而一个年轻男人用网抓了一只鸟。他头上剃掉的头发刚刚长出来，这表明他是一名玩忽职守的牧师。这里暗藏了一桩家庭丑闻，一个年轻的牧师和 杰弗里爵士的女儿伊丽莎白私奔了。可能是这家人的宗教顾问画了这幅画来提醒这家人不要忘记失败，并鼓励他们在宗教上继续努力。一些艺术家甚至把自己画进了手稿中，克里斯蒂娜 · 德 · 皮桑（Christine dePisan） 作品集的卷首图就是关于德 · 皮桑把这本书 献给法兰西女王。女王对德 · 皮桑之前的作品印象深刻，所以她委托制作了一份自己的复本。来自皇室的资助让她得以在巴黎开了自己的出版社。泥金装饰本的传统持续了上千年。这些书由个人或团队制作，用途广泛，包括私人祈祷的辅助、教堂的祈祷书、课本和带上战场的护身符。虽然形式千变万化，这些书本上的奇异插画从一个独特的角度展示了 中世纪艺术家的想法。

**P710 2019-03-27 'First Kiss' by Tim Seibles**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=710)

First Kiss Her mouth fell into my mouth like a summer snow, like a 5th season, like a fresh Eden, like Eden when Eve made God whimper with the liquid tilt of her hips— her kiss hurt like that— I mean, it was as if she’d mixed the sweat of an angel with the taste of a tangerine, I swear. My mouth had been a helmet forever greased with secrets, my mouth a dead-end street a little bit lit by teeth—my heart, a clam slammed shut at the bottom of a dark, but her mouth pulled up like a baby-blue Cadillac packed with canaries driven by a toucan—I swear those lips said bright wings when we kissed, wild and precise—as if she were teaching a seahorse to speak— her mouth so careful, chumming the first vowel from my throat until my brain was a piano banged loud, hammered like that— it was like, I swear her tongue was Saturn’s 7th moon— hot like that, hot and cold and circling, circling, turning me into a glad planet— sun on one side, night pouring her slow hand over the other: one fire flying the kite of another. Her kiss, I swear—if the Great Mother rushed open the moon like a gift and you were there to feel your shadow finally unhooked from your wrist. That’d be it, but even sweeter— like a riot of peg-legged priests on pogo-sticks, up and up, this way and this, not falling but on and on like that, badly behaved but holy—I swear! That kiss: both lips utterly committed to the world like a Peace Corps, like a free store, forever and always a new city—no locks, no walls, just doors—like that, I swear, like that.

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翻译人员: Cissy Yun 校对人员: Wanting Zhong《初吻》她的唇落入我的嘴，像夏日之雪，像第五个季节， 像最初的伊甸园，像在伊甸园中，夏娃曼妙的翘臀使上帝低声呜咽——她的吻是那般伤人——我是说，就像融合了天使的汗水与柑橘的甘甜。我发誓，我的嘴永远如头盔，以秘密滋润，我的嘴是一条死胡同， 一点点被唇齿点燃——我的心就如蛤蜊， 在黑暗底处砰然紧闭，但她的唇如一辆浅蓝色的凯迪拉克， 突然停下，由翠鸟驱车，载着金丝雀——我发誓，那嘴唇在我们拥吻时 述说着斑斓的翅膀，狂野而准确—— 好似她在教海马说话——她的唇齿小心翼翼，啜吮着 我口中那第一声元音，直到我的大脑混沌 若钢琴般锵然激昂，就像，我发誓她的舌就是 土星的第七颗月亮——如此炽热，炽热， 冰冷，旋转，舞动，将我也变成 一颗快乐的星球——一边阳光明媚， 夜晚将徐缓之手流淌于另一侧： 一簇火 放飞另一簇火的风筝。她的吻，相信我——若自然之母 急切地拉开月亮之帘，就像迫切地打开礼物一样， 而你的暗影终于放开了擒住你的手腕。或许如此， 但更加甜蜜——正如一群装着义肢的传教士 踩着娃娃跳杆，一直往上，这样那样，却永不坠下， 一路往前，像这样，虽然行为不端，但是神圣无比，我发誓！ 那吻，完全投入的双唇像是和平组织的使者投身于这世界，像是免费的商店，永远，永远在探索一座新城——没有枷锁和高墙束缚， 只有敞开的大门——就像这样，我发誓。就是如此。

**P711 2019-04-01 How to biohack your cells to fight cancer - Greg Foot**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=711)

Ok, so you, are a 4 billion year old meat robot. Yeah, you heard me right. In fact, as you're made of 30-ish trillion cells, and each of those have their own task, you're a robot made of trillions of mini robots- you are a mega-meat-bot! And your mission, for the past 4 billion years or so- and for as long as you keep playing this game of life- is to safeguard the code. To duplicate it. To pass it on. The thing is, you're rubbish at copying your own code. Every time it's copied, errors crop up. Not good when an error makes a robot worse at surviving, but sometimes a mistake helps them survive... and they pass that glitch in the code on- that's evolution in a nutshell, right? Which means you're not the result of some fancy design, I'm afraid. You're a result of billions of years of bad copies. Go you. Another reason you're not totally awesome is because that megabot of yours often breaks down. Fortunately, cardiologists, immunologists, microbiologists- all the "ists"- have spent centuries figuring out our sensors and wiring so if something does go wrong, they can usually fix it. Where they struggle, though, is when the machinery turns on itself- when a copying error leads a cell to start dividing uncontrollably, to grow and multiply into a tumor. That's cancer. And sadly, even with the might of our modern medicine, some cancers evade treatment. But this is where a new band of biologists step into the story: The "Synthetic Biologists." These biohackers are mashing up science, medicine and engineering to rewrite the code and fix the un-fixable. Biohackers are going into a patient's genetic code and reprogramming their own immune system to recognize cancer cells and destroy them. It's called CAR T-cell therapy, and it's awesome. See, you're constantly under attack by pathogens- single-celled bacteria, viruses and fungi. Despite deciding, back in the day, to stay solo and not 'avengers assemble' like you did, those pathogens see you, in all your mega-meat-bot glory, as a fortress ripe for the plundering. Thankfully, you've got a security team in place to battle these invaders- your immune system- and some of it's top guards are your white blood cells. They trawl the darkness that is your inner space, checking the IDs of any cells they pass... although they're not name badges, but rather protein fragments on the cell's surface called antigens. There are two types of these guards: T-cells and B-cells. T-cells check those antigen IDs using special claws- receptors that lock with a particular antigen. If they find a match, they attach and they release toxic chemicals that burst open the invading cell's membrane. Their B-cell workmates create antibodies- loads of small proteins, little claws that latch perfectly onto a particular antigen, marking them for destruction. These two comrades have got your back and your immune system is brilliant at spotting and fighting pathogens that invade from outside. However, they're not so good at spotting your own cells that have gone rogue. The antigens on cancerous cells don't look weird, they look a lot like your own cells, and the T's and B's aren't programmed to attack them. The usual way to deal with cancer is to try to cut the tumor out, or turn to radiotherapy and then chemotherapy to destroy or block the growth of cancer cells, but if it's a blood cancer, if it's floating around your whole body, you can't do that. And if the blood cancer actually starts in your white blood cells- those key guards in your immune system- you'll really struggle to spot it. That's the case with acute lymphoblastic leukemia, and that's where CAR T-cell therapy is kicking butt. The biohackers are reprogramming a patient's own immune system to recognize particular antigens- those particular protein fragments- on the cancer cells. To do it, you first need millions of a patient's T-cells Then, to get a T-cell to do something different, you need to replace its normal code with something new, something you've designed. What synthetic biologists can now do with DNA is super cool- they use a computer to put together their own sequences of bases- the chemical letters that spell out the DNA- then they model what that new genetic code will do on a computer and then make those sequences on a DNA printer- yeah, that's a thing!- printing not with ink, or with a plastic polymer like in a 3D printer, but with those fundamental building blocks of life, with those A's and C's and T's and G's. The new code they designed for a T-cell has 3 key instructions: 1. It tells it how to recognize and kill a cancer cell. More specifically, how to modify an antibody- what the B-cells make to latch onto a target antigen. The antibody is modified to make a new receptor that can detect the particular antigens on the specific cancer. 2. It tells it to make copies of itself when it finds that cancer cell and 3. It tells it to survive in the patient's body. To get this new code into the patient's T-cells, you use a vector- it's something that will easily infect the T-cell and carry that bespoke DNA in with it. And voila! One CAR T-cell. The name comes from a fire-breathing monster from Ancient Greece, that had a lion's head, a goat's body and a serpent's tail. It was called "Chimera"- a name that has now come to be used for something that contains two or more different types of tissues or cells. As this newly engineered cell's genetic code is part T-cell, part antibody, it's a "C"himera and it goes in search of the cancer's "A"ntigen using its new "R"eceptor. Before you put the multiplied up T-cells back into the patient, you give them a mild dose of chemotherapy to wipe their existing T-cells. Then you simply reinsert the now modified T-cells- the CAR T-cells- and they follow their normal DNA programming to move and search. However, thanks to their new butt-kicking code, they've changed what they're looking for: they're now on a mission to find the cancerous cells and destroy them. Unlike conventional chemical-based drugs that get used up or excreted from the body pretty quickly, CAR T-cells are living drugs that stay in the patient's bloodstream for years. That's a huge pro. The flip side is that they're expensive- each CAR T-cell treatment is bespoke to the patient- and it's more difficult to get them to work with common cancers like breast or lung, because you need a specific antigen on the cancer cells for the CAR T-cell to target- and it's much easier to find that in blood cancers. It's still early days, though, and there's an exciting future for CAR T-cell therapy. Researchers like Dr. Martin Pule and his team at UCL, are working on improving the leukemia and lymphoma treatments even further, and there's recently been some promising work on solid cancers. Thanks to CAR T-cell therapy, the survival rate for B acute lymphoblastic leukemia has improved hugely -nearly all patients go into remission- which means that leukemia cannot be detected anymore- and most patients stay in remission. Biohacking is here, and it can reprogram your own genetic code to enable your mega-meat-bot to do things it's never been able to do before!

**P711 2019-04-01 How to biohack your cells to fight cancer - Greg Foot**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=711)

翻译人员: Yichen Huang 校对人员: Tianji (Homer) Li好，所以你是一个四十亿岁的肉身机器人。对，你没听错。事实上，因为你由约 30 万亿细胞构成，而这些细胞又各司其职，你是一个由数万亿小机器人 构成的大机器人——你是一个巨型肉身机器人！而你的任务， 在过去大概四十亿年——直到你离开生命的世界——是守护遗传编码。复制遗传编码， 传递遗传编码。但问题是，你很不擅长 复制你自己的遗传编码。每次复制中都可能出现错误。错误有时会降低 机器人的生存能力，但有时也会让他们更善于生存……他们会传承那些有利的编码——简而言之，那就是进化，对吧？也就是说， 你恐怕不是什么精妙的设计，而是数十亿年不完美复制的产物。真有你的。另一个你不完美的理由：你巨型机器人的 身体经常会故障。幸运的是，心脏病学家、免疫学家、 微生物学家——各种“学家”们花费了数个世纪 厘清了我们身体的运作机理因此若是有故障发生， 他们通常能修复我们。而令他们苦恼的是， 有时机器人会失控攻击自己——复制中的错误可能会 导致一个细胞不可控制地增殖，成为一个肿瘤。那就是癌症。不幸的是， 即使有了最强大的现代药物，我们依然无法治疗一些癌症。这就是一批崭新的生物学家 施展拳脚的时候了：他们就是“合成生物学家”。这些生物黑客融会了 基础科学、医学和工程学来写出强大的编码修复 难以修复的问题。生物黑客们研究病人的遗传编码然后改写他们的免疫系统使其能够识别出癌变的 细胞并摧毁他们。这就是 CAR T-细胞疗法，这很棒。你每时每刻都在受到 病原体的袭击——单细胞的细菌、病毒和真菌。即使这些细胞在过去 决定了要独自行动而不像你一样“复仇者集结”，它们将你的巨型肉身机器身体看作一座吸引人的宝藏。还好你有一队安保部队 准备好与这些入侵者战斗——你的免疫系统——白细胞就是其中的精锐之一。它们在你体内游走，检查他们所遇到 所有细胞的身份……细胞的身份可不记录在名牌上而是记录着细胞表面 被称作抗原的蛋白质片段上。白细胞包括了 T-细胞和 B-细胞。T-细胞用特殊的爪子 检查抗原的身份——这些爪子回合特定的抗原匹配。要是爪子和抗原匹配成功， 它们会结合并放出有毒的化学物质。这些化学物质会破坏入侵细胞的细胞膜。B-细胞则会生产抗体——大批的小型蛋白质，这些小蛋白质可以 锁住特定的抗原，标记它们以便于摧毁。这两种保卫者守护着你，而你的免疫系统也善于发现和对抗来自外部的病原体。然而，它们并不擅长对抗 你自己“叛变”的细胞。癌变的细胞的抗原 看起来并无异样，就像你自己正常的细胞一样，T-细胞和 B-细胞 并不能攻击它们。通常应对癌症的方法 是切除整个肿瘤，或者采用放射疗法和化学疗法来摧毁癌变的细胞 或是抑制其生长，但血癌，即白血病， 会扩散至人的全身，就不能应用放射和化学疗法。若是血癌是源自 你白细胞的癌变——白细胞是免疫系统的 关键组成部分——就很难被识别。这就是急性淋巴细胞性白血病，正是 CAR T-细胞疗法 大展拳脚的地方。生物黑客们正致力于 改写病人自己的免疫系统来识别出癌变细胞上特定的抗原——那些特殊的蛋白质片段。要做到这点，你首先需要病人 身上数百万的 T-细胞。然后，为了更新 T-细胞的功能，你需要改写它原本的编码，改成你设计的编码。合成生物学家改写 DNA 的能力超群，他们用计算机拼装 特定的碱基序列——碱基是构成DNA的化学符号——然后他们在计算机上 模拟新的遗传密码的属性最后他们用 DNA 打印机 制成那些序列，没错，真的有 DNA 打印机！不是用墨水打印，也不是像3D 打印机一样用可塑的聚合物打印，而使用用那些构成生物的基础，那些A、C、T 和 G 碱基来打印。他们为 T-细胞设计的新密码 有三个关键指示：1、这告诉 T-细胞 如何识别并消灭癌变的细胞。具体来讲，如何修改抗体——B-细胞制造抗体， 抗体吸附于目标抗原上。抗体被修改使其能够识别特定癌变 细胞上的特殊抗原。2、告诉 T-细胞在发现 癌变细胞后增值，3、告诉 T-细胞在 病人的体内生存。为了将这些新的密码 写入病人的 T-细胞，要使用一个载体——载体能轻易感染 T-细胞并且能搭载之前所述的 DNA。这样就得到一个 CAR T-细胞了！此疗法的名字源于 古希腊文化中的一种喷火怪物，它有狮头、羊身和蛇尾。它被称作奇美拉（Chimera），现在被用于形容 使用多种组织活细胞的疗法。CAR T-细胞疗法制造出的新细胞 正是部分 T-细胞，部分抗体，它是一种奇美拉，它能够找出 癌变细胞的抗原（Antigen）用的是它的新接收器（Receptor）。在你把增殖后的 T-细胞 送回病人体内之前，要对病人进行轻微的化学疗法 来消灭体内已有的 T-细胞。然后注入修改过的 T-细胞——即 CAR T-细胞——然后它们依据 DNA 编码 来移动和搜寻。和原本的 T-细胞不同，多亏了修改过的 DNA 编码，它们可以发现并摧毁癌变的细胞。传统的化学药物在短时间内容易用尽 或是被排出体外，而 CAR T-细胞是活的药物， 能够在病人的血液循环中保留数年。这是个巨大的优点。而缺点是此疗法很昂贵——每次 CAR T-细胞疗法 都要为病人定制——因此很难将其用于一般的癌症 如乳腺癌和肺癌，因为此疗法需要癌变 细胞上特定的抗原来作为 CAR T-细胞的目标——而这些抗原在血癌中 则更容易获得。不过 CAR T-细胞疗法还在初级阶段，它的未来应用前景十分明朗。一些科学家，如马丁 · 普莱博士和 他在伦敦大学学院的团队，正在致力于推进白血病 和淋巴瘤的治疗，最近针对固态瘤的研究 也有很大的进展。因为 CAR T-细胞疗法，急性 B 细胞白血病的 生还率显著增加，几乎所有的患者的 症状都能得到缓解，这些病人的体内不再 被检测出白血病，而且大部分病人都能保持在缓解的状态。生物黑客技术已成现实，使人们可以改写基因编码， 使得你的巨型肉身机器做到之前无法做到的事！

**P713 2019-04-09 'Accents' by Denice Frohman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=713)

I'm Denice Frohman, and this is "Accents." my mom holds her accent like a shotgun, with two good hands. her tongue, all brass knuckle slipping in between her lips her hips, are all laughter and wind clap. she speaks a sanchocho of spanish and english, pushing up and against one another, in rapid fire there is no telling my mama to be "quiet," my mama don't know "quiet." her voice is one size better fit all and you best not tell her to hush, she waited too many years for her voice to arrive to be told it needed house keeping. English sits in her mouth remixed so "strawberry" becomes "eh-strawbeddy" and "cookie" becomes "eh-cookie" and kitchen, key chain, and chicken all sound the same. my mama doesn't say "yes" she says, "ah ha" and suddenly the sky in her mouth becomes a Hector Lavoe song. her tongue can't lay itself down flat enough for the English language, it got too much hip too much bone too much conga too much cuatro to two step got too many piano keys in between her teeth, it got too much clave too much hand clap got too much salsa to sit still it be an anxious child wanting to make Play-Doh out of concrete English be too neat for her kind of wonderful. her words spill in conversation between women whose hands are all they got sometimes our hands are all we got and accents that remind us that we are still bomba, still plena you say "wepa" and a stranger becomes your hermano, you say "dale" and a crowd becomes a family reunion. my mother's tongue is a telegram from her mother decorated with the coqui's of el campo so even when her lips can barely stretch themselves around english, her accent is a stubborn compass always pointing her towards home.

**P713 2019-04-09 'Accents' by Denice Frohman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=713)

翻译人员: Tianji (Homer) Li 校对人员: Heze Ma我叫丹妮斯·佛罗曼，这首诗题为《口音》。我妈妈说话带口音，就好像用双手紧握着猎枪。她的舌头像 戴上了指节铜环，从她的双唇间溜进；她的臀部充满了笑声和风声。她说话西班牙语和英语夹杂着，就像用快火烩制一锅大杂烩，各种食材相互推推攘攘， 你挤我碰。没法叫我妈妈“静下来”，因为我妈妈不明白 “quiet” 是什么意思她的音量使得她十分健谈，你最好别叫她静下来，她一贯如此说话，这许多年之后，她才得知她的 音量需要 “内务”管理。英语在她的嘴中加以混音，于是 “strawberry (草莓)” 变成了 “eh-strawbeddy”,“cookie (饼干)”变成了 “eh-cookie”，而 “kitchen (厨房)”、“key chain (钥匙扣)” 和 “chicken (鸡)” 听起来都 一样。我妈妈不说 “yes (是的)”，她说 “ah ha”，突然，她嘴里的天空变成了 赫克托·拉沃的歌，她的舌头无法摊平说英语。这舌头有太大臀部，太多骨头，太多康加舞，太多四弦吉他，无法跳两步舞,在她的牙齿间，太多钢琴键，太多打击节奏，太多拍手声，太多萨尔萨舞，让人坐不住，它像个焦虑的孩子，想要把混凝土 变成培乐多彩泥，英语太整洁了，不适合表达她 那种美好的方式，她在俩女人间谈话，滔滔不绝，双手是她们所有的，有时，我们的双手 是我们所有的。而口音提醒我们仍是炸弹，仍是集会。你说“哇，太好了”，一个陌生人就成了你的兄弟，你说“加油”，一群人就成了家人团聚，我妈妈的发音就像她妈妈，用“呱呱”类似声音装饰的电报因此即使她的嘴唇很难吞吐说出英语，但她的口音就如同永恒的指南针总是引领着她回乡。

**P714 2019-04-10 Can you solve the cuddly duddly fuddly wuddly riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=714)

For your son’s sixth birthday, you’ve promised to get him the cutest creature in creation: the cuddly. It’s hard to believe that it’s a cousin of the terrifying duddly or the hideous fuddly. They’re all members of the Wuddly species, and the process of adopting them is deeply peculiar. It takes 100 eggs to make a single animal in genus Wuddly. When 100 eggs are placed together in an incubator, they undergo egg fusion, and combine in the following way. Blue and purple combine to make red eggs. Red and blue combine to make purple eggs, and red and purple combine to make blue eggs. The most plentiful eggs pair up first, and if two piles are even, an egg comes from one of them at random. They keep combining until there’s just one left. If the final egg is blue, a Cuddly hatches out of it. Purple eggs give you Duddlies, and Red eggs give you Fuddlies. The incubator currently has 99 eggs in it. 23 are blue, 33 are purple, and 43 are red. You can begin the process of egg fusion by adding an egg of any color to the room. When all the eggs have combined into a single egg, the creature that hatches will bond with you on sight, which is why getting a Cuddly is so important. After all, you made a promise to your son. Which color egg should you add to the incubator to get a cuddly? Pause the video to figure it out for yourself. Answer in 3 Answer in 2 Answer in 1 It’s easy to get mixed up with all the cuddlies, duddlies, and fuddlies coming from different colored eggs. If we ignore how many total eggs of each color there are, and just look at the process of egg fusion, we might notice something that will make this problem simpler. When two eggs fuse, the number of eggs of each of those colors decreases by one, and the number of the third color increases by one. That means they all change parity, or evenness and oddness, at the same time. Right now all three piles are odd, but you get to add an egg to one color, which means that it’ll be even and the other two will be odd. Whichever color you choose will always be the opposite parity of the other two piles: odd when they’re even and even when they’re odd, since every egg fusion flips each pile’s parity simultaneously. We want to end with 1 blue, 0 purple, and 0 red eggs, or odd, even, even. That means we want the blue egg pile to be the opposite parity of the other two piles at the start as well. So you add a blue egg into the room, and 99 egg fusions later, only a single blue egg remains. The Cuddly that hatches is sure to make your 6-year-old as happy as can be. Just be sure to follow the shopkeeper’s warning, and never feed it after midnight.

**P714 2019-04-10 Can you solve the cuddly duddly fuddly wuddly riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=714)

翻译人员: Carol Wang你儿子的六岁生日要来了，你承诺要给他一只 世界上最可爱的宠物：卡迪。难以置信的是， 卡迪有两个堂兄弟，面目狰狞的杜迪 和丑恶的法迪。它们都是瓦迪家族成员，而领养它们的过程也别具一格，要融合100枚蛋 才能得到一只瓦迪成员。把100枚蛋放入孵化器后，融合开始，并以下列方式进行组合。蓝色和紫色合成红色蛋，红色和蓝色合成紫色蛋，红色和紫色会合成蓝色蛋。数量最多的一组会先融合，如果其中两堆数量相同，会随机从中选一枚进行融合。不断两两相融，直至只剩一枚蛋。如果最后的蛋是蓝的，会孵出卡迪，紫色的会是杜迪，红色则是法迪。现在，孵化器里有99枚蛋。23枚蓝蛋、33枚紫蛋、43枚红蛋。你只需再放入一个任意颜色的蛋， 融合过程即可开始。当所有的蛋融合成一个，孵化后的动物会对你一见钟情，因此，得到卡迪就格外重要。毕竟，你承诺过儿子要给他卡迪。那么，放哪枚蛋才能得到卡迪呢？若想自己解题，可暂停视频答案公布倒计时：3答案公布倒计时：2答案公布倒计时：1不同颜色孵出卡迪、杜迪和法迪，很容易把人弄糊涂，如果先忽略各自的数量，只看融合过程，会发现这让问题简化了。当两枚蛋融合时，各自数量将分别减一，而第三种蛋的数量则加一，其奇偶性同时发生了改变，即同时偶变奇，奇变偶。目前三堆蛋都是奇数 ， 但你要加一枚某个颜色的蛋，三堆蛋数量变成一偶、两奇。无论你选什么颜色，总是一种蛋是偶数， 另两种蛋是奇数：一奇两偶，或一偶两奇，因为每次融合 会同时改变其奇偶性。最终我们想要：1枚蓝蛋、 0枚紫蛋和红蛋，即一奇两偶，也就是说，融合开始前，蓝蛋与其它两种奇偶性相反。因此，你放入一个蓝蛋，历经99次蛋融合，最后只剩一个蓝蛋。孵化出的卡迪 令你六岁的儿子高兴万分。但千万铭记店主的建议，午夜十二点后请勿喂食。

**P715 2019-04-11 Can you spot the problem with these headlines (Level 1) - Jeff Leek &**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=715)

"New drug may cure cancer." "Aspirin may reduce risk of heart attacks." "Eating breakfast can help you lose weight." Health headlines like these flood the news, often contradicting each other. So how can you figure out what’s a genuine health concern or a truly promising remedy, and what’s less conclusive? In medicine, there’s often a disconnect between news headlines and the scientific research they cover. That’s because a headline is designed to catch attention— it’s most effective when it makes a big claim. By contrast, many scientific studies produce meaningful results when they focus on a narrow, specific question. The best way to bridge this gap is to look at the original research behind a headline. We’ve come up with a simplified research scenario for each of these three headlines to test your skills. Keep watching for the explanation of the first study; then pause at the headline to figure out the flaw. Assume all the information you need to spot the flaw is included. Let’s start with this hypothetical scenario: a study using mice to test a new cancer drug. The study includes two groups of mice, one treated with the drug, the other with a placebo. At the end of the trial, the mice that receive the drug are cured, while those that received the placebo are not. Can you spot the problem with this headline: "Study shows new drug could cure cancer" Since the subjects of the study were mice, we can’t draw conclusions about human disease based on this research. In real life, early research on new drugs and therapies is not conducted on humans. If the early results are promising, clinical trials follow to determine if they hold up in humans. Now that you’ve warmed up, let’s try a trickier example: a study about the impact of aspirin on heart attack risk. The study randomly divides a pool of men into two groups. The members of one group take aspirin daily, while the others take a daily placebo. By the end of the trial, the control group suffered significantly more heart attacks than the group that took aspirin. Based on this situation, what’s wrong with the headline: "Aspirin may reduce risk of heart attacks" In this case, the study shows evidence that aspirin reduces heart attacks in men, because all the participants were men. But the conclusion “aspirin reduces risk of heart attacks” is too broad; we can’t assume that results found in men would also apply to women. Studies often limit participants based on geographic location, age, gender, or many other factors. Before these findings can be generalized, similar studies need to be run on other groups. If a headline makes a general claim, it should draw its evidence from a diverse body of research, not one study. Can you take your skills from the first two questions to the next level? Try this example about the impact of eating breakfast on weight loss. Researchers recruit a group of people who had always skipped breakfast and ask them to start eating breakfast everyday. The participants include men and women of a range of ages and backgrounds. Over a year-long period, participants lose an average of five pounds. So what’s wrong with the headline: "Eating breakfast can help you lose weight" The people in the study started eating breakfast and lost weight— but we don’t know that they lost weight because they started eating breakfast; perhaps having their weight tracked inspired them to change their eating habits in other ways. To rule out the possibility that some other factor caused weight loss, we would need to compare these participants to a group who didn’t eat breakfast before the study and continued to skip it during the study. A headline certainly shouldn’t claim the results of this research are generally applicable. And if the study itself made such a claim without a comparison group, then you should question its credibility. Now that you’ve battle-tested your skills on these hypothetical studies and headlines, you can test them on real-world news. Even when full papers aren’t available without a fee, you can often find summaries of experimental design and results in freely available abstracts, or even within the text of a news article. Individual studies have results that don’t necessarily correspond to a grabby headline. Big conclusions for human health issues require lots of evidence accumulated over time. But in the meantime, we can keep on top of the science, by reading past the headlines.

**P715 2019-04-11 Can you spot the problem with these headlines (Level 1) - Jeff Leek &**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=715)

翻译人员: Yue Zhang 校对人员: Lipeng Chen“新型药品可能治愈癌症”,“阿司匹林可降低心脏病发作的风险”,“吃早餐有助于减肥”，类似的健康新闻标题泛滥成灾，也常常自相矛盾。那么，你如何能分辨出 什么才是真正的健康问题或真正有前景的治疗手段，而哪些又不太可信呢？在医学上，新闻标题和它们所涉及的科学研究往往出现断层。这是因为，新闻标题的设计 旨在吸引注意力——当其夸大效果时最为有效。相反，许多科学研究的结果是非常有意义的，它们只专注于某个很小的具体问题。弥补这两者之间的断层的最佳方式则是着眼于标题背后的原始研究。我们为这三个新闻标题 均设定了一个简化的研究情景来测试你的（辨别）能力。继续观看第一项研究的解释，当出现标题时， 暂停视频来找出其中的逻辑错误。假设找出逻辑问题的所有必要信息 都被包含其中。那我们从这一个假设情景开始吧：一项研究用老鼠来测试 一种新型抗癌药物。这项研究采用两组老鼠，一组用药物， 另一组用安慰剂。在试验结尾，药物组老鼠被治愈，而安慰剂组老鼠没有被治愈。你能从这个标题中发现问题吗：“研究表明新药能治愈癌症”因为研究对象是老鼠，我们不能基于这项研究 而对人类疾病（的药物治疗）作出结论。在实际生活中，新药和治疗方法的 早期研究并不会在人类身上进行。如果早期研究结果有前景，临床试验会进一步判断 它们是否会在人体上起作用。现在你已经有了基础，接下来我们再看一个更有意思的案例：关于阿司匹林对心脏病发作风险 的影响的一项研究。这项研究将一群人随机分为两组。其中一组人员每天服用阿司匹林，而另一组每天服用安慰剂。在试验结尾，对照组人员心脏病发作的次数明显更多相比服用阿司匹林组人员。基于这样的情景， 以下标题有什么问题：“阿司匹林能降低心脏病发作风险”在这个案例中，研究证明阿司匹林减少了 男性（患者）的心脏病发作次数，因为所有的参与者都是男性。但是 “阿司匹林降低了心脏病发作风险” 的这一结论太宽泛；我们不能假设（试验中）男性患者的结果 会同样适用于女性患者。研究常常根据地理位置、年龄、 性别或许多其他因素，来限制参与者。在这些研究结果能被普遍推广之前，需要对多组不同的 其他参与者进行类似的研究。如果标题要作一个普遍适用性申明，它应该从多种不同的研究获取证据， 而不是凭借单项研究。那么从前两个问题中， 你能将你的辨别能力进一步提升吗？那么再看一个案例， 关于吃早餐对减肥的影响。研究者招纳了一组人员， 他们总是不吃早饭，并且让他们每天开始吃早饭。参与者包括男性和女性， 有着不同的年龄范围和背景。在一年之久的这段期间，参与者平均减少了五磅体重。所以，下面这则标题有什么问题呢：“吃早餐能帮助你减少体重”参与这项研究的人 开始吃早饭，体重下降——但是我们并不知道 他们体重下降是否因为开始吃早饭；也许是记录他们的体重影响了他们， 让他们改变了饮食的习惯。要排除其他因素 会造成体重下降的可能，我们需要将这些研究参与者与另一组人员进行对比， 这一组（对照组）人员在实验之前不吃早餐，实验过程中也继续不吃早餐。当然，一个新闻标题 不能宣称这项研究的结果是普遍适用的。并且，如果研究本身 不采用对照组就作出断言，那么你应该质疑它的可信度。既然，通过这些假设性研究和标题，你完成了辨别能力的实战训练，你不妨在真实新闻中试试身手。即便当你没有付费， 不能阅读全篇文章时，实验设计和结果的概要也可以在免费的文章摘要，甚至新闻报道中找到。个别研究的结果并不需要一个夺人眼球的标题。人类健康问题的重大结论，需要日积月累的大量（实验）证据。但与此同时，通过超越标题的深入阅读， 我们则能与科学并驾齐驱。

**P716 2019-04-12 How do self-driving cars “see” - Sajan Saini**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=716)

It’s late, pitch dark, and a self-driving car winds down a narrow country road. Suddenly, three hazards appear at the same time. What happens next? Before it can navigate this onslaught of obstacles, the car has to detect them— gleaning enough information about their size, shape, and position, so that its control algorithms can plot the safest course. With no human at the wheel, the car needs smart eyes, sensors that’ll resolve these details— no matter the environment, weather, or how dark it is— all in a split-second. That’s a tall order, but there’s a solution that partners two things: a special kind of laser-based probe called LIDAR, and a miniature version of the communications technology that keeps the internet humming, called integrated photonics. To understand LIDAR, it helps to start with a related technology— radar. In aviation, radar antennas launch pulses of radio or microwaves at planes to learn their locations by timing how long the beams take to bounce back. That’s a limited way of seeing, though, because the large beam-size can’t visualize fine details. In contrast, a self-driving car’s LIDAR system, which stands for Light Detection and Ranging, uses a narrow invisible infrared laser. It can image features as small as the button on a pedestrian’s shirt across the street. But how do we determine the shape, or depth, of these features? LIDAR fires a train of super-short laser pulses to give depth resolution. Take the moose on the country road. As the car drives by, one LIDAR pulse scatters off the base of its antlers, while the next may travel to the tip of one antler before bouncing back. Measuring how much longer the second pulse takes to return provides data about the antler’s shape. With a lot of short pulses, a LIDAR system quickly renders a detailed profile. The most obvious way to create a pulse of light is to switch a laser on and off. But this makes a laser unstable and affects the precise timing of its pulses, which limits depth resolution. Better to leave it on, and use something else to periodically block the light reliably and rapidly. That’s where integrated photonics come in. The digital data of the internet is carried by precision-timed pulses of light, some as short as a hundred picoseconds. One way to create these pulses is with a Mach-Zehnder modulator. This device takes advantage of a particular wave property, called interference. Imagine dropping pebbles into a pond: as the ripples spread and overlap, a pattern forms. In some places, wave peaks add up to become very large; in other places, they completely cancel out. The Mach-Zehnder modulator does something similar. It splits waves of light along two parallel arms and eventually rejoins them. If the light is slowed down and delayed in one arm, the waves recombine out of sync and cancel, blocking the light. By toggling this delay in one arm, the modulator acts like an on/off switch, emitting pulses of light. A light pulse lasting a hundred picoseconds leads to a depth resolution of a few centimeters, but tomorrow’s cars will need to see better than that. By pairing the modulator with a super- sensitive, fast-acting light detector, the resolution can be refined to a millimeter. That’s more than a hundred times better than what we can make out with 20/20 vision, from across a street. The first generation of automobile LIDAR has relied on complex spinning assemblies that scan from rooftops or hoods. With integrated photonics, modulators and detectors are being shrunk to less than a tenth of a millimeter, and packed into tiny chips that’ll one day fit inside a car’s lights. These chips will also include a clever variation on the modulator to help do away with moving parts and scan at rapid speeds. By slowing the light in a modulator arm only a tiny bit, this additional device will act more like a dimmer than an on/off switch. If an array of many such arms, each with a tiny controlled delay, is stacked in parallel, something novel can be designed: a steerable laser beam. From their new vantage, these smart eyes will probe and see more thoroughly than anything nature could’ve imagined— and help navigate any number of obstacles. All without anyone breaking a sweat— except for maybe one disoriented moose.

**P716 2019-04-12 How do self-driving cars “see” - Sajan Saini**

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翻译人员: Carol Wang 校对人员: Ziyao Wang天已晚，黑夜中一辆自动驾驶汽车 沿狭窄的乡村公路蜿蜒行驶而来。突然间，同时出现了三个危险警示。接下来会发生什么呢？在驾驶通过突然出现的障碍物前，汽车必须先发现障碍物——收集有关大小、形状和位置信息，以便用算法规划出最安全的路线。因为无人驾驶，汽车需要智能眼， 也就是解决问题的探测器——无论周围环境、天气如何， 或者天有多黑——问题要在眨眼间解决。要求虽高，但有解决方案， 该方案由两样东西组成：特殊激光探测技术 LIDAR和集成光电技术，即实时联网的微通信技术。要了解光达 LIDAR，需要先了解 与此相关的技术 ——雷达。在航空领域，雷达天线向飞机 发射无线电脉冲或微波，通过计算波束返回时长 来确定飞机位置。但这一种观察方式很有限，因为大光束脉冲或微波 无法显示微小的细节。相反，自动驾驶汽车的 LIDAR 系统使用窄带不可见红外激光，LIDAR 是光探测和测距的缩写。它可以将极其微小物件成像，如街对面行人衬衫上的扣子。但是，我们如何确定 这些物件的形状或距离呢？LIDAR 发射一系列超短 激光脉冲去测距离。以乡间小路上的驼鹿为例，汽车驶过时，一个 LIDAR 脉冲 遇到鹿角的根部后散开，它反弹回来前，下一个脉冲 可能已到达一个鹿角的顶端。测量这两个脉冲返回的时长差，可得到有关鹿角形状的数据。通过发射大量短脉冲，LIDAR 系统可快速得出物体详细轮廓。打开再关上激光器是 产生光脉冲最简便的方法，但会造成激光束不稳定， 并影响发射脉冲的精确频率，影响距离测量准确性。更好的办法是让激光器开着，用其他东西定期、快速地阻挡光线。这就是集成光子技术。互联网的数字数据是由精确定时的光脉冲承载的，有的脉冲短至一百皮秒。一种产生光脉冲的方法是 使用马赫-曾德尔干涉仪，该设备利用特定的波特性，称为干扰特性。想一下将一些鹅卵石 扔进池塘的情景：涟漪扩散和交叠 构成了一种花纹，某些地方的波峰 叠加，变得非常大;而其他地方，则完全抵消了。马赫-曾德尔 干涉仪的原理与此类似。先将光波沿 2 个平行臂 分为 2 束，然后合二为一。如果一束光减慢而延迟，因为 2 束光不同步，合并后的 抵消现象就阻挡了光线。通过切换一束光的延迟，干扰器就像一个开合的开关， 发射出光脉冲。持续一百皮秒的光脉冲可以探测到小至几厘米厚的物体，但未来的汽车需要更高的分辨率。将干扰器与超灵敏、 反应快的光探测器配对，可将分辨率提高到毫米级。比我们以正常视力看街对面的物体，要好一百倍以上，第一代自动驾驶汽车的 LIDAR依赖车顶或发动机盖上的 复杂旋转组件进行扫描。借助集成光子技术，干扰器和探测器可缩小至 不到十分之一毫米，装在小巧的芯片中， 将来可以放在车灯里。这些芯片还将包括 干扰器智能调节器，可消除移动物体，并快速扫描。通过减慢干扰器一个平行臂发出的光，这个额外设备的作用不像开关， 更像一个调光器，如果许多带微型控制延时的 平行臂并列排放的话，就设计出了新的特性：可操纵的激光束。有了这些新优势，这些智能眼的探测和观察比能想到的任何自然的东西更彻底——帮助导航通过任何数量的障碍物,不费吹灰之力——或许一头没有方向感的驼鹿除外。

**P717 2019-04-15 The Chinese myth of the meddling monk - Shunan Teng**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=717)

Xu Xian had just received yet another invitation to the opening ceremony of the new Jin Shan Temple. His wife, Bai Su Zhen, had warned him not to attend. Since she was in fact a benevolent white snake spirit in human form, their marriage had already weathered attacks by meddling monks. But devout Buddhist that he was, Xu Xian felt obligated to make an appearance. What they didn’t know was that these invitations had come from none other than Fa Hai– the misguided monk who had tried to separate the young lovers, almost killing Xu Xian in the process. The monk confronted Xu Xian, telling him that because he consorted with a demon, he must remain at the monastery and cleanse his soul. Xu Xian protested, but Fa Hai would not let him escape. At home, Bai Su Zhen was uneasy. Her husband had departed so quickly that she hadn’t been able to tell him she was pregnant with his child. And now he had been gone so long she sensed something must be wrong. She made her way to the temple, and upon encountering Fa Hai the monk threw his prayer mat, which erupted into fire and smoke. Weakened from her pregnancy, Bai Su Zhen desperately summoned a fleet of shrimp soldiers and crab generals to subdue the monk, and waves to put out the blaze. But the water also flooded the surrounding area, drowning many innocent villagers. For the first time, Bai Su Zhen had harmed humans, and she fell out of the gods’ favor. With their blessing retracted, Fa Hai attempted to trap her in his magical alms bowl. But just when all hope seemed lost, a bright glow came from within her belly, saving her from the mad monk’s magic. The couple fled home, grateful to the mysterious power that had saved them, and soon after, Bai Su Zhen gave birth to their son, Xu Shi Lin. Yet despite this joyous occasion, Xu Xian was uneasy. He was shaken by his wife’s accidental act of destruction, and he feared the misfortune it might bring upon their home. Not a month later, Fa Hai appeared at their doorstep. He offered Xu Xian an alms bowl to ensure good fortune for his newborn son. Still wary of the monk, but also remembering Bai Su Zhen’s destructive act, Xu Xian accepted the gift. But as soon as the bowl entered their home, it flew to Bai Su Zhen’s head and trapped her inside. Against the family’s wishes, Fa Hai buried the bowl beneath the Lei Feng Pagoda. And when Xu Xian begged him to release his wife, the monk sternly replied: “She will be free when the iron tree blooms.” Overcome with guilt, Xu Xian ran away to a monastery, leaving Shi Lin in the care of his aunt. But there was something neither of them knew. The boy was the reincarnation of Wen Qu Xing, the wisdom god, sent to the family to reward Xu Xian’s devotion. It was this power that had protected Bai Su Zhen at the temple, and as he grew, so did his wisdom. At age 19, Shi Lin went to the capital city to take the nation-wide imperial exam and obtained the highest score in all the empire. The Emperor himself bestowed Shi Lin’s prize: an ornate hat decorated with jewel-encrusted flowers. But though he returned home in glory, the fate of his parents still weighed heavy on his mind. Coaxing his father from exile, Shi Lin took him to visit the Lei Feng Pagoda to pay respects to his mother. Kneeling before it, he placed his jeweled prize on the iron tree as an offering. Suddenly, the ground opened and Bai Su Zhen stepped out. With her sins absolved by the tribute of a god, and a blossom on the iron tree, Shi Lin had freed his mother, and reunited his family– both mortal and divine.

**P717 2019-04-15 The Chinese myth of the meddling monk - Shunan Teng**

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翻译人员: Yisi Zhu 校对人员: Cissy Yun许仙刚刚又收到了一封请帖，请他去参加金山寺的开光。他的妻子白素贞叫他不要去。因为白素贞其实是 一条善良的白蛇精化成的人，而他们二人的婚礼 曾被心怀鬼胎的僧人攻击过。但是许仙是个虔诚的佛教徒，觉得自己有责任去参加。但他们不知道的是，发布这些邀请的不是别人， 正是法海 --那个曾试图分开这对年轻恋人的 金山寺僧人。他在当时几乎杀了许仙。法海这次又找到了许仙，对许仙讲白素贞乃蛇妖。法海要许仙留在寺庙里 净化灵魂。许仙不愿留下，但法海自然不会让他轻易逃脱。家中，白素贞惴惴不安。他的丈夫离开得太突然，以致她还没能告诉他 自己怀上了他的孩子。而现在许仙已经离开了很久， 她隐隐觉得事情有些不对。素贞于是至寺庙索夫，法海僧人将他的蒲团扔出，一时间火光闪现，烟雾弥漫。因为怀孕而虚弱的白素贞，慌忙召唤虾兵蟹将 以压制法海，又唤出水浪扑灭了火焰。但大水也涌向周围，淹死了许多无辜的村民。生平第一次， 白素贞伤害了人类，也因此触犯了天界众神。在素贞失去众神的保佑后，法海试图将她困于一钵盂下。但就在看似希望渺茫时，一道亮光从素贞的肚子里映出，从愤怒的僧人手下救了她。素贞夫妻二人逃回家中，他们十分感激那救了他们的 神秘力量。不久之后，白素贞生下了 他们的儿子许仕林。但尽管有着如此快乐的时光，许仙仍感到不安，他无法忘怀妻子在意外中 曾造成的巨大破环。他担心他们的家庭 会因此遭遇不幸。不到一个月后，法海来到他们门前，他给了许仙一个钵盂， 声称可以保佑许仙新出世的儿子。许仙对此将信将疑，但想到白素贞曾造成的破坏，他接受了这份礼物。但这钵盂一进到他们家中，就飞到白素贞的头顶， 把她困在其中。法海不顾这家人的意愿，把此钵盂埋在了雷峰塔下。当许仙乞求法海放了他的妻子时，法海不为所动，他回答道：“铁树开花时她才能自由。“许仙愧疚无比，从此长住于寺庙中。他把仕林托付给他婶婶照顾。但有件事他们谁都不知道，这个男婴实是天上主文运的星宿文曲的转世，下凡至这个家庭 以奖励许仙的虔诚。正是这股力量， 曾在寺庙保护了白素贞。仕林日渐长大，聪颖也渐显。在19岁时，他进京赶考，一举中了状元。皇帝亲自颁奖给仕林：一顶华丽的状元帽， 花朵形的珠玉镶嵌其上。但尽管他载誉归乡，他父母的命运仍如大石般 压在他心上。仕林说服父亲下山，他们一同至雷峰塔前祭母。于塔前跪下时，仕林将他的珠宝奖励作祭品 放在了铁树上。突然间，大地开裂， 白素贞于其间走了出来。文曲星的孝心感动了上天，加上铁树上也实实在在开了花，仕林得以救出他的母亲。一家人于是终能团聚，功德圆满，重列仙班。

**P718 2019-04-16 The Opposites Game**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=718)

"The Opposites Game" For Patricia Maisch This day my students and I play the Opposites Game with a line from Emily Dickinson. My life had stood a loaded gun, it goes and I write it on the board, pausing so they can call out the antonyms – My Your Life Death Had stood ? Will sit A Many Loaded Empty Gun ? Gun. For a moment, very much like the one between lightning and its sound, the children just stare at me, and then it comes, a flurry, a hail storm of answers – Flower, says one. No, Book, says another. That's stupid, cries a third, the opposite of a gun is a pillow. Or maybe a hug, but not a book, no way is it a book. With this, the others gather their thoughts and suddenly it’s a shouting match. No one can agree, for every student there’s a final answer. It's a song, a prayer, I mean a promise, like a wedding ring, and later a baby. Or what’s that person who delivers babies? A midwife? Yes, a midwife. No, that’s wrong. You're so wrong you’ll never be right again. It's a whisper, a star, it's saying I love you into your hand and then touching someone's ear. Are you crazy? Are you the president of Stupid-land? You should be, When's the election? It’s a teddy bear, a sword, a perfect, perfect peach. Go back to the first one, it's a flower, a white rose. When the bell rings, I reach for an eraser but a girl snatches it from my hand. Nothing's decided, she says, We’re not done here. I leave all the answers on the board. The next day some of them have stopped talking to each other, they’ve taken sides. There's a Flower club. And a Kitten club. And two boys calling themselves The Snowballs. The rest have stuck with the original game, which was to try to write something like poetry. It's a diamond, it's a dance, the opposite of a gun is a museum in France. It's the moon, it's a mirror, it's the sound of a bell and the hearer. The arguing starts again, more shouting, and finally a new club. For the first time I dare to push them. Maybe all of you are right, I say. Well, maybe. Maybe it's everything we said. Maybe it’s everything we didn't say. It's words and the spaces for words. They're looking at each other now. It's everything in this room and outside this room and down the street and in the sky. It's everyone on campus and at the mall, and all the people waiting at the hospital. And at the post office. And, yeah, it's a flower, too. All the flowers. The whole garden. The opposite of a gun is wherever you point it. Don’t write that on the board, they say. Just say poem. Your death will sit through many empty poems.

**P718 2019-04-16 The Opposites Game**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=718)

翻译人员: Carol Wang 校对人员: Candace Hwang《反义词游戏》写给派翠西亚 · 梅诗（Patricia Maisch 2011 年 1 月 8 日图森枪击案幸存者）这天，我和学生玩反义词游戏 用了艾米莉 · 迪金森的一句诗我的生命曾站立——一把上膛的枪我把这句话写在黑板上 他们喊出每个词的反义词我的——你的生命——死亡曾站立——将坐下一把——很多上膛的——空空的枪——枪——如闪电与雷声间的时延孩子们只是呆呆盯着我然后是七嘴八舌、 如冰雹般的抢答——是花儿，一个声音说 不，是书！另一个回答愚蠢！第三个声音喊 枪的反义词是枕头或者，可能是拥抱 但不是书，绝对不是书说完，其他人集中精力思考突然爆出震耳的抢答比赛根本没有重样的答案 因为每人都有自己的最终选择是歌，是祈祷我觉得是承诺，就像婚戒 然后是婴儿接生婴儿的人叫什么助产士吗 对，就是助产士错，不对，大错特错啦 你绝对猜不到！是低语，是星星是正在对着你的手说我爱你 然后去摸某人的耳朵你疯了吗 你是傻子国总统吗你真该是！何时大选是泰迪熊、是剑 是最最完美的梨子还是从头开始吧 是花儿，是白色的玫瑰下课铃响起，我拿起黑板擦 但一女孩从我手里抢走了它还没确定答案呢， 她说我们还没做完游戏我只好把答案都留在黑板上第二天，他们分成了几拨 有些人已经互不说话有花儿队、猫咪队还有仅 2 个男孩的雪球队其他人还继续玩最初的游戏努力写下像诗一样的文字是钻石、是舞蹈枪的反义词是天上的一只鸟是月亮，是明镜是钟声和相伴的云淡风轻争论又起，喊声更甚最终又形成新的一派我第一次敢敦促他们，说道也许你们都对好吧，也许吧 也许是我们所说的一切也许是没说的一切 是字组成的句子现在他们看着彼此，喊出 是教室里的一切和教室外的一切是整个街道上的一切 和天上的一切是校园里和商场里的所有人是医院里、邮局里 在等待的所有人是的，也是花儿，所有花儿 是那整个的花园枪的反义词是你指向的任何地方不用写在黑板上 他们说，请直接读诗吧你的死亡将看完 很多空空的诗篇（枪声）

**P719 2019-04-17 How does the stock market work - Oliver Elfenbaum**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=719)

In the 1600s the Dutch East India Company employed hundreds of ships to trade gold, porcelain, spices, and silks around the globe. But running this massive operation wasn’t cheap. In order to fund their expensive voyages, the company turned to private citizens– individuals who could invest money to support the trip in exchange for a share of the ship’s profits. This practice allowed the company to afford even grander voyages, increasing profits for both themselves and their savvy investors. Selling these shares in coffee houses and shipping ports across the continent, the Dutch East India Company unknowingly invented the world’s first stock market. Since then, companies have been collecting funds from willing investors to support all kinds of businesses. And today, the stock market has schools, careers, and even whole television channels dedicated to understanding it. But the modern stock market is significantly more complicated than its original incarnation. So how do companies and investors use the market today? Let’s imagine a new coffee company that decides to launch on the market. First, the company will advertise itself to big investors. If they think the company is a good idea, they get the first crack at investing, and then sponsor the company’s initial public offering, or IPO. This launches the company onto the official public market, where any company or individual who believes the business could be profitable might buy a stock. Buying stocks makes those investors partial owners in the business. Their investment helps the company to grow, and as it becomes more successful, more buyers may see potential and start buying stocks. As demand for those stocks increases, so does their price, increasing the cost for prospective buyers, and raising the value of the company's stocks people already own. For the company, this increased interest helps fund new initiatives, and also boosts its overall market value by showing how many people are willing to invest in their idea. However, if for some reason a company starts to seem less profitable the reverse can also happen. If investors think their stock value is going to decline, they’ll sell their stocks with the hopes of making a profit before the company loses more value. As stocks are sold and demand for the stock goes down, the stock price falls, and with it, the company’s market value. This can leave investors with big losses– unless the company starts to look profitable again. This see-saw of supply and demand is influenced by many factors. Companies are under the unavoidable influence of market forces– such as the fluctuating price of materials, changes in production technology, and the shifting costs of labor. Investors may be worried about changes in leadership, bad publicity, or larger factors like new laws and trade policies. And of course, plenty of investors are simply ready to sell valuable stocks and pursue personal interests. All these variables cause day-to-day noise in the market, which can make companies appear more or less successful. And in the stock market, appearing to lose value often leads to losing investors, and in turn, losing actual value. Human confidence in the market has the power to trigger everything from economic booms to financial crises. And this difficult-to-track variable is why most professionals promote reliable long term investing over trying to make quick cash. However, experts are constantly building tools in efforts to increase their chances of success in this highly unpredictable system. But the stock market is not just for the rich and powerful. With the dawn of the Internet, everyday investors can buy stocks in many of the exact same ways a large investor would. And as more people educate themselves about this complex system they too can trade stocks, support the businesses they believe in, and pursue their financial goals. The first step is getting invested.

**P719 2019-04-17 How does the stock market work - Oliver Elfenbaum**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=719)

翻译人员: Zining Pearl Yuan 校对人员: Ziyao Wang17世纪初，荷兰东印度公司雇佣了上百只商船在全球进行黄金，陶瓷，香料， 丝绸等贸易。这是一笔不小的开销。为了获得足够的资金来供养 这些昂贵的航行，荷兰东印度公司将目光转向了大众每一位能够为出海贸易出资的人，将会得到贸易利润的一部分作为交换。这一做法使公司有能力负担 规模更大的航行，同时带给精明的出资人和公司 更高的利润。这些股份在欧洲各地的 咖啡厅和港口被售卖，就这样，荷兰东印度公司在不知不觉中 发明了世界第一个股票市场。自那以后，各个公司纷纷效仿， 向有意的投资者们募款，用来做各种各样的生意。如今，很多学校，职业，甚至专门的电视频道致力于教人们理解股票市场的运作。但现代股票市场要比当年复杂得多。所以，如今的公司和投资人 该怎样运用这个市场？让我们来想象一个决定进入市场的新咖啡公司。首先，这家公司会向大型投资人推销自己。如果投资者认为，这是个好点子，他们将取得投资的先机，并且将资助该公司的首次公开募股（IPO）。这使得这家咖啡公司进入 正式的公开市场。在这里，任何相信它会盈利的 个人投资者或公司，都可以购买股票。股票这一方式， 使投资人变成公司的股东。他们的投资会帮助该公司成长，在这个过程中，更多人会看到它的潜力， 并购买更多的股票。当对该股票的需求不断增长，股票的价格也水涨船高，对于手中持有股票的人来说， 他们的股票价值也会有所上升。于公司而言，新增加的利益不仅会资助新的企划，并且通过许多人对公司的的投资意愿,抬高了公司整体市场价值。然而，出于某些原因， 这家公司不那么盈利时，与之前截然相反的情况就有可能发生。如果投资者认为他们所拥有的 股票价值会下降，他们将卖掉手中的股票，并希望能在公司掉价前获得利润。这使得该股票需求持续减少，股票价格下跌，公司的市场价值也随之下降。除非公司的盈利情况开始好转，否则投资者将会面临很大的亏损。很多因素会影响到这样的供求平衡。首先，市场力量是所有公司都无法避免的，这包括原料价格的波动，生产设备和技术的变化，以及劳动力成本的改变。投资者还可能会担心领导的变动， 不好的宣传或者是像新法和贸易政策一类 更大的原因。当然，许多投资者也会随时卖掉昂贵的股票去追求个人利益这些变量都会干扰市场，并影响公司的成功与否。在股票市场，市场价值下降会导致失去投资者，也会使股票真正失去价值。人们对市场的信心作用很大，它可以促使经济繁荣， 也可以造成经济危机。这个难以掌控的变量是许多专家推荐可靠的长期投资而不是赚快钱的原因。然而，专家们在不断寻找新的工具来加大他们在这个不可测的系统中 成功的几率。但股票市场不是专门为那些 有权有势的人准备的。在互联网时代，每一天都有很多投资人用像大投资方一样的方式购买股票。有更多的人自学这复杂市场的运作原理，他们也可以进行股票交易，支持他们相信的企业 ，并追求他们自己的理财目标。第一步，就是投入进去。

**P720 2019-04-17 Titan of terror - the dark imagination of H.P. Lovecraft - Silvia Mor**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=720)

Arcane books of forbidden lore, disturbing secrets in the family bloodline, and terrors so unspeakable the very thought of them might drive you mad. By now, these have become standard elements in many modern horror stories. But they were largely popularized by a single author– one whose name has become an adjective for the particular type of terror he inspired. Born in Providence, Rhode Island in 1890, Howard Phillips Lovecraft grew up admiring the Gothic horror stories written by Edgar Allan Poe and Robert Chambers. But by the time he began writing in 1917, World War I had cast a long shadow over the arts. People had seen real horrors, and were no longer frightened of fantastical folklore. Lovecraft sought to invent a new kind of terror, one that responded to the rapid scientific progress of his era. His stories often used scientific elements to lend eerie plausibility. In "The Colour out of Space," a strange meteorite falls near a farmhouse, mutating the farm into a nightmarish hellscape. Others incorporated scientific methodology into their form. "At the Mountains of Madness" is written as a report of an Antarctic expedition that unearths things better left undiscovered. In others, mathematics themselves become a source of horror, as impossible geometric configurations wreak havoc on the minds of any who behold them. Like then-recent discoveries of subatomic particles or X-rays, the forces in Lovecraft’s fiction were powerful, yet often invisible and indescribable. Rather than recognizable monsters, graphic violence, or startling shocks, the terror of “Lovecraftian” horror lies in what’s not directly portrayed– but left instead to the dark depths of our imagination. Lovecraft’s dozens of short stories, novellas, and poems often take place in the same fictional continuity, with recurring characters, locations, and mythologies. At first glance, they appear to be set within Lovecraft’s contemporary New England. But beneath the surface of this seemingly similar reality lie dark masters, for whom Earth’s inhabitants are mere playthings. More like primordial forces than mere deities, Lovecraft’s Great Old Ones lurk at the corners of our reality. Beings such as Yog-Sothoth, “who froths as primal slime in nuclear chaos beyond the nethermost outposts of space and time.” Or the blind, idiot god Azathoth, whose destructive impulses are stalled only by the “maddening beating of vile drums and the thin monotonous whine of accursed flutes.” These beings exist beyond our conceptions of reality, their true forms as inscrutable as their motives. Lovecraft’s protagonists– often researchers, anthropologists, or antiquarians– stumble onto hints of their existence. But even these indirect glimpses are enough to drive them insane. And if they survive, the reader is left with no feeling of triumph, only cosmic indifference– the terrible sense that we are but insignificant specks at the mercy of unfathomable forces. But perhaps the greatest power these creatures had was their appeal to Lovecraft’s contemporaries. During his lifetime, Lovecraft corresponded with other writers, encouraging them to employ elements and characters from his stories in their own. References to Lovecraftian gods or arcane tomes can be found in many stories by his pen pals, such as Robert E. Howard and Robert Bloch. Today, this shared universe is called the Cthulhu Mythos, named after Lovecraft’s infamous blend of dragon and octopus. Unfortunately, Lovecraft’s fear of the unknown found a less savory expression in his personal views. The author held strong racist views, and some of his works include crude stereotypes and slurs. But the rich world he created would outlive his personal prejudices. And after Lovecraft’s death, the Cthulhu Mythos was adopted by a wide variety of authors, often reimagining them from diverse perspectives that transcend the author’s prejudices. Despite his literary legacy, Lovecraft was never able to find financial success. He died unknown and penniless at the age of 46– a victim of the universe’s cosmic indifference. But his work has inspired numerous short stories, novels, tabletop games, and cultural icons. And as long as humans feel a sense of dread about our unknown future, Lovecraftian horror will have a place in the darkest corners of our imagination.

**P720 2019-04-17 Titan of terror - the dark imagination of H.P. Lovecraft - Silvia Mor**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=720)

翻译人员: Yue Zhang 校对人员: Lipeng Chen关于禁忌传说的隐秘书籍，令人不安的家族秘密，以及难以言说的恐惧事件， 每联想到它们，足以让你发狂。如今，这些都已成为 许多现代恐怖小说的标准元素。然而，它们能如此流行， 一位作家功不可没——他的名字已经演化成形容词用以形容一种特别的恐怖故事类型， 他是其灵感来源。1890 年，霍华德·菲利普斯·洛夫克拉夫特 出生于罗德岛州，普罗维斯登。他从小喜爱 爱伦·坡和罗伯特·钱伯斯创作的哥特式恐怖小说。他于 1917 年开始创作，然而在这之前，第一次世界大战 让艺术长久地蒙上了阴影。人们看到了真正的恐惧，对那些奇幻的民间传说， 不再害怕。洛夫克拉夫特试图 创造一种新的恐怖故事类型，这一故事类型与他所处的 时代中科技的快速发展大相呼应。他的故事通常采用科学元素， 以达到恐怖的“逼真感”。在小说《星之彩》中，一颗奇怪的流星砸向 一个农场附近，将农场突然变为 一个噩梦般的恐怖场景。其他故事则是将科学方法论 整合到故事形式之中。小说 《疯狂山脉》 被写成一篇南极探险报告，挖掘出一些不该被了解的东西。在其他故事中， 数学本身成为了恐怖之源，无可能的几何排列但凡人眼盯着它们， 会对大脑造成巨大破坏。比如，当时刚发现的 亚原子粒子或 X 光，在洛夫克拉夫特的小说中， 它们拥有强大的力量，然而通常是无形的， 难以描述。没有描写可辨识的怪物，写实的暴力，或骇人的刺激，洛夫克拉夫特式恐怖在于 那些间接隐晦的刻画——刻画的内容充分加深了 我们的黑暗想象力。洛夫克拉夫特创作的 许多短篇小说，中篇小说和诗歌通常建构于同一个虚构体系中，有着重复出现的角色，场景和神话。乍眼一看，它们的场景似乎都被设定于 洛夫克拉夫特当时所在的新英格兰。然而，在看似相似的现实表层之下， 却潜藏着黑暗的主宰，于它们而言， 地球上的居民仅是玩物罢了。洛夫克拉夫特的 《旧日支配者》中刻画的神明，不仅仅是神明，更像是一种原始力量， 潜伏于我们的现实的角落里。如犹格·索托斯这样的存在，“它形为一团太初淤泥， 在原初混沌之核源中泛着泡沫超越空间与时间的最底处的边界。”或如盲目痴愚之神，阿撒托斯，想要阻止他的破坏冲动，“只能疯狂地敲打肮脏的巨鼓，吹受诅咒的长笛，吹出 单调乏味让人作呕的哀鸣之音。”这些存在，超出了 我们对现实的认知范畴，他们真正的外形， 同他们的动机一样，难以捉摸。洛夫克拉夫特塑造的主人公——通常是研究者，人类学家，或古董商——意外发现他们（神明）存在的蛛丝马迹。即便只有间接的一瞥， 足以让他们丧失理智。如果他们存活下来，读者也不会感觉这是胜利， 只体会到宇宙的冷漠——这种感觉非常可怕， 我们不过是微不足道的一粒尘埃，被某些深不可测的力量支配着。但是，也许正是这些神明 所拥有的最强大的力量强烈吸引着 与洛夫克拉夫特同时代的人。在洛夫克拉夫特的一生中，他与其他作家通信，鼓励他们在自己的故事里 采用他故事中的元素和角色。洛夫克拉夫特式神明或隐秘书卷，在他的笔友所创作的 许多故事中都被引用，其笔友包括罗伯特·E·霍华德 和罗伯特·布洛赫。如今，这一共享的宇宙世界 被叫做克苏鲁神话，名字来源于洛夫克拉夫特所创造的 恶名昭著的龙与章鱼的结合体怪物。不幸的是，在他的个人观点中， 洛夫克拉夫特对未知的恐惧的表达，并不尽人意。这位作家的言辞中， 带着强烈的种族歧视色彩，而他的某些作品中， 有着粗鲁的刻板印象和诽谤言辞。然而，他所创造的丰富世界， 相比他的个人偏见，影响更深远。在洛夫克拉夫特死后，克苏鲁神话体系 被大量的作者采用，通常是从多元的角度 来重新构想它们，超越了他的个人偏见。尽管留下许多文学遗产，洛夫克拉夫特却没能 获得经济上的成功。他无名而卒，身无分文， 年仅46岁——他也是一名受害者， 遭受着宇宙的冷漠。但是，他的作品 却为众多短篇故事、小说、桌游和文化意象带来了灵感。只要人类对我们未知的未来 尚具一丝恐惧，洛夫克拉夫特式恐惧就会存在于 我们想象中最黑暗的角落里。

**P721 2019-04-18 The hidden network that makes the internet possible - Sajan Saini**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=721)

In 2012, a team of Japanese and Danish researchers set a world record, transmitting 1 petabit of data— that’s 10,000 hours of high-def video— over a fifty-kilometer cable, in a second. This wasn’t just any cable. It was a souped-up version of fiber optics— the hidden network that links our planet and makes the internet possible. For decades, long-distance communications between cities and countries were carried by electrical signals, in wires made of copper. This was slow and inefficient, with metal wires limiting data rates and power lost as wasted heat. But in the late 20th century, engineers mastered a far superior method of transmission. Instead of metal, glass can be carefully melted and drawn into flexible fiber strands, hundreds of kilometers long and no thicker than human hair. And instead of electricity, these strands carry pulses of light, representing digital data. But how does light travel within glass, rather than just pass through it? The trick lies in a phenomenon known as total internal reflection. Since Isaac Newton’s time, lensmakers and scientists have known that light bends when it passes between air and materials like water or glass. When a ray of light inside glass hits its surface at a steep angle, it refracts, or bends as it exits into air. But if the ray travels at a shallow angle, it’ll bend so far that it stays trapped, bouncing along inside the glass. Under the right condition, something normally transparent to light can instead hide it from the world. Compared to electricity or radio, fiber optic signals barely degrade over great distances— a little power does scatter away, and fibers can’t bend too sharply, otherwise the light leaks out. Today, a single optical fiber carries many wavelengths of light, each a different channel of data. And a fiber optic cable contains hundreds of these fiber strands. Over a million kilometers of cable crisscross our ocean floors to link the continents— that’s enough to wind around the Equator nearly thirty times. With fiber optics, distance hardly limits data, which has allowed the internet to evolve into a planetary computer. Increasingly, our mobile work and play rely on legions of overworked computer servers, warehoused in gigantic data centers flung across the world. This is called cloud computing, and it leads to two big problems: heat waste and bandwidth demand. The vast majority of internet traffic shuttles around inside data centers, where thousands of servers are connected by traditional electrical cables. Half of their running power is wasted as heat. Meanwhile, wireless bandwidth demand steadily marches on, and the gigahertz signals used in our mobile devices are reaching their data delivery limits. It seems fiber optics has been too good for its own good, fueling overly-ambitious cloud and mobile computing expectations. But a related technology, integrated photonics, has come to the rescue. Light can be guided not only in optical fibers, but also in ultrathin silicon wires. Silicon wires don’t guide light as well as fiber. But they do enable engineers to shrink all the devices in a hundred kilometer fiber optic network down to tiny photonic chips that plug into servers and convert their electrical signals to optical and back. These electricity-to-light chips allow for wasteful electrical cables in data centers to be swapped out for power-efficient fiber. Photonic chips can help break open wireless bandwidth limitations, too. Researchers are working to replace mobile gigahertz signals with terahertz frequencies, to carry data thousands of times faster. But these are short-range signals: they get absorbed by moisture in the air, or blocked by tall buildings. With tiny wireless-to-fiber photonic transmitter chips distributed throughout cities, terahertz signals can be relayed over long-range distances. They can do so via a stable middleman, optical fiber, and make hyperfast wireless connectivity a reality. For all of human history, light has gifted us with sight and heat, serving as a steady companion while we explored and settled the physical world. Now, we’ve saddled light with information and redirected it to run along a fiber optic superhighway— with many different integrated photonic exits— to build an even more expansive, virtual world.

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翻译人员: Carol Wang 校对人员: Ruilin Yao在2012年，由日本和丹麦研究人员组成的小组 创下了一项世界记录，在一根50千米的电缆上传输 1 Pbit 的数据用时只有1秒——这相当于一万小时的高清视频。这可不是普通电缆。这是一种增强型光纤——组成了连接我们的星球、让互联网成为可能的隐形网络。几十年来，城市或国家间的长距离沟通都由经铜线传导的电信号承载。这种方式慢而低效，金属线限制了数据传输速率， 而且电线发热造成功率损耗。但在20世纪晚期，工程师掌握了一种更好的传输方式。不再使用金属导线，而是将玻璃精心融化后 拉成柔韧的纤维，纤维可长至几百公里， 和人的头发一样细。纤维不再传递电信号，而是传递代表数字信号的光脉冲。但光如何在玻璃纤维中传导 而不会穿出去呢？秘密就在于光全内反射现象。自艾萨克·牛顿时代以来，眼镜制造商和科学家们已经知道，光穿过空气和其他介质 如水或玻璃的交界时产生折射。当一束穿过玻璃的光 以很陡的角度抵达玻璃表面时，它会发生折射， 即弯折后进入空气中。但如果光束角度很小时，它会产生反射并留在玻璃中，在琉璃中来回反弹。在特定条件下，透光的东西就能把光藏在其内， 不会让光穿透出来。与电信号或无线信号相比，光纤信号在长距离传输中 几乎没有损耗——会散失一点能量，且光纤不能大角度弯折，否则光信号会外泄。如今一根光纤可承载 不同波长的光信号，不同波长传输不同的数据。一段光缆包含几百根光纤。大洋底纵横交错的百万公里光缆，它们将各大洲连在一起——光缆总长足以绕赤道差不多30圈。有了光纤，数据传输不再受距离的限制，而互联网则发展为全球计算机。我们的移动工作和娱乐更加依赖位于世界各地 超大数据中心的大量超负荷工作的计算机服务器,这就是云计算，而它引发了两个大问题：热损耗和带宽要求。多数网络传输 发生在各数据中心内部，而这些服务器都是由传统电缆连接，一半的运行功率 以热损耗方式浪费掉了。与此同时，无线带宽需求稳步增长，移动设备中使用的千兆赫兹信号已达到其数据传输极限。光纤为通信领域带来的革命，助长了对云计算 和移动计算的过高预期，但集成光学这项 相关技术应运而生。光不仅可以在光纤中传导，也可以在超薄硅中传导。虽然光在超薄硅中的 传导性不及光纤，但它们让工程师能够将百公里光纤网络中的设备集成到可插入服务器的 微小光子芯片中，实现电信号和光信号互转。有了光电转换芯片，数据中心中就可以 将损耗大的电缆换成节能光纤。光子芯片也打破了无线带宽限制。研究人员正在努力用太赫兹频率取代移动千兆赫信号，将数据传输速度提高数千倍。但它们是短距离无线信号：容易被空气中的水分吸收，或被高层建筑物阻挡。通过分布在整个城市的无线-光纤光子发射器微型芯片，太赫兹信号可以进行远距离传输。中间传输借助稳定的光纤来实现，让超高速无线连接成为现实。在人类历史上，光带给我们热并照亮世界，陪伴我们探索物理世界 并定居下来。现在，我们给光插上了信息的翅膀，让它沿着光纤超高速公路飞奔 ——配备多种集成光子出口——去构建一个更加广阔的虚拟世界。

**P722 2019-04-19 Why is this painting so shocking - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=722)

On April 26th, 1937, Fascist forces bombed the Basque village of Guernica in Northern Spain. It was one of the worst civilian casualties of the Spanish Civil War, waged between the democratic republic and General Franco’s fascist contingent. For Pablo Picasso, the tragedy sparked a frenzied period of work in which he produced a massive anti-war mural, aptly titled "Guernica." The painting is a powerful work of historical documentation and political protest. But while Picasso’s artistic motivations are clear, the symbolism of the painting can be as confusing and chaotic as war itself. How can we make sense of this overwhelming image, and what exactly makes it a masterpiece of anti-war art? The painting’s monumental canvas is disorienting from the start, rendered in the abstracted Cubist style Picasso pioneered. Cubism deliberately emphasized the two-dimensionality of the canvas by flattening the objects being painted. This afforded viewers multiple and often impossible perspectives on the same object; a technique considered shocking even in Picasso’s domestic scenes. But in this context, the style offers a profoundly overwhelming view of violence, destruction, and casualties. Multiple perspectives only compound the horror on display– sending the eyes hurtling around the frame in a futile hunt for peace. On the far left, a woman holding her dead child releases a scream; her eyes sliding down her face in the shape of tears and her head bending back unnaturally to echo her baby’s. There is the statue of a soldier present below, but he is unable to defend the woman and child. Instead his broken body lies in pieces, his arm clutching a splintered sword in a signal of utmost defeat. The tip of his sword meets a woman’s foot as she attempts to flee the devastation. But her other leg appears rooted to the spot, locked in the corner of the canvas even as she stretches to move it. Another victim appears behind this slouching figure. Falling helplessly as flames lick around her, she too is caught in her own hopeless scene. Each of these figures bordering the painting are horribly trapped, giving the work an acute sense of claustrophobia. And where you might expect the canvas’ massive size to counteract this feeling, its scale only highlights the nearly life-sized atrocities on display. Some possible relief comes from a lamp held tightly by a ghostly woman reaching out her window. But is her lantern’s hopeful glow truly lighting the scene? Or is it the jagged lightbulb– thought to represent the technologies of modern warfare– which illuminates her view of the chaos below? From the coffin-like confines of her window, her arm guides the viewer back into the fray, to perhaps the most controversial symbols of all– two ghostly animals caught in the destruction. Does the screaming horse embody the threat of Franco’s military nationalism; or does the spike running through its body convey its victimhood? Does the white bull represent Spain, the country of matadors and a common theme in Picasso’s work– or does it stand for the brutality of war? In this scene of strife, these animals raise more questions than answers. And additional elements hidden throughout the frame offer even more secrets for close observers. At the top of the canvas flashes a bird desperate to escape the carnage. And the abundance of animals on display may hint at the bombing’s date– a market day which flooded the streets with villagers, animals, and other potential causalities. Like the bombing of Guernica itself, Picasso’s painting is dense with destruction. But hidden beneath this supposed chaos, are carefully crafted scenes and symbols, carrying out the painting’s multifaceted attack on fascism. Decades after its creation, "Guernica" retains its power to shock viewers and ignite debate, and is often referenced at anti-war gatherings around the world. Hundreds of viewers have grappled with its harsh imagery, shattering symbolism and complex political messaging. But even without a close understanding of it’s complicated subtext, Picasso’s work remains a searing reminder of the true casualties of violence.

**P722 2019-04-19 Why is this painting so shocking - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=722)

翻译人员: Melody Chen 校对人员: Ziyao Wang1937年4月26日，德国法西斯武装轰炸了西班牙北部的 巴斯克村庄格尔尼卡。这是西班牙内战期间伤亡最惨重的一刻，这场内战由民主共和军 和弗朗哥将军的国民军发起。对巴勃罗·毕加索来说，这场惨剧 点燃了他一段疯狂的创作时期，在此期间他创作了一幅巨大的反战争壁画，并恰到好处地为它取名为“格尔尼卡”。这幅画是糅合了历史记录和政治性抗议的强有力作品。虽然毕加索的创作动机很明确，但是这幅画作中的象征意义可能 比战争本身还要令人迷惑和混乱。我们如何才能理解 这气势磅礴的图象，而又是什么才让它成为 反战艺术品中的杰作的呢？这幅画里程碑式的画面 本身就是令人迷惑的，它以由毕加索为先驱的立体派风格呈现。立体派通过扁平化勾勒对象有意突出画布的二维属性。这给予观察者对同一个对象多元的而且常常是不可能实现的视角；这是一种即使在毕加索的家居画中 也被认为是惊世骇俗的绘画技法。但在这个主题下，这种风格提供了一种极具压倒性的对于暴力，毁灭和伤亡的视觉感知。多元的视角加重了画面中的恐怖元素——让观者的目光在轮廓之间游走， 追寻着无法找到的和平。在最左边，一位怀抱她死去孩子的女子 正发出绝望的尖叫；她的眼睛以眼泪的形状从她的脸上滑下她的头不自然地扭向后方， 与她孩子的头相呼应。一名士兵的身影在画面下方被呈现出来，但他却无法保护那位母亲和孩子。他破碎的身体一块块地躺在地上，紧握一把破碎尖刀的手臂象征着惨败。他的刀尖碰到了一个 从废墟中逃跑的女人的脚。而她的另一条腿似乎被定住了，即使她努力挣脱， 仍然被锁在了画布一角。另一名受害者在这个 垂头丧气的人物背后出现。在火舌肆意舔舐她时 无助地坠落，她同样也是在自己 最无助的那一刻被捕捉。每一个在画面边缘的人物 都被可怕地困住了，给予这幅作品一种强烈的幽闭恐惧症感。可能你会认为画布的 巨大篇幅会抵消这种感受，但它的大小实际上更强烈地 呈现出活生生的暴行。或许那位幽灵般的女人伸向窗户的手中紧握的台灯 能给我们些许的慰藉。但她充满希望的灯光 真的能够点亮这个画面吗？还是说，那锯齿状的灯泡——被认为象征着现代战争中的科技元素——照亮了她下方混乱血腥的景象？从她窗户棺材般的轮廓线看出去，她的手臂将观者的视线 又引回那片混乱之中，然后引向画中最具争议性的形象——两头在废墟中被抓住的魔鬼般的动物。那只尖叫着的马是象征着 佛朗哥将军极端民族主义的威胁吗？还是说，那根穿透它身体的长钉 传达着它殉难者的身份？那头白色的公牛是象征着 毕加索绘画中的常用主题——斗牛士之国西班牙——还是只是代表着战争的残酷？在这冲突的场景中，这些动物 引发了比答案更多的问题。贯穿于整个主体中的其他元素为近距离的观察者提供了更多秘密。画布的上方闪现了一只 迫切想要逃离这场大屠杀的鸟。画面中大量的动物 可能暗示着轰炸的那一天是一个赶集日，村民，牲口和其他潜在受害者 纷纷涌向大街。正如对格尔尼卡的轰炸本身，毕加索的画作充满了毁灭。藏在这些混乱之下的 是仔细推敲过的场景和物象，才完成这幅画作对 法西斯主义的多面抗议。这幅画作完成几十年后的今天，《格尔尼卡》仍旧保持着 震撼人心，激发讨论的力量，而且常常被全世界的反战集会所援引。成百上千的观赏者依然纠结于 它粗犷的想象，令人震惊的象征意义以及其中的错综复杂的政治讯息。但即使对它复杂的潜台词 不曾深刻了解的情况下，毕加索的画作依然是 对暴力手段下伤亡的客观警示。

**P723 2019-04-25 How this disease changes the shape of your cells - Amber M. Yates**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=723)

What shape are your cells? Squishy cylinders? Jagged zig-zags? You probably don’t think much about the bodies of these building blocks, but at the microscopic level, small changes can have huge consequences. And while some adaptations change these shapes for the better, others can spark a cascade of debilitating complications. This is the story of sickle-cell disease. Sickle-cell disease affects the red blood cells, which transport oxygen from the lungs to all the tissues in the body. To perform this vital task, red blood cells are filled with hemoglobin proteins to carry oxygen molecules. These proteins float independently inside the red blood cell’s pliable, doughnut-like shape, keeping the cells flexible enough to accommodate even the tiniest of blood vessels. But in sickle cell disease, a single genetic mutation alters the structure of hemoglobin. After releasing oxygen to tissues, these mutated proteins lock together into rigid rows. Rods of hemoglobin cause the cell to deform into a long, pointed sickle. These red blood cells are harder and stickier, and no longer flow smoothly through blood vessels. Sickled cells snag and pile up– sometimes blocking the vessel completely. This keeps oxygen from reaching a variety of cells, causing the wide range of symptoms experienced by people with sickle-cell disease. Starting when they’re less than a year old, patients suffer from repeated episodes of stabbing pain in oxygen-starved tissues. The location of the clogged vessel determines the specific symptoms experienced. A blockage in the spleen, part of the immune system, puts patients at risk for dangerous infections. A pileup in the lungs can produce fevers and difficulty breathing. A clog near the eye can cause vision problems and retinal detachment. And if the obstructed vessels supply the brain the patient could even suffer a stroke. Worse still, sickled red blood cells also don’t survive very long— just 10 or 20 days, versus a healthy cell’s 4 months. This short lifespan means that patients live with a constantly depleted supply of red blood cells; a condition called sickle-cell anemia. Perhaps what’s most surprising about this malignant mutation is that it originally evolved as a beneficial adaptation. Researchers have been able to trace the origins of the sickle cell mutation to regions historically ravaged by a tropical disease called malaria. Spread by a parasite found in local mosquitoes, malaria uses red blood cells as incubators to spread quickly and lethally through the bloodstream. However, the same structural changes that turn red blood cells into roadblocks also make them more resistant to malaria. And if a child inherits a copy of the mutation from only one parent, there will be just enough abnormal hemoglobin to make life difficult for the malaria parasite, while most of their red blood cells retain their normal shape and function. In regions rife with this parasite, sickle cell mutation offered a serious evolutionary advantage. But as the adaptation flourished, it became clear that inheriting the mutation from both parents resulted in sickle-cell anemia. Today, most people with sickle-cell disease can trace their ancestry to a country where malaria is endemic. And this mutation still plays a key role in Africa, where more than 90% of malaria infections occur worldwide. Fortunately, as this “adaptation” thrives, our treatment for sickle cell continues to improve. For years, hydroxyurea was the only medication available to reduce the amount of sickling, blunting symptoms and increasing life expectancy. Bone marrow transplantations offer a curative measure, but these procedures are complicated and often inaccessible. But promising new medications are intervening in novel ways, like keeping oxygen bonded to hemoglobin to prevent sickling, or reducing the stickiness of sickled cells. And the ability to edit DNA has raised the possibility of enabling stem cells to produce normal hemoglobin. As these tools become available in the areas most affected by malaria and sickle cell disease, we can improve the quality of life for more patients with this adverse adaptation.

**P723 2019-04-25 How this disease changes the shape of your cells - Amber M. Yates**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=723)

翻译人员: Carol Wang 校对人员: Lipeng Chen你的细胞是什么形状的？软粘的圆柱体？ 还是锯齿状的之字形？你可能不太会想这些 基本构体的具体形状，但在微观层面，微小变化 会产生巨大的后果。虽然一些适应性 改变形状会变得更好，其他适应性改变会引发 一连串的抑制性并发症。这是镰状细胞病的故事。镰状细胞病影响红血球，红血球将氧气从肺部 输送到体内的所有组织。为了完成这项重要任务，红血球内充满了 携带氧分子的血红蛋白。这些蛋白质独立漂浮在红血球柔韧、甜甜圈般的形状内，让红血球保持足够的灵活性，即使是最微小的血管也能通过。但在镰状细胞病中，单一的基因突变 改变了血红蛋白的结构。这些突变的蛋白质 向组织释放氧气后，就锁成整齐的行。血红蛋白组成的棒状物， 使细胞变形为长而尖的镰刀。这些红血球变得更硬、更粘，不再能顺利地流过血管。镰状细胞留在那里 并堆积起来——有时会堵塞整个血管。造成氧气无法送达各种细胞，产生镰状细胞病患者所经历的多种症状。患者从不到一岁开始，就饱受缺氧组织中 反复发作刺痛感的折磨。血管堵塞的位置，决定了患者所经历的具体症状。脾脏作为免疫系统的一部分，它的堵塞会使患者 面临危险感染的风险。肺部的镰状细胞堆积， 会引起发烧和呼吸困难。眼睛附近的堵塞， 会导致视力问题和视网膜脱离。如果供应大脑的血管堵塞了，患者甚至会中风发作。更糟的是, 镰状红血球 无法存活很久——只有10或20天， 而健康细胞可以活4个月。短暂的寿命意味着，患者的红血球供应不断枯竭；这就是被称为 镰状细胞性贫血的疾病。可能这种恶性突变 最令人惊讶的是，它最初进化竟然是良性适应。研究人员已追踪到镰变起源，源于历史上被热带疾病 疟疾破坏的地区。经由当地蚊子身上 发现的寄生虫传播，疟疾用红血球作为孵化器，迅速而致命地通过血液传播。然而，将红血球变成路障的 同样的结构变化也使他们对疟疾具有 更强的抵抗力。如果孩子只从一个家长那里 继承了突变的基因，就会有足够的异常血红蛋白，让疟原虫难以生存，而他们的大多数红血球 保持正常的形状和功能。在这种寄生虫流行的地区，镰变提供了关键的进化优势。但随着适应性的不断发展，很明显，从父母双方 继承突变的孩子，会得镰状细胞性贫血。如今，多数患有镰状细胞性贫血的人，其祖先可追溯到 疟疾流行的国家。这种突变在非洲 仍然发挥着关键作用，其中90%以上的疟疾感染 发生在全球范围内。幸运的是，随着这种 “适应”的蓬勃发展，对镰状细胞的治疗 也在继续改进中。多年来，羟基脲是唯一可用药，它能减少镰变细胞数量、减缓症状，并延长寿命预期。骨髓移植提供了一种治疗措施，但这些过程很复杂， 往往无法实现。但给人希望的新药物 正以新颖方式干预治疗，比如把氧气粘合到血红蛋白上， 防止红细胞镰变，或降低镰状细胞的粘性。而且，编辑DNA的能力提升了使干细胞产生 正常血红蛋白的可能性。随着这些工具的出现，在受疟疾和镰状细胞病 影响最严重的地区，针对这些携带这种 不利的适应性改变的患者，我们可以提高他们的生活质量。

**P724 2019-04-29 Why should you read “Crime and Punishment” - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=724)

What drives someone to kill in cold blood? What goes through the murderer’s mind? And what kind of a society breeds such people? Over 150 years ago Fyodor Mikhailovich Dostoyevsky took these questions up in what would become one of the best-known works of Russian literature: "Crime and Punishment." First serialized in a literary magazine in 1866, the novel tells the story of Rodion Romanovich Raskolnikov, a young law student in Saint Petersburg. Raskolnikov lives in abject poverty, and at the start of the story has run out of funds to continue his studies. Letters from his rural home only add to his distress when he realizes how much his mother and sister have sacrificed for his success. Increasingly desperate after selling the last of his valuables to an elderly pawnbroker, he resolves on a plan to murder and rob her. But the impact of carrying out this unthinkable act proves to be more than he was prepared for. Though the novel is sometimes cited as one of the first psychological thrillers, its scope reaches far beyond Raskolnikov’s inner turmoil. From dank taverns to dilapidated apartments and claustrophobic police stations, the underbelly of 19th century Saint Petersburg is brought to life by Dostoyevsky’s searing prose. We’re introduced to characters such as Marmeladov, a miserable former official who has drank his family into ruin, and Svidrigailov, an unhinged and lecherous nobleman. As Raskolnikov’s own family arrives in town, their moral innocence stands in stark contrast to the depravity of those around them, even as their fates grow increasingly intertwined. This bleak portrait of Russian society reflects the author’s own complex life experiences and evolving ideas. As a young writer who left behind a promising military career, Fyodor had been attracted to ideas of socialism and reform, and joined a circle of intellectuals to discuss radical texts banned by the Imperial government. Upon exposure, members of this group, including Dostoyevsky, were arrested. Many were sentenced to death, only to be subjected to a mock execution and last-minute pardon from the Tsar. Dostoyevsky spent the next four years in a Siberian labor camp before being released in 1854. The experience left him with a far more pessimistic view of social reform, and his focus shifted toward spiritual concerns. In the 1864 novella "Notes from Underground," he expounded on his belief that utopian Western philosophies could never satisfy the contradictory yearnings of the human soul. "Crime and Punishment" was conceived and completed the following year, picking up on many of the same themes. In many ways, the novel follows a common narrative thread where a promising youth is seduced and corrupted by the dangers of urban life. But its social critique cuts far deeper. Raskolnikov rationalizes that his own advancement at the cost of the exploitative pawnbroker’s death would be a net benefit to society. In doing so, he echoes the doctrines of egoism and utilitarianism embraced by many of Dostoyevsky’s contemporary intellectuals. And in believing that his intelligence allows him to transcend moral taboos, Raskolnikov cuts himself off from his own humanity. Yet although the book is deeply concerned with morality, "Crime and Punishment" never comes across as merely moralizing, with each character given their own distinctive and convincing voice. One of the most remarkable things about "Crime and Punishment" is its ability to thrill despite the details of the central murder being revealed in the first act. Raskolnikov’s crime is clear. But it’s only through Dostoyevsky’s gripping account of the ensuing social and psychological turmoil that we learn the true nature of his punishment– and the possibility of redemption.

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翻译人员: Carol Wang 校对人员: Xinyu Zhao是什么驱使人变成了冷血杀手？凶手心里想的是什么？又是什么样的社会 造就了这样的人呢？150多年前，费奥多尔·米哈伊洛维奇·陀思妥耶夫斯基 在作品中提出了上述问题，这部作品后来成为 俄国文学史上最著名的作品之一：《罪与罚》。这部小说于1866年 首次在一本文学杂志上连载，讲述了圣彼得堡一个年轻的法学生罗迪·罗曼诺维奇·拉斯科尔尼科夫的故事。拉斯科尔尼科夫的生活穷困潦倒，故事开头的他因 交不起学费而辍学。农村老家的来信使他更为沮丧，他发现母亲和妹妹为了让他成功 已经牺牲太多了。把最后一点值钱的东西 卖给当铺的老太婆后，他更加绝望了，他决心要杀掉当铺老板娘， 夺走她的钱财。但实施这项鲁莽计划的后果，比他预想的要严重得多。虽然该作有时被认为是 最早的心理惊悚小说之一，小说所揭露的远不止 拉斯科利尼科夫内心的挣扎。从潮湿的小酒馆，到破旧的公寓和幽闭恐怖的警察局,19世纪圣彼得堡的社会阴暗面在陀思妥耶夫斯基 犀利的笔触下跃然纸上。我们认识了诸多角色，例如马美拉多夫，一位因酗酒而倾家荡产的可怜的下岗官员；还有斯维里加洛夫， 一位傲慢、脾气暴躁的贵族。当拉斯科利尼科夫的家人来到镇上时，他们道德上的纯真与周围人的堕落形成鲜明对比，即使他们的命运逐渐交织在了一起。这幅冷酷的俄罗斯社会肖像画，反映了作者自身复杂的生活经历 和不断发展的思想。告别了前途无量的军队仕途， 费奥多尔成为一名年轻作家，被社会主义和改革思想所吸引，并加入了知识分子的圈子，讨论被帝国政府禁止的激进文章。暴露后，包括陀思妥耶夫斯基在内的 团体成员被捕。许多人被判处死刑，在行刑前一刻才被沙皇赦免， 只经受了模拟处决。陀思妥耶夫斯基 在西伯利亚劳改营待了四年,直到1854年才被释放。这次经历让他对社会改革越发悲观，他也把目光更多地投向了精神层面的话题。在1864年的中篇小说 《地下室手记》中，他阐述了他的观点， 认为乌托邦式的西方哲学永远无法满足 人类灵魂中相互矛盾的欲望。次年，他构思并完成了《罪与罚》，书中许多主题与上篇小说相同。在许多方面，小说遵循一个共同的叙事线索，一个有前途的年轻人被城市 生活的险恶所诱惑和腐蚀，但作品对社会的批评更加深刻。拉斯科利尼科夫认为，杀死剥削他人的当铺老板的行为 乃“替天行道”，对社会有益无害。他的做法正契合陀思妥耶夫斯基时代许多知识分子所信奉的 自我主义和功利主义思想。拉斯科利尼科夫认定自己的才智 给予了他超越道德禁忌的权力，并最终走向了人性的堕落。尽管《罪与罚》 深刻探讨了有关道德的话题，这本书从来都不是单纯的道德说教，每个人物都有其独特 而有说服力的声音。《罪与罚》最引人注目的一点就在于尽管第一幕就详细描绘了 作为故事高潮的谋杀案，全书依然让人欲罢不能。拉斯科利尼科夫的“罪”显而易见。但是，只有通过陀思妥耶夫斯基对社会动荡和主人公内心挣扎 扣人心弦的描述，我们才了解到他的“罚”的 真实本质——以及救赎的可能性。

**P725 2019-05-02 Can a black hole be destroyed - Fabio Pacucci**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=725)

Black holes are among the most destructive objects in the universe. Anything that gets too close to the central singularity of a black hole, be it an asteroid, planet, or star, risks being torn apart by its extreme gravitational field. And if the approaching object happens to cross the black hole’s event horizon, it’ll disappear and never re-emerge, adding to the black hole’s mass and expanding its radius in the process. There is nothing we could throw at a black hole that would do the least bit of damage to it. Even another black hole won’t destroy it– the two will simply merge into a larger black hole, releasing a bit of energy as gravitational waves in the process. By some accounts, it’s possible that the universe may eventually consist entirely of black holes in a very distant future. And yet, there may be a way to destroy, or “evaporate,” these objects after all. If the theory is true, all we need to do is to wait. In 1974, Stephen Hawking theorized a process that could lead a black hole to gradually lose mass. Hawking radiation, as it came to be known, is based on a well-established phenomenon called quantum fluctuations of the vacuum. According to quantum mechanics, a given point in spacetime fluctuates between multiple possible energy states. These fluctuations are driven by the continuous creation and destruction of virtual particle pairs, which consist of a particle and its oppositely charged antiparticle. Normally, the two collide and annihilate each other shortly after appearing, preserving the total energy. But what happens when they appear just at the edge of a black hole’s event horizon? If they’re positioned just right, one of the particles could escape the black hole’s pull while its counterpart falls in. It would then annihilate another oppositely charged particle within the event horizon of the black hole, reducing the black hole’s mass. Meanwhile, to an outside observer, it would look like the black hole had emitted the escaped particle. Thus, unless a black hole continues to absorb additional matter and energy, it’ll evaporate particle by particle, at an excruciatingly slow rate. How slow? A branch of physics, called black hole thermodynamics, gives us an answer. When everyday objects or celestial bodies release energy to their environment, we perceive that as heat, and can use their energy emission to measure their temperature. Black hole thermodynamics suggests that we can similarly define the “temperature” of a black hole. It theorizes that the more massive the black hole, the lower its temperature. The universe’s largest black holes would give off temperatures of the order of 10 to the -17th power Kelvin, very close to absolute zero. Meanwhile, one with the mass of the asteroid Vesta would have a temperature close to 200 degrees Celsius, thus releasing a lot of energy in the form of Hawking Radiation to the cold outside environment. The smaller the black hole, the hotter it seems to be burning– and the sooner it’ll burn out completely. Just how soon? Well, don’t hold your breath. First of all, most black holes accrete, or absorb matter and energy, more quickly than they emit Hawking radiation. But even if a black hole with the mass of our Sun stopped accreting, it would take 10 to the 67th power years– many many magnitudes longer than the current age of the Universe— to fully evaporate. When a black hole reaches about 230 metric tons, it’ll have only one more second to live. In that final second, its event horizon becomes increasingly tiny, until finally releasing all of its energy back into the universe. And while Hawking radiation has never been directly observed, some scientists believe that certain gamma ray flashes detected in the sky are actually traces of the last moments of small, primordial black holes formed at the dawn of time. Eventually, in an almost inconceivably distant future, the universe may be left as a cold and dark place. But if Stephen Hawking was right, before that happens, the normally terrifying and otherwise impervious black holes will end their existence in a final blaze of glory.

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翻译人员: Carol Wang 校对人员: Ziyao Wang黑洞是宇宙最具破坏性的物体之一，任何太靠近黑洞中心奇点的物体，无论是小行星，行星还是恒星，都有被其巨大引力场摧毁的危险。如果接近黑洞的物体 恰好穿过黑洞的事件视界，它将会消失，永不再出现，此过程中，黑洞质量增加， 而且黑洞半径扩大。没有任何扔向黑洞的东西会对它造成一点损害即使另一个黑洞也无法摧毁它——这两个黑洞只会合成一个更大的黑洞，此过程中释放出一点引力波能量。理论证明，在遥远的将来，黑洞会组成整个宇宙。然而有一种方法 可能可以摧毁或“蒸发”这些黑洞。如果那个理论可靠，我们只需要等待。1974年，斯蒂芬·霍金提出一个可能导致黑洞 逐渐失去质量的过程：霍金辐射学说。这个理论基于一种 真空量子波动的已知现象。根据量子力学，时空中的一个点在多个 可能的能量状态之间波动。这些波动是由虚粒子对的不断产生和湮灭所造成的，虚粒子对由粒子 和带相反电荷的反粒子组成。通常两者出现后不久 就会相互碰撞和湮灭，总能量不变。但它们出现在黑洞 事件视界时会发生什么呢？如果它们恰好位于视界边缘，一个粒子可能会逃脱黑洞引力，而另一个坠入黑洞。黑洞视界边缘内的粒子会中和另一个带相反电荷的粒子，从而减少黑洞的质量。对外部观察者来说，就好像黑洞发射了逃逸粒子。因此，除非黑洞继续 吸收外部物质和能量，它将以极其缓慢的速度蒸发粒子。有多慢呢？黑洞热力学给出了答案。日常物体或天体 向周围环境释放能量，我们把其感受为热量，并且根据释放的能量 来测量它们的温度。黑洞热力学认为，我们也可以类似地 定义黑洞的“温度”。该理论认为，黑洞质量越大，其温度越低。宇宙最大的黑洞，其温度为10的负17次方开尔文，非常接近绝对零度。而一个与灶神星 同质量的黑洞的温度，则接近200摄氏度，它以霍金辐射的形式，向寒冷的外部环境释放大量能量。黑洞越小，其燃烧得更加炽热——而且很快就会烧光。到底多快呢？好吧，别期望太高。首先，多数黑洞聚集 或吸收物质和能量的速度远远大于发出霍金辐射的速度，即使一个与太阳质量 相同的黑洞停止了聚集物质能量，它也需要10的67次方年——也就是比现在宇宙的年龄更长的时间——才能完全消失。当黑洞达到230公吨左右时，它只会再生存一秒。在最后一秒，它的事件视界变得越来越小，直到最终将所有能量释放回宇宙。虽然人们从未直接观察到霍金辐射，但一些科学家认为，天空中 探测到的某些伽马射线闪光就是是远古时期形成的、小的原始黑洞最后一刻的痕迹。最终，在未知的遥远未来，宇宙会成为冰冷、黑暗之所。但如果霍金辐射的理论是正确的，在那发生之前，可怕而神秘莫测的黑洞，将在最后的荣耀之火中湮灭。

**P726 2019-05-02 The Aztec myth of the unlikeliest sun god - Kay Almere Read**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=726)

Nanahuatl, weakest of the Aztec gods, sickly and covered in pimples, had been chosen to form a new world. There had already been four worlds, each set in motion by its own “Lord Sun," and each, in turn, destroyed: the first by jaguars, the next by winds, the next by rains of fire, and the fourth by floods. To establish the Fifth Sun, Lord Quetzalcoatl, the “Feathered Serpent,” had gone to the underworld and returned with the bones of earlier people, nourishing them with his own blood to create new life. But for them to have a world to live in, another god had to leap into the great bonfire and become the fifth sun. The Lord of Sustenance and the Lord of Fire had chosen Nanahuatl for this task, while the Lord of Rain and the Lord of the Four Quarters had picked their own offering: the proud, rich Tecciztecatl. First, the chosen ones had to complete a four-day fasting and bloodletting ritual. Nanahuatl had nothing but cactus thorns with which to bleed himself, and fir branches to paint with his red offering, but he resolved to try his best. Meanwhile, Tecciztecatl flaunted his riches, using magnificent jade spines and branches adorned with iridescent quetzal feathers for his own blood offering. When four days had passed, the fire was roaring high. Four times proud Tecciztecatl approached the flames, and four times he pulled back in fear. Humble Nanahuatl stepped forward. The other gods painted him chalky white and glued feathers to him. Without hesitation, he threw himself into the flames. A fire-blackened eagle swooped over the fire, grabbed Nanahuatl and carried him into the sky. There, Lord and Lady Sustenance bathed him, sat him on a feathered throne, and wrapped a red band around his head. Inspired by Nanahuatl, Tecciztecatl threw himself into what was left of the fire: cooled ashes. A jaguar jumped over the fire pit, but couldn’t carry Tecciztecatl into the sky. When Tecciztecatl reached the horizon, a band of goddesses dressed him in rags. Still, he shined just as brightly as Nanahuatl. But since he had shown far less bravery and much more pride, one of the gods picked up a rabbit and tossed it in his face, dimming his light. But the fifth world still wasn’t truly established. Nanahuatl, Lord Sun, shined for four days straight without moving through the sky like all the previous suns had moved. Back in their home, Teotihuacan, the gods began to worry. They sent Obsidian Hawk up to ask what was wrong. Nanahuatl replied that just as he had sacrificed himself to become Lord Sun, he now needed the nourishing blood of the other gods in order to move through the sky. Enraged at this suggestion, Lord Dawn stepped up and shot an arrow at Lord Sun. Lord Sun shot back, and his quetzal-feathered arrows struck Lord Dawn in the face, turning him to frost. Before anyone else could act rashly, the other gods turned to each other to discuss what to do. Of course, no one wanted to sacrifice themselves, but nor did anyone want to act like Lord Dawn. Besides, Nanahuatl had held up his end of the bargain to nourish the earth— how could they refuse to nourish him in return? They remembered how even the wimpy Tecciztecatl had eventually managed to emulate Nanahuatl's bravery. At long last, five other gods agreed to sacrifice themselves. One by one, Lord Death stabbed them in the heart with an obsidian knife, offering their bodies to their new Lord Sun. As the last god made the sacrifice, Lord Quetzalcoatl blew the embers of the great fire back to life, and the sun began to move through the sky at last, ushering in the fifth age. Thanks to a pimply weakling whose fortitude inspired all the other gods, the sun moves along its daily path, the rabbit-faced moon following in its wake.

**P726 2019-05-02 The Aztec myth of the unlikeliest sun god - Kay Almere Read**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=726)

翻译人员: Candace Hwang 校对人员: Carol Wang阿兹特克众神中最弱的纳纳华特， 体弱多病并且全身长满了丘疹，被选中去创造一个新的世界。过去已存在过四个世界， 每个都由自己的 “太阳神” 启动，并且依次被毁灭。第一个世界被美洲豹毁灭， 第二个世界被风毁灭，第三个被火雨毁灭， 第四个被洪水摧毁。为了建立第五个太阳，魁札尔科亚特尔神，即”羽蛇神“，前往地下世界并带回了先民骨头，用自己的鲜血滋养骨头造出新生命。为了让他们有一个可以生活的世界，另一个神必须跳入篝火， 成为第五个太阳。创造神和火神选择 纳纳华特来完成这项任务，而雨神和四方位神则推举了骄傲而富有的特库希斯特卡特。首先， 被选中的人必须经历 禁食四天和放血的仪式。纳纳华特只有用仙人掌刺 扎破自己流血，用冷杉枝蘸着自己的鲜血 作画去献祭，但是他决心竭尽所能。与此同时，特库希斯特卡特 在炫耀着他的财富，用华丽玉脊和彩虹色 咬鹃羽毛所装饰的树枝来代替自己的血液祭献，四天过去了，火焰熊熊燃烧，骄傲的特库希斯特卡特四次靠近火焰，又四次害怕地退回来。谦虚的纳纳华特走上前，其余众神将他涂成雪白并沾上羽毛，他没有任何犹豫，扑进了火焰里，一只被火烧黑的老鹰， 俯冲到火堆上方，抓住纳纳华特并带他上了天，在那里，创造神和创造女神为他洗礼，让他登上羽毛宝座，并头系红带。被纳纳华特所激励，特库希斯特卡特跳进了 烧剩下的火堆：冷却的灰烬，一只美洲豹越过火坑，却无法 把特库希斯特卡特带向天空，当特库希斯特卡特到达地平线时， 一群女神给他穿上破衣服，他的光芒仍像纳纳华特一样闪亮，但因他表现得不够勇敢且太骄傲，其中一位神捡起一只兔子 并扔到了他的脸上，调暗了他的光芒。但第五个世界并没真正建立起来，太阳神纳纳华特持续照耀了四天，不像以前的太阳那样在天空移动。众神回到特奥蒂瓦坎城的家， 开始担忧起来。他们派黑鹰上天，询问事由。纳纳华特回复说，就像 他牺牲自己成为太阳神，现在需要其他众神用血来滋养他，这样才能在天空中运转。黎明之神被这个提议所激怒， 站出来并向太阳神射了一箭，太阳神射箭反击，其咬鹃羽毛箭射中黎明之神的脸，把他变成了冰霜。在任何人冲动行动之前，其他的神开始互相讨论该怎么做。当然，没有人想牺牲自己，但也没人想效仿黎明之神。此外，纳纳华特信守承诺滋养地球，其他神怎可拒绝用滋养回报他呢？众神记起懦弱如特库希斯特卡特，最终也效仿纳纳华特勇敢的举动。终于, 其他五个神同意牺牲自己。死神依次用黑石刀捅进他们的心脏，把他们的身体祭献给新太阳神。当最后一位神作出牺牲时，生命之神重燃大火的余烬，太阳终于在天空中开始运转，引领第五太阳纪。多亏一个长满肿泡的弱者， 他的坚毅激发了所有其他的神，太阳沿着它每天的路径运行，兔子脸的月亮紧随着它的轨迹。

**P727 2019-05-02 You are more transparent than you think - Sajan Saini**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=727)

It’s an increasingly common sight in hospitals around the world: a nurse measures our height, weight, blood pressure, and attaches a glowing plastic clip to our finger. Suddenly, a digital screen reads out the oxygen level in our bloodstream. How did that happen? How can a plastic clip learn something about our blood… without a blood sample? Here’s the trick: our bodies are translucent, meaning they don’t completely block and reflect light. Rather, they allow some light to actually pass through our skin, muscles, and blood vessels. Don’t believe it? Hold a flashlight to your thumb. Light, it turns out, can help probe the insides of our bodies. Consider that medical fingerclip— it’s called a pulse oximeter. When you inhale, your lungs transfer oxygen into hemoglobin molecules, and the pulse oximeter measures the ratio of oxygenated to oxygen-free hemoglobin. It does this by using a tiny red LED light on one side of the fingerclip, and a small light detector on the other. When the LED shines into your finger, oxygen-free hemoglobin in your blood vessels absorbs the red light more strongly than its oxygenated counterpart. So the amount of light that makes it out the other side depends on the concentration ratio of the two types of hemoglobin. But any two patients will have different-sized blood vessels in their fingers. For one patient, a saturation reading of ninety-five percent corresponds to a healthy oxygen level, but for another with smaller arteries, the same reading could dangerously misrepresent the actual oxygen level. This can be accounted for with a second infrared wavelength LED. Light comes in a vast spectrum of wavelengths, and infrared light lies just beyond the visible colors. All molecules, including hemoglobin, absorb light at different efficiencies across this spectrum. So contrasting the absorbance of red to infrared light provides a chemical fingerprint to eliminate the blood vessel size effect. Today, an emerging medical sensor industry is exploring all-new degrees of precision chemical fingerprinting, using tiny light-manipulating devices no larger than a tenth of a millimeter. This microscopic technology, called integrated photonics, is made from wires of silicon that guide light— like water in a pipe— to redirect, reshape, even temporarily trap it. A ring resonator device, which is a circular wire of silicon, is a light trapper that enhances chemical fingerprinting. When placed close to a silicon wire, a ring siphons off and temporarily stores only certain waves of light— those whose periodic wavelength fits a whole number of times along the ring’s circumference. It’s the same effect at work when we pluck guitar strings. Only certain vibrating patterns dominate a string of a particular length, to give a fundamental note and its overtones. Ring resonators were originally designed to efficiently route different wavelengths of light— each a channel of digital data— in fiber optics communication networks. But some day this kind of data traffic routing may be adapted for miniature chemical fingerprinting labs, on chips the size of a penny. These future labs-on-a-chip may easily, rapidly, and non-invasively detect a host of illnesses, by analyzing human saliva or sweat in a doctor’s office or the convenience of our homes. Human saliva in particular mirrors the composition of our bodies’ proteins and hormones, and can give early-warning signals for certain cancers and infectious and autoimmune diseases. To accurately identify an illness, labs-on-a-chip may rely on several methods, including chemical fingerprinting, to sift through the large mix of trace substances in a sample of spit. Various biomolecules in saliva absorb light at the same wavelength— but each has a distinct chemical fingerprint. In a lab-on-a-chip, after the light passes through a saliva sample, a host of fine-tuned rings may each siphon off a slightly different wavelength of light and send it to a partner light detector. Together, this bank of detectors will resolve the cumulative chemical fingerprint of the sample. From this information, a tiny on-chip computer, containing a library of chemical fingerprints for different molecules, may figure out their relative concentrations, and help diagnose a specific illness. From globe-trotting communications to labs-on-a-chip, humankind has repurposed light to both carry and extract information. Its ability to illuminate continues to astonish us with new discoveries.

**P727 2019-05-02 You are more transparent than you think - Sajan Saini**

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翻译人员: Han Zheng 校对人员: Carol Wang在全球的医院中， 这一现象越来越普遍：护士测量我们的身高、体重、血压，并用一个闪光塑料夹 夹住我们的手指。电子频幕立刻就显示出 我们血液中的氧气水平。这是如何办到的？在不采血样的情况下，塑料夹是如何测出 血液的相关信息呢？奥秘就在于：我们的身体是半透明的，也就是说，我们的身体 不会完全阻挡并反射光线。相反，一部分光线可以 透过皮肤、肌肉和血管穿透我们的身体。不相信，是吗？用手电筒照射你的大拇指试试。你会发现，光线可以穿透 到我们的身体里。想想那个称为脉搏血氧仪 的医用手指夹的工作原理。当你吸气时，肺将氧气 输送给血红蛋白分子，脉搏血氧仪能测量氧合 血红蛋白与还原血红蛋白的比率。它是通过手指夹一侧的 红色微型 LED 灯和另一侧的小光探测器实现的。当 LED 灯光射进你的手指时，血管中的还原血红蛋白比氧合血红蛋白吸收更多红光。因此能够穿透手指的光的数量取决于两种血红蛋白的吸光比例。但是任意两个病人手指的 血管大小都不尽相同，95% 的饱和指数对某个病人来说是一个健康的含氧水平。但对动脉小的病人来说，同样的指数可能会 危险地曲解真实含氧水平。这一现象可用第二个 红外波长的 LED 来弥补。光由许多不同波长的光线组成光谱，红外线光在可见光之外。所有分子，包括血红蛋白，对光谱中不同光线的 吸收程度不尽相同。所以对比从红色光 和红外线光的吸收程度，可得到化学指纹，用来排除 血管大小差异带来的影响。如今，一个新兴的医学 传感器产业正在通过大小不超过 0.1 毫米的 微型光操纵设备，探索前所未有的高精度 化学指纹提取术。这一微观技术，又称集成光子学，由能导光的硅线制成——就像水管中的水一样——能改变方向、改变形状， 甚至会暂时阻滞光束。环形谐振器设备由一个 环状硅线构成，用来阻滞光束以提高 化学指纹精度。当该装置靠近硅线时，它会吸收并暂时储存一些 特定的光波——即光波波长的整数倍等于环周长的周期性光波。这和我们拨动吉他弦的原理相似，一根琴弦在特定长度时 才会产生某种震动模式，才能产生主音和泛音。环形谐振器最初的设计是应用在光纤通信网中，用于有效分路不同波长的光波——每个光波对应一个电子数据通道。但未来这种数据分流设备也许会用于微型化学指纹检验室，用在只有 1 分硬币大小的芯片上。未来这些芯片检验室能够实现对各类疾病的轻松、 迅速、无创之检测。医生可以在办公室里 检验我们的唾液和汗液，有条件者也可以在家检验。人的唾液尤其能够反映人体的蛋白和激素构成，并能够发出对某些癌症、感染、以及自体免疫疾病的早期预警。为了精准诊断一种疾病，芯片检验室会采用包括化学指纹采集在内的几种方法，对唾液样本中大量的 混杂微量物质进行筛选。唾液中不同的生物分子 吸收同一波长的光，但每个分子都有 独一无二的化学指纹。在芯片检验室中， 当光透过唾液样本之后，每个微调过的小环都会吸入稍有不同的光波，并发给配对的测光仪。最终，这组测光仪将解析样本中所有的化学指纹集合。由这些信息，装载着 不同分子化学指纹库的微型芯片电脑就能算出它们的相对浓度，以帮助诊断特定疾病。从全球通讯到芯片检验室，人类把光用于新用途， 用于承载和提取信息。光的照明能力正通过各种新发现 令我们眼前一亮。

**P728 2019-05-06 The lovable (and lethal) sea lion - Claire Simeone**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=728)

Sunning themselves on rocks or waddling awkwardly across the beach, it’s easy to think of these immobile mammals less as sea lions, and more as sea house cats. But don’t be fooled by their beachside behavior. Under the waves, sea lions are incredible endurance hunters. Hurtling around at speeds from 4 to 18 miles an hour and hunting for up to 30 hours at a time, these majestic mammals live up to their name. And thanks to a suite of physical adaptations, finely tuned over millions of years, they make for resourceful foragers. To find their favorite food, sea lions hunt much deeper than many of their semi-aquatic peers. With some species diving to depths of nearly 400 meters, they’re able to cope with the mounting pressure by collapsing their pliable rib cage, and compressing a pair of springy lungs. This pushes air up through the smaller airways, collapsing rings of cartilage as oxygen travels out from the lungs, to be held in the larger, upper airways. Upon surfacing, this air will be used to re-inflate the lungs, but for now their heart slows down to preserve oxygen. Blood flow is redirected towards only the most essential organs like the heart, lungs, and brain, which rely on reserve oxygen stored in blood and muscle. Once they arrive at their hunting ground, sea lions depend on their superior vision to find their prey. Most mammal eyes have a structure called a lens– a transparent, convex structure whose shape refracts light to enable sight. In humans, this lens is curved to process light waves traveling through air. But sea lions need to see their best at hundreds of meters deep. To accommodate, their eyes have a much rounder lens to refract light underwater, as well as teardrop-shaped pupils which can expand to 25 times their original size. This lets in as much light as possible, helping them pinpoint their prey in even the dimmest conditions. But once they’ve closed in, they rely on something akin to a sixth sense to actually catch their meal. Their whiskers, or vibrissae, are composed of keratin and full of nerve fibers that run deep into the connective tissue of their face. Sea lions have full directional control over these whiskers, which can lie flat against their face, or stick out at a 90-degree angle. When properly tuned, these whiskers can sense the slim trails of moving water fish leave in their wake. And they’re precise enough to let blindfolded sea lions tell the difference between objects less than two centimeters different in size. With these tools a healthy sea lion can catch generous helpings of fish such as anchovy, mackerel, and squid on every outing. And with their exceptional memories, they can remember multiple hunting grounds, including those they haven’t visited in decades. This memory also extends to breeding territories and birthing areas, as well as which neighbors are friend and foe. There’s even evidence that sea lions can remember how to perform tasks after 10 years with no practice in between, letting them navigate old stomping grounds with ease. Yet despite these incredible adaptations, there are changes unfolding in their habitats too rapidly for sea lions to handle. As climate change warms the oceans, certain toxic algae species thrive. This algae is harmless to the fish who eat it, but for the sea lions which ingest those fish, the algae’s domoic acid can trigger seizures and brain damage. Changing ocean conditions keep this algae blooming year round, causing more and more sea lions to wash up on beaches. This tragic discovery is just one of the many ways the health of aquatic animal communities can help us better understand Earth’s oceans. These red flags help us take action to protect ourselves and other maritime mammals. And the more we can learn about the changing ocean that sea lions inhabit, the better equipped we’ll be to help these clever creatures thrive.

**P728 2019-05-06 The lovable (and lethal) sea lion - Claire Simeone**

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翻译人员: Carol Wang 校对人员: Liu Qi岩石上晒着太阳 或海滩上蹒跚的海狮，这些不能正常行走的哺乳动物 容易让人觉得不像海狮，而是像家猫。但不要被它们在海滩上的行为所误导。海浪之下，海狮是耐力超强的猎手，它们时速可达4到18英里，一次狩猎可长达30个小时，这些了不起的哺乳动物 绝对是实至名归。得益于一系列的身体适应变化，历经数百万年的细微调整， 它们成为足智多谋的觅食者。为找到最喜欢的食物，海狮的水下捕食深度 远超许多半水栖同类。有些海狮种类可下潜到近400米，面对不断增加的水下压力，它们收缩柔韧的肋骨、 压缩富有弹性的肺。使肺部空气上行通过狭窄呼吸道，肺部氧气流出时， 软骨环同时收缩，把空气封闭在更大的上呼吸道中。浮出水面时，这些空气 又会重新充满肺部，但现在，它们要减缓心跳来节省氧气。血液流向被改变， 仅流经最重要的器官，如心脏，肺和大脑，这些器官依赖于血液 和肌肉中储备的氧气。一旦抵达猎场，海狮凭借绝佳视力来发现猎物。多数哺乳动物的眼睛 都有一种晶状体结构 ——一种透明、凸起的结构， 可折射光线成像。人类的晶状体是弧形的， 可以处理穿过空气的光波，但海狮需要看清几百米深的地方。为了适应环境，它们拥有更圆的 晶状体来折射水下光线，同时还拥有泪珠状的瞳孔，其瞳孔可以扩大25倍。这可以使尽可能多的光线进入眼睛，帮它们在最昏暗的环境下 准确地找到猎物。但一旦它们接近了猎物，它们依靠类似第六感来捕获食物。它们的胡须，或触须，由角蛋白组成，富含神经纤维，神经纤维深入其脸部结缔组织。海狮可全方位控制胡须，既可平贴脸上， 也能90度直直探出。适当调整后，胡须能感知鱼儿游动留下的细小痕迹。蒙眼的海狮可以通过胡须精确地区分大小相差不到两厘米的物体。借助这些工具，健康的海狮 每次外出时都能捕获大量鱼类，如凤尾鱼，鲭鱼和鱿鱼。凭借超凡记忆力， 它们能记住多个猎场，包括几十年没去的猎场。海狮也能记住繁殖和分娩区域，以及那些邻居是敌是友。甚至有证据表明， 海狮还能记住如何在某地狩猎，即使10年没在那里狩猎，这种超强记忆 令其轻松巡游旧地盘。然而，尽管有这些惊人的适应力，栖息地的变化还是快得让海狮难以适应。随着气候变化让海洋变暖， 某些有毒藻类繁荣生长。这种藻类对吃它的鱼无害，但对于以这些鱼为食的海狮来说，藻类的软骨藻酸 会引发癫痫和脑损伤。不断变化的海洋环境 使这种藻类终年繁盛，导致越来越多的海狮死亡， 被冲到海滩上。这种悲剧的发现只是，我们通过水生动物健康状况，来更好地了解地球海洋的方式之一。这些红色警示帮助我们采取行动，去保护自己和其它海洋哺乳动物。越了解海狮栖息地海洋的变化，我们就能更好地帮助这些 聪明的动物繁衍壮大。

**P729 2019-05-07 Why should you read “The Master and Margarita” - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=729)

The Devil has come to town. But don’t worry – all he wants to do is stage a magic show. This absurd premise forms the central plot of Mikhail Bulgakov’s masterpiece, "The Master and Margarita." Written in Moscow during the 1930s, this surreal blend of political satire, historical fiction, and occult mysticism has earned a legacy as one of the 20th century’s greatest novels– and one of its strangest. The story begins when a meeting between two members of Moscow’s literary elite is interrupted by a strange gentleman named Woland, who presents himself as a foreign scholar invited to give a presentation on black magic. As the stranger engages the two companions in a philosophical debate and makes ominous predictions about their fates, the reader is suddenly transported to 1st century Jerusalem. There a tormented Pontius Pilate reluctantly sentences Jesus of Nazareth to death. With the narrative shifting between the two settings, Woland and his entourage– Azazello, Koroviev, Hella, and a giant cat named Behemoth– are seen to have uncanny magical powers, which they use to stage their performance while leaving a trail of havoc and confusion in their wake. Much of the novel’s dark humor comes not only from this demonic mischief, but also the backdrop against which it occurs. Bulgakov’s story takes place in the same setting where it was written– the USSR at the height of the Stalinist period. There, artists and authors worked under strict censorship, subject to imprisonment, exile, or execution if they were seen as undermining state ideology. Even when approved, their work– along with housing, travel, and everything else– was governed by a convoluted bureaucracy. In the novel, Woland manipulates this system along with the fabric of reality, to hilarious results. As heads are separated from bodies and money rains from the sky, the citizens of Moscow react with petty-self interest, illustrating how Soviet society bred greed and cynicism despite its ideals. And the matter-of-fact narration deliberately blends the strangeness of the supernatural events with the everyday absurdity of Soviet life. So how did Bulgakov manage to publish such a subversive novel under an oppressive regime? Well… he didn’t. He worked on "The Master and Margarita" for over ten years. But while Stalin’s personal favor may have kept Bulgakov safe from severe persecution, many of his plays and writings were kept from production, leaving him safe but effectively silenced. Upon the author’s death in 1940, the manuscript remained unpublished. A censored version was eventually printed in the 1960s, while copies of the unabridged manuscript continued to circulate among underground literary circles. The full text was only published in 1973, over 30 years after its completion. Bulgakov’s experiences with censorship and artistic frustration lend an autobiographical air to the second part of the novel, when we are finally introduced to its namesake. "The Master" is a nameless author who’s worked for years on a novel but burned the manuscript after it was rejected by publishers– just as Bulgakov had done with his own work. Yet the true protagonist is the Master’s mistress Margarita. Her devotion to her lover’s abandoned dream bears a strange connection to the diabolical company’s escapades– and carries the story to its surreal climax. Despite its dark humor and complex structure, "The Master and Margarita" is, at its heart, a meditation on art, love, and redemption, that never loses itself in cynicism. And the book’s long overdue publication and survival against the odds is a testament to what Woland tells the Master: “Manuscripts don’t burn.”

**P729 2019-05-07 Why should you read “The Master and Margarita” - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=729)

翻译人员: Tianning Zhu 校对人员: 功伟 邢恶魔来到了城里。但别担心——他只想来表演个魔术。这个荒诞的设定就是 米哈伊尔·布尔加科夫的杰作《大师和玛格丽特》的主要情节。这本书创作于1930年代的莫斯科，凭借政治讽刺、历史小说 以及神秘主义的超现实融合，成为了20世纪最伟大的小说之一，也是最古怪的小说之一。故事开始于两个莫斯科 文学精英的一次会面会面被一个古怪的绅士打断，绅士名为沃兰德，自称是国外的学者被邀请来做一个关于黑魔法的展示。正当这个陌生人将这两个同伴 卷入一场哲学辩论，并对他们的命运做出了不详的预言时，读者却突然被传送到一世纪的耶路撒冷。在那里备受折磨的本丢·彼拉多正不情愿地判处拿撒勒的耶稣死刑。随着叙事视角在两个叙事背景之间转换，沃兰德和他的随从—— 阿扎泽勒、卡罗维夫、赫勒，以及一只叫做河马的大猫——展示了超乎寻常的魔力，他们用魔力来上演表演与此同时又在身后 留下一堆的混乱和困惑。小说中的许多黑色幽默不仅来源于 这个恶魔的恶作剧，还来自于故事发生的背景，布尔加科夫的故事发生在小说写作时的 同一背景下——斯大林时期的苏联。那时艺术家和作家们 在严格的审查制度下工作，随时可能坐牢、被流放或者处决，如果他们被认为是 在破坏国家的意识形态，即使是允许的创作，他们的工作——与住房、旅行以及其它的一切一样——都被一个盘根错节的官僚体系管理着。在小说中，沃兰德利用现实的材料 操纵着这个体系，使之产生了滑稽的结果。随着脑袋和身体分家， 以及从天而降的金钱雨，莫斯科的市民们表现出了 小气的自私自利，展现了苏联社会是如何培养出贪婪 和愤世嫉俗，尽管这与其意识形态相悖。实事求是的叙事风格则精心地融合了超自然事件的陌生感以及苏联人日常生活的荒诞。所以布尔加科夫究竟是怎么在 一个压迫性的政权下发表如此颠覆性的小说的呢？好吧，其实他并没有。他写作《大师和玛格丽特》 有十年以上的时间。尽管斯大林的个人宠幸可以保证布尔加科夫免遭严重迫害，他的许多戏剧以及文学作品被禁止出版，使得他很安全，但也被禁言。直到1940年作者死去，手稿仍旧没有出版。审查删改后的版本最终 在60年代得以印刷，而未删节的手稿则仍然流通于地下文学圈子里，完整版本直到1973年才出版，在作品完成的30年后。布尔加科夫的受审查经历 以及艺术上的挫败感使得小说的第二部分充满了 自传性的色彩，在这一部分，我们终于明白 小说名字的意思。“大师”是一个不知名的作者， 他花费多年写作一部小说，但在被出版商拒绝后，烧掉了手稿，正如布尔加科夫对自己作品所做的。而真正的主角是大师的情妇玛格丽特。她对爱人所遗弃的梦想的热爱，与恶魔集团的恶作剧产生了奇怪的联系，使故事到达了超自然的高潮。尽管有着黑色幽默以及复杂结构，《大师和玛格丽特》在本质上 是对艺术、爱情以及救赎的思考，这种思考不会被愤世嫉俗所掩盖。这本书漫长的出版历程和幸存经过，则是沃兰德告诉大师的话的证明：“手稿不会被烧光的”。

**P730 2019-05-08 The mysterious science of pain - Joshua W. Pate**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=730)

In 1995, the British Medical Journal published an astonishing report about a 29-year-old builder. He accidentally jumped onto a 15-centimeter nail, which pierced straight through his steel-toed boot. He was in such agonizing pain that even the smallest movement was unbearable. But when the doctors took off his boot, they faced a surprising sight: the nail had never touched his foot at all. For hundreds of years, scientists thought that pain was a direct response to damage. By that logic, the more severe an injury is, the more pain it should cause. But as we’ve learned more about the science of pain, we’ve discovered that pain and tissue damage don’t always go hand in hand, even when the body’s threat signaling mechanisms are fully functioning. We’re capable of experiencing severe pain out of proportion to an actual injury, and even pain without any injury, like the builder, or the well-documented cases of male partners of pregnant women experiencing pain during the pregnancy or labor. What’s going on here? There are actually two phenomena at play: the experience of pain, and a biological process called nociception. Nociception is part of the nervous system’s protective response to harmful or potentially harmful stimuli. Sensors in specialized nerve endings detect mechanical, thermal, and chemical threats. If enough sensors are activated, electrical signals shoot up the nerve to the spine and on to the brain. The brain weighs the importance of these signals and produces pain if it decides the body needs protection. Typically, pain helps the body avoid further injury or damage. But there are a whole set of factors besides nociception that can influence the experience of pain— and make pain less useful. First, there are biological factors that amplify nociceptive signals to the brain. If nerve fibers are activated repeatedly, the brain may decide they need to be more sensitive to adequately protect the body from threats. More stress sensors can be added to nerve fibers until they become so sensitive that even light touches to the skin spark intense electrical signals. In other cases, nerves adapt to send signals more efficiently, amplifying the message. These forms of amplification are most common in people experiencing chronic pain, which is defined as pain lasting more than 3 months. When the nervous system is nudged into an ongoing state of high alert, pain can outlast physical injury. This creates a vicious cycle in which the longer pain persists, the more difficult it becomes to reverse. Psychological factors clearly play a role in pain too, potentially by influencing nociception and by influencing the brain directly. A person’s emotional state, memories, beliefs about pain and expectations about treatment can all influence how much pain they experience. In one study, children who reported believing they had no control over pain actually experienced more intense pain than those who believed they had some control. Features of the environment matter too: In one experiment, volunteers with a cold rod placed on the back of their hand reported feeling more pain when they were shown a red light than a blue one, even though the rod was the same temperature each time. Finally, social factors like the availability of family support can affect perception of pain. All of this means that a multi-pronged approach to pain treatment that includes pain specialists, physical therapists, clinical psychologists, nurses and other healthcare professionals is often most effective. We’re only beginning to uncover the mechanisms behind the experience of pain, but there are some promising areas of research. Until recently, we thought the glial cells surrounding neurons were just support structures, but now we know they have a huge role in influencing nociception. Studies have shown that disabling certain brain circuits in the amygdala can eliminate pain in rats. And genetic testing in people with rare disorders that prevent them from feeling pain have pinpointed several other possible targets for drugs and perhaps eventually gene therapy.

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翻译人员: Yingyu Liu 校对人员: Liu Qi1995 年，英国医学杂志发表了一份惊人的报告，一个 29 岁的建筑工人不小心 踩上一根 15 厘米长的钉子，钉子直接刺穿了他的钢头靴。奇痛异常，连最小的晃动 都会让他痛到无法承受。但是当医生把他的靴子脱掉后，他们惊讶的发现： 钉子根本没有刺到他的脚。几百年来，科学家认为疼痛 是对伤害的直接反应。按照这种逻辑，伤害越严重， 造成的疼痛感就会越强烈。但是当我们逐渐了解 痛感这门科学，我们发现即使身体的 威胁信号机制正常运作，痛感和组织损伤 也并不总是同时发生。我们能够经历剧烈的、 与实际伤害不成比例的疼痛，甚至在没有受伤时感到疼痛，像那个建筑工人，以及案例中男性伴侣在孕妇怀孕或 分娩期间所经历疼痛。这是为什么呢？实际上有两种现象在起作用：痛苦的经历和被称作为 伤害感受的生物过程。伤害感受是神经系统中对有害或潜在有害刺激 保护性反应的一部分。传感器处于专门的神经末梢，用于检测机械、热和化学威胁。如果足够多的传感器被激活，电信号从神经输出到脊椎和大脑。大脑衡量这些信号重要性，如果大脑认为身体需要保护， 就会产生痛感。通常，疼痛使身体 免受进一步伤害或损坏。但是除了伤害感受，还有一整套因素可以影响疼痛经历， 并降低疼痛的示警功能。首先，有些生物因素会 将伤害性信号放大到大脑。如果神经纤维被反复激活，大脑可能认为神经纤维需要变得更敏感 才能充分保护身体抵御威胁。更多的压力传感器会 添加到神经纤维，直到它们变得非常敏感，即使只是轻微接触皮肤， 也会激发强烈的电信号。还有一些情况，神经发送的信号更为有效， 并且将信息放大。这些放大信号的形式在慢性疼痛病人中最常见，也就是疼痛持续超过三个月的病人。当神经系统被推入 持续的高度戒备状态，疼痛持续的时间 会超过身体受伤的时间。这造成了一个恶性循环，疼痛持续时间越长， 扭转就会变得越困难。心理因素当然也会影响痛感，可能通过潜在影响伤害感受和 通过直接影响大脑。一个人的情绪状态、记忆，对于疼痛的信念和对于治疗的期待都可以影响他们的疼痛感。一项研究中发现：相比那些相信自己可以控制的孩子，认为自己无法控制疼痛的孩子真的会经历更剧烈的疼痛。环境因素也很重要。在一个实验中，在志愿者的手背上放置冷冻的冰棍，虽然冰棍的温度每次都是相同的，看着红灯的人比 看着蓝灯的人痛感更强，最后，社会因素比如家庭的支持，也可以影响疼痛的感知。所有这一切都意味着 疼痛治疗需多管齐下，由疼痛专家、物理治疗师、 临床心理学家、护士，和其他医疗专业人士的介入， 这种方法通常最有效。虽然我们才刚刚开始 探索痛感的机制，但是已经发现了 一些有前景的研究领域。直到最近，我们以前认为神经胶质细胞 周围神经元只是支撑结构，但现在我们知道他们对 影响伤害感受有很大的作用。研究表明，禁用某些 杏仁核中的脑电路可以消除大鼠的疼痛。对少见的没有痛感的人进行基因检测已经发现了其他几个 可以开发药物的方向，及最终可能实现的基因治疗。

**P731 2019-05-08 This one weird trick will help you spot clickbait - Jeff Leek & Lucy**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=731)

One simple vitamin can reduce your risk of heart disease. Eating chocolate reduces stress in students. New drug prolongs lives of patients with rare disease. Health headlines like these are published every day, sometimes making opposite claims from each other. There can be a disconnect between broad, attention-grabbing headlines and the often specific, incremental results of the medical research they cover. So how can you avoid being misled by grabby headlines? The best way to assess a headline’s credibility is to look at the original research it reports on. We’ve come up with a hypothetical research scenario for each of these three headlines. Keep watching for the explanation of the first example; then pause at the headline to answer the question. These are simplified scenarios. A real study would detail many more factors and how it accounted for them, but for the purposes of this exercise, assume all the information you need is included. Let’s start by considering the cardiovascular effects of a certain vitamin, Healthium. The study finds that participants taking Healthium had a higher level of healthy cholesterol than those taking a placebo. Their levels became similar to those of people with naturally high levels of this kind of cholesterol. Previous research has shown that people with naturally high levels of healthy cholesterol have lower rates of heart disease. So what makes this headline misleading: "Healthium reduces risk of heart disease." The problem with this headline is that the research didn’t actually investigate whether Healthium reduces heart disease. It only measured Healthium’s impact on levels of a particular kind of cholesterol. The fact that people with naturally high levels of that cholesterol have lower risk of heart attacks doesn’t mean that the same will be true of people who elevate their cholesterol levels using Healthium. Now that you’ve cracked the case of Healthium, try your hand at a particularly alluring mystery: the relationship between eating chocolate and stress. This hypothetical study recruits ten students. Half begin consuming a daily dose of chocolate, while half abstain. As classmates, they all follow the same schedule. By the end of the study, the chocolate eaters are less stressed than their chocolate-free counterparts. What’s wrong with this headline: "Eating chocolate reduces stress in students" It’s a stretch to draw a conclusion about students in general from a sample of ten. That’s because the fewer participants are in a random sample, the less likely it is that the sample will closely represent the target population as a whole. For example, if the broader population of students is half male and half female, the chance of drawing a sample of 10 that’s skewed 70% male and 30% is about 12%. In a sample of 100 that would be less than a .0025% chance, and for a sample of 1000, the odds are less than 6 x 10^-36. Similarly, with fewer participants, each individual’s outcome has a larger impact on the overall results— and can therefore skew big-picture trends. Still, there are a lot of good reasons for scientists to run small studies. By starting with a small sample, they can evaluate whether the results are promising enough to run a more comprehensive, expensive study. And some research requires very specific participants that may be impossible to recruit in large numbers. The key is reproducibility— if an article draws a conclusion from one small study, that conclusion may be suspect— but if it’s based on many studies that have found similar results, it’s more credible. We’ve still got one more puzzle. In this scenario, a study tests a new drug for a rare, fatal disease. In a sample of 2,000 patients, the ones who start taking the drug upon diagnosis live longer than those who take the placebo. This time, the question is slightly different. What’s one more thing you’d like to know before deciding if the headline, "New drug prolongs lives of patients with rare disease", is justified? Before making this call, you’d want to know how much the drug prolonged the patients’ lives. Sometimes, a study can have results that, while scientifically valid, don’t have much bearing on real world outcomes. For example, one real-life clinical trial of a pancreatic cancer drug found an increase in life expectancy— of ten days. The next time you see a surprising medical headline, take a look at the science it’s reporting on. Even when full papers aren’t available without a fee, you can often find summaries of experimental design and results in freely available abstracts, or even within the text of a news article. It’s exciting to see scientific research covered in the news, and important to understand the studies’ findings.

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翻译人员: Candace Hwang 校对人员: Carol Wang“一种简单的维生素 即可降低患心脏病的风险”，“吃巧克力可为学生减压”，“新药延长了罕见病患者寿命”，类似的健康标题每天都在发表，有时提出相互矛盾的主张。宽泛且引人注目的头条新闻，与涵盖的具体医学研究结果之间可能存在脱节。那么，如何避免被“标题党”误导呢？评估标题可信度的最佳方式是查看原始研究报告。我们为每一个头条新闻构思了假设的研究场景，先查看第一个例子的解释，然后在标题处暂停，回答问题。这是简化的流程，真正的研究会详细说明 多种因素及其影响。但就本练习而言，假设已包含需要的所有信息。让我们首先思考 一种维生素 Healthium该研究发现， 服用 Healthium 的参与者相较于服用安慰剂的人 健康胆固醇指标更高。他们的该项指标 与天生健康胆固醇高的人指标一样。以前的研究表明，健康胆固醇水平高的人 患心脏病的几率较低。“Healthium 可降低患心脏病的风险”，此标题产生误导的根源是什么呢？此标题的问题在于， 该研究实际上没有调查Healthium 是否可降低心脏病。它只测量了Healthium 对某种胆固醇水平的影响。该胆固醇天生水平高的人心脏病发作的风险较低，并不意味着用 Healthium 提高胆固醇水平的人也如此。现在你已经破解了 Healthium 的案例，试着破解一个特别诱人的谜题吧：“吃巧克力和压力之间的关系”。这项假设的研究招募了十名学生。一半人开始每天吃一定量的巧克力，而另一半没有吃。他们同班，所以时间表也相同。研究结束时，巧克力食用者相较于未食用者压力较小。“吃巧克力可减少学生压力”，此标题的问题是什么呢？从十个样本中得出关于一般 学生的结论是牵强附会的。因为随机选取样本的人数越少，样本就越不能代表整体的目标人群。例如，更广泛的学生群体 是一半男生一半女生，抽 10 人的样本，其中 70％ 男生 30% 女生 概率约为 12％。100 人的样本中， 则概率小于 0.0025％，对于 1000 的样本，其概率小于 6 x 10 ^ -36。同样，由于参与者较少，个人结果对整体结果影响较大——因此会扭曲大局趋势。不过，仍有很多好的理由 支持科学家们进行小型研究。以小样本开始，他们能评估结果是否有希望进行更全面、昂贵的研究。有些研究需要特殊参与者，可能无法大量招募。关键在于可重复性——如果一篇文章从一项 小型研究中得出结论，结论也许是可疑的——但如果它从许多研究中 都得到类似结论，结论便更可信。我们还剩一个难题，此案例中，一项研究测试了一种 治疗罕见致命疾病的新药。2000 名患者的样本中，被诊断患病并开始服用该药的人比服用安慰剂的人活得久。这一次，问题略有不同。在判断标题“新药延长了罕见疾病 患者的生命”是否恰当之前，你还要再清楚一件什么事呢？做这个决定之前，你想知道用药 对病人生命药延长多久。有时，一项研究结果虽然科学上讲是有效的， 但对现实世界的结果影响不大。例如，一项胰腺癌药物的 现实临床试验发现，预期寿命增加了 10 天。当你下次看到令人惊讶的医学标题，看看它报道的科学性。即使没有免费提供完整的论文，也可以在免费摘要中找到实验设计概要和实验结果，甚至在新闻文本中也能找到。看到新闻报道的科学研究令人兴奋，但理解研究结果也很重要。

**P732 2019-05-13 How close are we to eradicating HIV - Philip A. Chan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=732)

The world is getting closer to achieving one of the most important public health goals of our time: eradicating HIV. And to do this, we won’t even have to cure the disease. We simply have to stop HIV from being transmitted until eventually it fizzles out. Once, this goal would have seemed impossible. HIV has caused millions of deaths and is one of the most devastating diseases that humanity has ever known. But we’re now at a point where new advances such as one-pill, once-a-day medications are helping us tackle HIV in effective ways. HIV is a retrovirus– meaning it integrates copies of itself into an infected cell’s DNA, allowing it to replicate and infect other cells. HIV has evolved numerous ways to evade the human immune system, which makes it difficult to cure. But by developing ways to block HIV replication, we can stop the spread of HIV itself. That’s where antiretrovirals– a.k.a. ARVs– come in. ARVs are a group of drugs which work in different ways to combat HIV. Some block HIV’s access into immune cells, and others work by stopping the virus itself from replicating. ARVs also work preventatively in people who don’t have HIV. This type of approach is called pre-exposure prophylaxis, or PrEP. PrEP works by accumulating in a person’s body and preventing HIV from establishing itself. That means an HIV-negative person who may be at risk of contracting the disease can take certain ARVs to protect themselves, before they become exposed. Here’s where it gets especially interesting: In people with HIV, ARVs can also dramatically reduce HIV transmission. This is called “Treatment as Prevention.” On a global scale, this has the potential to end the HIV epidemic. It’s based on the idea that someone with HIV who takes ARV’s can lower the virus level in their bodies until it becomes undetectable. That doesn’t mean the virus is gone; it could still be lurking within cells, ready to reactivate if treatment stops. But so long as it’s kept dormant with drugs, HIV remains undetectable. And when HIV is undetectable, it’s untransmittable, too. In theory this means that by testing everyone who’s at risk of HIV and treating those who test positive, we could stop transmission and eventually eradicate HIV. In the real world, however, things are more complex. Many at-risk HIV negative people across the world do not have access to PrEP or ARVs, and those who are HIV positive may experience challenges to taking ARVs. These problems are often greatest in countries where the burden of HIV is highest. Getting these medications depends on access to a functioning healthcare system– and this isn’t something everyone has. That’s part of the reason why stopping the spread of HIV for good will require a significant investment of resources to improve those systems. One study carried out by the UNAIDS estimated that between 20-30 billion dollars per year would be needed to achieve a nearly 90% reduction in new HIV infections by 2030. This investment would ensure more people would get tested in the first place, and more would be able to access and maintain treatment. Achieving this goal and improving healthcare in general is in everyone’s best interest, from individual people to society as a whole. We have roadmaps that could allow us to bring the HIV epidemic to an end in the near future, with the possibility of eradicating the disease altogether several generations in the future. In the period from 1996 to 2017 we almost halved the number of new HIV infections, and for the millions of people who still live with the virus, ARV treatments enable most to lead long and healthy lives. With continued and increased investments, we can get transmission rates low enough to end HIV once and for all. A world without HIV is no longer inconceivable: it’s closer than ever.

**P732 2019-05-13 How close are we to eradicating HIV - Philip A. Chan**

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翻译人员: Carol Wang 校对人员: Harper Zhang世界正越来越接近实现当代最重要的 公共卫生目标之一：消灭艾滋病毒HIV。要做到这一点，我们 其实不必治愈这种疾病，只需阻断艾滋病毒的传播、直到它最终消失即可。曾几何时，该目标显得遥不可及。艾滋病已造成数百万人死亡，它是人类已知的、 最具破坏性的疾病之一。但我们现在已取得最新进展，如每日1次、每次1粒的 药物治疗方案，正帮助我们有效 解决艾滋病毒问题。艾滋病毒是一种逆转录病毒——即病毒能把自身整合复制到 被感染细胞的DNA中，实现自我复制并感染其他细胞。艾滋病毒已进化出很多 避开人体免疫系统的方法，使得它难以治愈。但通过研发阻断 艾滋病毒复制的方法，我们可以阻止 艾滋病毒的自身传播，抗逆转录病毒药物 a.k.a. ARVs就应运而生。抗逆转录病毒药物是一组 以不同方式对抗HIV病毒的药物，有些药物能阻断HIV进入免疫细胞，而另一些则能阻止 HIV病毒的自我复制。抗逆转录病毒药物也可用于 未感染HIV人群的预防性治疗，该方法称为暴露前预防，即PrEP。PrEP的工作原理是，通过在人体内聚集阻断药物， 防止HIV病毒在体内的建立。这意味着HIV病毒呈阴性者，在接触HIV病原体之前，可服用某些抗逆转录病毒 来保护自己。特别有趣的是：抗逆转录病毒药物也能 极大降低艾滋病患者对HIV的传播，这称为“预防性治疗”，它可能在全球范围内 终结艾滋病毒的流行。该想法是基于感染者 服用抗逆转录病毒药物后，会降低体内的HIV病毒水平， 直至检测不到。但这并非意味着病毒消失了；它依然潜伏在细胞内， 如果停止服用药物，还会反扑。但只要药物控制 能令病毒蛰伏在体内，就检测不出HIV病毒。只要检测不出HIV病毒， 它就没有传播性。理论上来说，只要 对HIV高危人群进行检测，并对HIV阳性患者进行药物治疗，我们就可以阻断病毒传播， 并最终灭艾滋病毒HIV。然而，现实生活中， 情况则更加复杂。世界各地许多处于危险中的 艾滋病毒呈阴性的人，无法获得暴露前预防 或抗逆转录病毒药物，而艾滋病毒感染者也面临 服用抗逆转录病毒药的挑战。在艾滋病毒负担最高的国家，这些问题往往最为严重。获得这些药物取决于能否 获得有效的医疗保健系统——而这并非人人都有。这就是为什么 永远阻止艾滋病毒的传播，需要投入大量资源 来改善这些系统的原因。据联合国艾滋病规划署 开展的一项研究估计，到2030年，每年需投入200-300亿美元，才能使艾滋病 新感染率降低近90％。这项投资将确保更多人 首先接受测试，并且让更多人能获得 和维持药物治疗。从个人到整个社会，实现这一目标并改善整体医疗服务，符合每个人的最佳利益。我们的发展蓝图是，在不久的将来阻断艾滋病毒的流行，并有可能在未来几代人中彻底消灭艾滋病。在1996年至2017年期间，新的艾滋病毒感染人数 几乎下降了一半，对于数百万感染了 艾滋病毒的人来说，抗逆转录病毒疗法使多数人 能够过上长寿和健康的生活。随着持续和增加的投资，我们可以将HIV传播率 降低到足以彻底消灭它。没有艾滋病毒的世界 不再只是奢望：离实现它只有一步之遥。

**P733 2019-05-14 'For Estefani' poem by Aracelis Girmay**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=733)

I'm Aracelis Girmay, and this is, "For Estefani, Third Grade, Who Made Me a Card." Elephant on an orange line, underneath a yellow circle, meaning sun. Six green, vertical lines, with color all from the top, meaning flowers. The first time I peel back the five squares of Scotch tape, unfold the crooked-crease fold of art class paper. I am in my living room. It is June. Inside of the card, there is one long word, and then Estefani’s name: Loisfoeribari Estefani Loisfoeribari? Loisfoeribari: The scientific, Latinate way of saying hibiscus. Loisforeribari: A direction, as in: are you going North? South? East? West? Loisfoeribari? I try, over and over, to read the word out loud. Loisfoeribari. LoISFOeribari. LoiSFOEribari. LoisFOERibARI. What is this word? I imagine using it in sentences like, “Man, I have to go back to the house, I forgot my Loisfoeribari.” or “There’s nothing better than rain, hot rain, open windows with music, and a tall glass of Loisfoeribari.” or “How are we getting to Pittsburgh? Should we drive or take the Loisfoeribari?” I have lived four minutes with this word not knowing what it means. It is the end of the year. I consider writing my student, Estefani, a letter that goes: To The BRILLIANT Estefani! Hola, querida, I hope that you are well. I’ve just opened the card that you made me, and it is beautiful. I really love the way you filled the sky with birds. I believe that you are chula, chulita, and super fly! Yes, the card is beautiful. I only have one question for you. What does the word ‘Loisfoeribari’ mean? I try the word again. Loisfoeribari. Loisfoeribari. Loisfoeribari. I try the word in Spanish. Loisfoeribari Lo-ees-fo-eh-dee-bah-dee Lo-ees-fo-eh-dee-bah-dee and then, slowly, Lo is fo e ri bari Lo is fo eribari love is for everybody love is for every every body love love love everybody love everybody love love is love everybody everybody is love love love for love for everybody for love is everybody love is for every love is for every body love love love for body love body body is love love is body every body is love is every love for every love is love for love everybody love love love love for everybody Love is for everybody.

**P733 2019-05-14 'For Estefani' poem by Aracelis Girmay**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=733)

翻译人员: Emma Gao 校对人员: Yizhuo He我是亚瑞瑟莉丝 ‧ 葛梅，这是《致送我贺卡的三年级生，埃斯特法尼》大象站在橘色的线上， 上面有一个黄圈，代表着太阳。六根绿色的垂直线顶上 有很多色彩，代表着花朵。我初次掀开五格胶带，翻开褶皱重重的卡纸。那时的我坐在客厅。正值六月。在卡片中，有一个长单词，接着是埃斯特法尼的名字：艾丝佛爱巴蒂 · 埃斯特法尼艾诗佛爱巴蒂?艾丝佛爱巴蒂：这是木槿花的拉丁语学名。艾诗佛爱巴蒂可被理解为“方向”： 即行走的方向。向北？向南？向东？向西？ 向艾诗佛爱巴蒂？我一遍遍地试着 大声读出这个单词。艾诗佛爱巴蒂。艾诗否欧爱巴蒂。艾诗佛艾尔巴蒂。艾诗佛爱瑞巴尔蒂。这个词到底是什么意思？ 我尝试着用这个词组句，“天，我得回家一趟， 我忘记带艾诗佛爱巴蒂了。”或者，“没有比在阴雨绵绵中开着窗，听着音乐，拿着一杯 艾诗佛爱巴蒂更惬意的事了。”又或者，“我们要怎么去匹兹堡？ 是开车去还是乘艾诗佛爱巴蒂？”我已经盯着这个词四分钟了， 却还是不知道它是什么意思。现在是年末， 我想着给我的学生，埃斯特法尼，写一封信：致聪颖的埃斯特法尼！你好呀，亲爱的， 希望你一切安好。我刚刚打开了你为我做的卡片， 做得真好看。我喜欢你用鸟儿填满了整片天空。我认为你画得特别好， 特别可爱，特别酷！真的，这张卡片真好看我只有一个小小的问题“艾诗佛爱巴蒂”这个词是什么意思？我又一次试着读出这个词。 艾诗佛爱巴蒂。艾诗佛爱巴蒂。 艾诗佛爱巴蒂。我尝试用西班牙语的读法。爱是佛爱巴蒂爱-是-佛-爱-瑞-巴-蒂爱-是-属于-爱-瑞-巴-蒂慢慢地，爱 是 属于 每 个 人 的？爱是属于每个人的爱是属于所有人的 爱是属于每一个人的，每个人都会去爱爱 去爱每一个人 每个人都会去爱，每个人都值得被爱每个人都有能力爱爱是属于每个人的 每个人都在爱爱是属于每一个个体的 每一个个体都在爱爱惜自身 自爱是爱 爱是自身 人人会爱每一个爱，给予爱的 都是为爱而爱爱，每个人都在爱 爱，去爱每一个人爱是属于所有人的。

**P734 2019-05-14 'New Colossus' by Emma Lazarus**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=734)

"The New Colossus" by Emma Lazarus Not like the brazen giant of Greek fame, With conquering limbs astride from land to land; Here at our sea-washed, sunset gates shall stand A mighty woman with a torch, whose flame Is the imprisoned lightning, and her name Mother of Exiles. From her beacon-hand Glows world-wide welcome; her mild eyes command The air-bridged harbor that twin cities frame. “Keep, ancient lands, your storied pomp!” cries she With silent lips. “Give me your tired, your poor, Your huddled masses yearning to breathe free, The wretched refuse of your teeming shore. Send these, the homeless, tempest-tost to me, I lift my lamp beside the golden door!”

**P734 2019-05-14 'New Colossus' by Emma Lazarus**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=734)

翻译人员: Carol Wang 校对人员: Lipeng Chen《新的巨人》作者：艾玛 · 拉撒路 翻译：沅湘（网络）不像那无耻的古希腊青铜巨人，叉腿横跨征服的陆地；在这海水冲洗的日落重门，将矗立起一位手持火炬的伟大女性，那火焰是被囚禁着的闪电，“流放者的母亲”就是她的姓名。手中“欢迎全世界光临的” 灯塔闪亮着，她温情俯瞰 以天为桥的港口与环绕它的双城；“旧世界，给你传说中的虚荣！” 她紧闭双唇呐喊道。“都给我吧，你受穷受累的人们、你那拥挤着渴望呼吸自由的大众、所有遗弃在你海滩上的悲惨众生。把这些风浪中颠簸的无家之人 都给我吧，我在黄金时代的门口 高举明灯迎接他们！”

**P735 2019-05-14 'Ode to the Only Black Kid in the Class' poem by Clint Smith**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=735)

I'm Clint Smith and this is "Ode to the Only Black Kid in the Class." You, it seems, are the manifestation of several lifetimes of toil. Brown v. Board in flesh. Most days the classroom feels like an antechamber. You are deemed expert on all things Morrison, King, Malcolm, Rosa. Hell, weren’t you sitting on that bus, too? You are every- body’s best friend until you are not. Hip-hop lyricologist. Presumed athlete. Free & Reduced sideshow. Exception and caricature. Too black and too white all at once. If you are successful it is because of affirmative action. If you fail it is because you were destined to. You are invisible until they turn on the Friday night lights. Here you are star before they render you asteroid. Before they watch you turn to dust.

**P735 2019-05-14 'Ode to the Only Black Kid in the Class' poem by Clint Smith**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=735)

翻译人员: Carol Wang我是克林特 · 史密斯，下面是我写的诗： 《献给班上唯一的黑人小孩》。你好像 代表着几世艰辛；你令人想起 布朗诉教育局的种族隔离案 。多数日子里 ，教室就像前厅。在大家眼里，你理应对莫里森、金、马尔科姆、 罗莎这些黑人运动领袖了如指掌。哎呀，你不是 也坐那辆校车吗?你成为每个人的好友，直到他们都离你而去。（大家以为黑人都是） 嘻哈说唱手、假定的运动员、看免费和打折演出、喜欢破例和漫画，偏黑的白人 和偏白的黑人也一样。你之所以成功，是因为平权主义；你之所以失败，是因为命运弄人。你是隐形的，直到 周五晚体育馆的灯亮起。此刻，你就是耀眼恒星， 直到他们把你说成小行星，看着你变得一文不值。

**P736 2019-05-14 There may be extraterrestrial life in our solar system - Augusto Carb**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=736)

Deep in our solar system, a new era of space exploration is unfolding. Beneath the thick ice of Europa, in the vapor plumes on Enceladus, and within the methane lakes of Titan, astrobiologists are on the hunt for extraterrestrial life. We’ve honed in on these three moons because each is an ‘ocean world,’ an environment that contains a liquid ocean– and liquid can support the formation of life. Living organisms have to be able to grow, reproduce, and feed themselves, among other things. All of those functions require the formation of complex molecules from more basic components. Liquids such as water allow chemical compounds to remain in suspension instead of sinking under the force of gravity. This enables them to interact frequently in a 3-dimensional space and, in the right conditions, go through chemical reactions that lead to the formation of living matter. That alone isn’t enough; the small but complex biomolecules that we’re familiar with are sensitive to temperature— too hot or cold, and they won’t mix. Liquid water has an additional advantage in that it’s relatively temperature-stable, meaning it can insulate molecules against large shifts in heat. On Earth, these and other conditions in aquatic environments may have supported the emergence of life billions of years ago. Tantalizingly, the same could be true in other parts of our solar system, like these three icy moons. Europa, which is a moon of Jupiter, is probably the most intriguing ocean world. Beneath a surface layer of ice thicker than Mount Everest, there exists a liquid ocean as much as 100 kilometers deep. Astrobiologists think this hidden ocean could harbor life. Thanks to the Galileo probe, we can deduce that its potential salt content is similar to that of some lakes on Earth. But most of its characteristics will be a mystery until we can explore it further. Like Jupiter, Saturn also has moons that might have the right conditions for life. For instance– Enceladus is a tiny ball of ice that’s small enough to nestle within the surface area of the Gulf of Mexico. Similarly to Europa, it likely contains an ocean deep under the ice. But Enceladus also has geysers that frequently vent water vapor and tiny ice grains into space. Astrobiologists are curious about whether these geysers are connected to the ocean below. They hope to send a probe to test whether the geysers’ plumes of vapor contain life-enabling material from that hidden sea. Although it’s the best known substance for nurturing life, water isn’t necessarily the only medium that can support living things. Take Titan, Saturn’s largest moon, which has a thick nitrogen atmosphere containing methane and many other organic molecules. Its clouds condense and rain onto Titan’s surface, sustaining lakes and seas full of liquid methane. This compound’s particular chemistry means it’s not as supportive a medium as water. But, paired with the high quantities of organic material that also rain down from the sky, these bodies of liquid methane could possibly support unfamiliar life forms. So what might indicate that life exists on these or other worlds? If it is out there, astrobiologists speculate that it would be microscopic, comparable to the bacteria we have on earth. This would make it difficult to directly observe from a great distance, so astrobiologists seek clues called biosignatures. Those may be cells, fossils, or mineral traces left behind by living things. And finding any biosignatures will be challenging for many reasons. One of the biggest concerns is to make sure we sterilize our probes extremely thoroughly. Otherwise we could accidentally contaminate ocean worlds with Earth’s own bacteria, which could destroy alien life. Titan, Enceladus, and Europa are just three of possibly many ocean worlds that we could explore. We already know of several other candidates in our solar system, including Jupiter’s moons Callisto and Ganymede, Neptune’s Triton, and even Pluto. If there’s this much potential for life to exist in our own tiny solar system, what unimagined secrets might the rest of the universe contain?

**P736 2019-05-14 There may be extraterrestrial life in our solar system - Augusto Carb**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=736)

翻译人员: Carol Wang 校对人员: Thomas Tam在太阳系的深处，太空探索的新时代正在发生。在木卫二的厚厚冰层之下、在土卫二的蒸汽羽流中、以及在土卫六的甲烷湖里，天体生物学家正在寻找 外星生命的线索。之所以他们锁定在以上的三个卫星， 是因为它们每个都是“海洋星球”，即拥有液态的海洋环境——而液体是形成生命的基础条件。除其它因素外，有机生物体必须要有 能生长、繁殖和食物养活的环境。所有这些功能都源于复杂的分子——由更基本的成分组成。水样液体能够使化合物保持悬浮，而非因重力的作用而下沉。使到它们能够在三维空间中， 作出频繁的相互作用，并在合适的条件下，产生化学反应，从而产生生命的物质。仅仅是这点，并不足够，我们熟悉的复杂而微小的生物分子对温度很敏感——太热或太冷，它们都不会结合。液态水还有另外的优点，就是温度相对稳定，意味着液态水能够将分子 从巨大温差中隔离。地球上，某些水生环境的特性，可能催生了数十亿年前生命的出现。这个发现，令人急于求证 太阳系其他部分，也有生命的可能，譬如这三个冰冷的卫星。木卫二是木星的一个卫星，它或许是最令人感兴趣的海洋星球。在比珠穆朗玛峰的高度 还厚的冰层底下，是个深达 100 公里的液态海洋。这让天体生物学家相信， 这个隐藏着的海洋，可能孕育着生命。这就多亏了伽利略探测器，他们推断液态海洋可能的含盐量与地球上的某些湖泊相近。大部分现象还需更多的探索， 才能解开谜团。就像木星一样，土星的卫星 也可能拥有适合生命的条件。例如土卫二是一个小小的冰球，小得可以放进去墨西哥湾。与木卫二相似，它也可能 在厚冰层之下有个海洋。但土卫二还有个间歇泉，经常向太空喷射水汽和微小冰粒。天体生物学家好奇，究竟喷泉是否与下方的海洋相连。他们希望发射一个探测器， 以测试间歇泉的蒸汽羽流，是否在隐藏海洋中 含有促成生命的物质。水虽然是孕育生命最著名的物质，但水不一定是维持生物的唯一介质。以土星最大的卫星土卫六为例，它有厚厚的氮气层，含有甲烷和许多其它有机分子。它的云层凝结做成降雨， 落到土卫六的表面上，形成充满液态甲烷的湖泊和海洋。液态甲烷的特殊化学性质意味着 它不太像水那样能够支持生命。但伴随着甲烷雨，大量有机物也从天而降，这些甲烷液体可能可以 支持不常见的生命形成。所以什么样的条件能够显示出 那些星球存在生命呢？天体生物学家推测， 如果有生物的话，也是极微小的，相当于我们地球上的细菌。这就很难从远处直接观察到生命了，因此，天体生物学家需要寻求 称为“生物印记”的线索。那些可能是生物残留下来的 细胞、化石或矿物痕迹。若要找到任何生物印记， 并非容易的事情。最大担忧之一，就是我们要确保探测器要彻底消毒，否则，一不小心我们就让地球上的细菌， 污染了那些海洋星球，极可能摧毁了外星的生命。土卫六、土卫二和木卫二只是众多可探索的 “海洋星球”之中的三个而已，还有在其他太阳系中 已知的几个候选者，包括木星的卫星： 木卫四和木卫三、海王星的海卫一，甚至是冥王星。如果在我们小小的太阳系内 都有如此多的可能性存有生物，那在宇宙的其他部分， 会存在哪样我们无法想象的秘密呢？

**P737 2019-05-14 Ugly History - Witch Hunts - Brian A. Pavlac**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=737)

In the German town of Nördlingen in 1593, an innkeeper named Maria Höll found herself accused of witchcraft. She was arrested for questioning, and denied the charges. She continued to insist she wasn’t a witch through 62 rounds of torture before her accusers finally released her. Rebekka Lemp, accused a few years earlier in the same town, faced a worse fate. She wrote to her husband from jail worrying that she would confess under torture, even though she was innocent. After giving a false confession, she was burned at the stake in front of her family. Höll and Lemp were both victims of the witch hunts that occurred in Europe and the American colonies from the late 15th century until the early 18th century. These witch hunts were not a unified initiative by a single authority, but rather a phenomenon that occurred sporadically and followed a similar pattern each time. The term “witch” has taken on many meanings, but in these hunts, a witch was someone who allegedly gained magical powers by obeying Satan rather than God. This definition of witchcraft spread through churches in Western Europe starting at the end of the 15th century. It really gained traction after the pope gave a friar and professor of theology named Heinrich Kraemer permission to conduct inquisitions in search of witches in 1485. His first, in the town of Innsbruck, didn’t gain much traction with the local authorities, who disapproved of his harsh questioning of respectable citizens and shut down his trials. Undeterred, he wrote a book called the "Malleus Maleficarum," or "Hammer of Witches." The text argued for the existence of witches and suggested ruthless tactics for hunting and prosecuting them. He singled out women as easier targets for the devil’s influence, though men could also be witches. Kraemer’s book spurred others to write their own books and give sermons on the dangers of witchcraft. According to these texts, witches practiced rituals including kissing the Devil’s anus and poisoning or bewitching targets the devil singled out for harm. Though there was no evidence to support any of these claims, belief in witches became widespread. A witch hunt often began with a misfortune: a failed harvest, a sick cow, or a stillborn child. Community members blamed witchcraft, and accused each other of being witches. Many of the accused were people on the fringes of society: the elderly, the poor, or social outcasts, but any member of the community could be targeted, even occasionally children. While religious authorities encouraged witch hunts, local secular governments usually carried out the detainment and punishment of accused witches. Those suspected of witchcraft were questioned and often tortured— and under torture, thousands of innocent people confessed to witchcraft and implicated others in turn. Because these witch hunts occurred sporadically over centuries and continents the specifics varied considerably. Punishments for convicted witches ranged from small fines to burning at the stake. The hunt in which Höll and Lemp were accused dragged on for nine years, while others lasted just months. They could have anywhere from a few to a few hundred victims. The motivations of the witch hunters probably varied as well, but it seems likely that many weren’t consciously looking for scapegoats— instead, they sincerely believed in witchcraft, and thought they were doing good by rooting it out in their communities. Institutions of power enabled real harm to be done on the basis of these beliefs. But there were dissenters all along– jurists, scholars, and physicians countered books like Kraemer’s "Hammer of Witches" with texts objecting to the cruelty of the hunts, the use of forced confessions, and the lack of evidence of witchcraft. From the late 17th through the mid-18th century, their arguments gained force with the rise of stronger central governments and legal norms like due process. Witch hunting slowly declined until it disappeared altogether. Both the onset and demise of these atrocities came gradually, out of seemingly ordinary circumstances. The potential for similar situations, in which authorities use their powers to mobilize society against a false threat, still exists today— but so does the capacity of reasoned dissent to combat those false beliefs.

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翻译人员: Carol Wang 校对人员: 功伟 邢1593 年，在德国小镇诺德林根，旅店老板玛利亚·霍尔被指控使用巫术。被捕后的审讯中，她否认这项指控。经历了 62 轮酷刑后， 她依然坚称自己不是女巫，控告者最终只好放了她。几年前，同一个镇上被指控的 丽贝卡·莱普，命运就糟透了。狱中，她给丈夫写信说道，担心自己会屈打成招，即使她是无辜的。她虚假招供后，家人目睹她被绑烧死在火刑柱上。霍尔和莱普，都是 15 世纪末到 18 世纪初期间，发生在欧洲和美国 殖民地的猎巫行动受害者。这些猎巫行动并非 由一个权威发出的统一行动，而是偶尔发生，并且每次都遵循相似模式的现象。“女巫”一词具有许多含义，但这些猎巫行动中的女巫，据称是通过服从撒旦 而非上帝获得魔力的人。这种巫术的定义于 15 世纪末开始在西欧教堂传播。直到 1485 年，在教皇准许修道士 和神学教授海因里希·克莱默开展寻找女巫的调查后，它才获得了广泛关注。在因斯布鲁克镇，他的第一个审讯并没得到 地方当局的大力支持，当地政府不赞成 他对可敬公民的严厉审讯，并关闭了他的审判。他没被吓倒，写了一本名为 《女巫之锤》的书。书中论证了女巫的存在，并提出狠毒策略 去猎巫并依法处置他们。他特别指出，女性 更容易受到魔鬼的影响，尽管男人也可能是巫师。克莱默的书鼓励 他人也写了类似的书，并就巫术的危险性发表讲道。根据这些书的描写，女巫们练习各种仪式， 包括亲吻魔鬼的肛门，以及毒害或蛊惑 魔鬼选出的伤害目标。虽然没有任何证据支持这些说法，但相信女巫存在的说法 却广泛流传开来。猎巫常常因不幸事件而发：庄稼欠收、奶牛生病或婴儿死胎。社区成员将其归咎于巫术， 并互相指责对方是女巫。被指控是女巫的， 多数是社会边缘人：老人、穷人或社会弃儿，但社区的任何成员 都可能成为目标，甚至偶尔会是儿童。宗教当局鼓励猎巫，通常由当地政府对被控告的女巫进行关押和惩罚。那些巫术嫌疑人受到审讯 并经常被折磨——数千名无辜者 在酷刑下承认使用巫术，反过来又牵连到其他人。因为这些猎巫事件 零星发生在几个世纪和不同大陆上，具体细节也差别很大。对被定罪女巫的惩罚范围， 从小额罚款到火刑烧死不等。霍尔和莱普被指控的 那次猎巫行动持续了 9 年，而其他猎巫行动只持续了几个月，受害者也从几人到几百人不等。猎巫人的动机可能也各不相同，但似乎许多人并非有意寻找替罪羊——相反，他们真相信巫术的存在，认为在社区中 根除巫术是做了件好事。权力机构让真正的伤害 得以产生，也是基于这些信念。但一直有持异议者——法学家、学者和医生们反驳像克雷默《女巫的锤子》那样的书，包括反对猎巫的残酷性、刑讯逼供，以及缺乏巫术存在的证据。从 17 世纪末一直到 18 世纪中叶，随着中央政府的强大 和法定诉讼程序类法规的出现，他们的论点得到了支持。猎巫行动才慢慢减少， 直至全部消失。这些暴行的开始和消亡，都有一个在看似普通的环境下 逐渐发展的过程。今天也有类似情况存在的可能性，当局可利用其权力动员社会力量抵御虚假威胁——但理性异议者打击 那些错误信念的能力亦如此。

**P738 2019-05-14 Your body vs. implants - Kaitlyn Sadtler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=738)

Insulin pumps improve the lives of many of the 415 million people with diabetes around the world by monitoring blood sugar, delivering insulin, and preventing the need for constant finger-pricking and blood testing. These small machines include a pump and a needle, which can sense glucose levels, feed back to the pump, and then calculate how much insulin to deliver through the needle. But they have a catch: they’re temporary. Within a few days, glucose sensors have to be moved and replaced. And it’s not just glucose monitors and insulin pumps that have this problem, but all bodily implants, at different time scales. Plastic prosthetic knees have to be replaced after about 20 years. Other implants, such as those used for cosmetic reasons, can meet the same fate in about 10. That isn’t just a nuisance: it can be expensive and risky. This inconvenience happens because of our bodies’ immune systems. Honed by several hundred million years of evolution, these defensive fronts have become exceptionally good at identifying foreign objects. Our immune systems boast an impressive arsenal of tools to tackle, intercept, and destroy anything they believe shouldn’t be there. But the consequence of this constant surveillance is that our bodies treat helpful implants, like insulin pumps, with the same suspicion as they would a harmful virus or bacteria. As soon as the insulin pump has been implanted in the skin, its presence triggers what’s known as a “foreign body response.” This starts with free-floating proteins that stick themselves to the surface of the implant. Those proteins include antibodies, which attempt to neutralize the new object and send out a signal that calls other immune cells to the site to strengthen the attack. Early-responding inflammatory cells, like neutrophils and macrophages, respond to the emergency call. Neutrophils release little granules filled with enzymes that try to break down the surface of the insulin pump’s needle. Macrophages secrete enzymes too, together with nitric oxide radicals, which create a chemical reaction that degrades the object over time. If the macrophages are unable to dispatch the foreign body rapidly, they fuse together, forming a mass of cells called a “giant cell.” At the same time, cells called fibroblasts travel to the site and begin to deposit layers of dense connective tissue. Those enclose the needle that the pump uses to deliver insulin and test for glucose levels. Over time this scaffolding builds up, forming a scar around the implant. The scar functions as an almost impenetrable wall that might start to block vital interactions between the body and the implant. For example, scarring around pacemakers can interrupt the electrical transmission that’s crucial for their functioning. Synthetic knee joints may give off particles as they’re worn down, causing immune cells to inflame around these fragments. Tragically, the immune system’s attack can even be life-threatening. However, researchers are finding ways to trick the immune system into accepting the new devices we introduce into our bodily tissues. We’ve discovered that coating implants with certain chemicals and drugs can dampen the immune response. Those basically make the implants invisible to the immune system. We’re also making more implants out of natural materials and in forms that directly mimic tissues, so that the body launches a weaker attack than it would if it came across a completely artificial implant. Some medical treatments involve implants designed to regenerate lost or damaged tissues. In those cases, we can design the implants to contain ingredients that will release specific signals, and carefully tailor our bodies’ immune reactions. In the future, this way of working alongside the immune system could help us develop completely artificial organs, totally integrative prostheses, and self-healing wound therapies. These treatments might one day revolutionize medicine– and transform, forever, the bodies we live in.

**P738 2019-05-14 Your body vs. implants - Kaitlyn Sadtler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=738)

翻译人员: Carol Wang 校对人员: Fanny C ai全球 4.15 亿糖尿病患者中，很多人因胰岛素泵而改善了生活。胰岛素泵可监测 血糖并释放胰岛素，避免了患者 频繁指尖取血检验的麻烦。这个小机器包括一个泵、感知血糖水平并将结果返给泵的针，然后计算出针头需注射的胰岛素量。但存在一个问题：它们是暂时的。几天后，就要更换血糖感应器。并非只是血糖检测仪 和胰岛素泵存在这个问题，而是所有身体植入物都有， 只是时间不同而已。塑料假膝盖大约 20 年后就要更换，其他植入物，如美容植入物，大约 10 后也要更换。这不仅仅是麻烦而已： 它既昂贵又有风险。由于我们身体免疫系统的缘故， 才会产生这些不便。经过数亿年的进化，免疫系统作为防守前锋，特别精于发现外来物。我们的免疫系统以拥有强大的工具库而闻名，但这种不断监测的结果是，我们的身体把有用的植入物， 如胰岛素泵，当做有害病毒或细菌一样怀疑。一旦胰岛素泵植入皮下，会立刻触发身体的排异反应。自由漂浮的蛋白质开始粘在植入物表面。这些蛋白质包括抗体，试图中和新物体，并发出信号引来其它免疫细胞以加强攻击。早期反应的发炎细胞，如中性粒细胞和巨噬细胞，在接警后会首先到达。中性粒细胞释放出充满酶的小颗粒，试图破坏胰岛素泵针头的表面。巨噬细胞也会分泌酶，与一氧化氮自由基一起产生化学反应， 随着时间的推移会使物体降解。如果巨噬细胞 无法快速处理掉异物，它们会融合在一起， 形成一团称为“巨细胞”的细胞。同时，纤维母细胞前往该部位，并开始 沉积致密结缔组织层。它们封闭了胰岛素泵中用于输送胰岛素 并测试血糖水平的针头。包围层逐渐形成，在植入物周围形成疤痕。疤痕就像一面几乎无法穿透的墙，开始阻止身体和植入物间的重要交互作用。例如，心脏起搏器周围的疤痕，可能会中断对其功能 至关重要的电传输。合成膝关节使用中磨损会产生颗粒，导致这些颗粒周围的 免疫细胞发炎。不幸的是，免疫系统的攻击 甚至可能危及生命。然而，研究人员正在寻找方法诱使免疫系统接受 我们引入身体组织的新设备。我们发现通过在植入物表面 涂抹某些化学物质和药物，可以抑制免疫反应。这些基本上使植入物 对免疫系统不可见。我们正以直接模仿组织的形式，用天然材料制作更多的植入物，比起全人造材料的植入物，身体对它的攻击要弱得多。有些医学治疗涉及植入物,旨在重建失去或受损组织。这些情况下，我们可将植入物设计为含有能够释放特定信号的成分、专为应对我们身体的 免疫反应而精心定制。未来，这种与免疫系协作的方式可以帮我们开发全人工器官，全集成假体和自愈的伤口疗法。这些治疗方法可能有一天 会引发医学革命——并永远改变我们赖以存在的身体。

**P739 2019-05-22 How do crystals work - Graham Baird**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=739)

Deep beneath the geysers and hot springs of Yellowstone Caldera lies a magma chamber produced by a hot spot in the earth’s mantle. As the magma moves towards the Earth’s surface, it crystallizes to form young, hot igneous rocks. The heat from these rocks drives groundwater towards the surface. As the water cools, ions precipitate out as mineral crystals, including quartz crystals from silicon and oxygen, feldspar from potassium, aluminum, silicon, and oxygen, galena from lead and sulfur. Many of these crystals have signature shapes— take this cascade of pointed quartz, or this pile of galena cubes. But what causes them to grow into these shapes again and again? Part of the answer lies in their atoms. Every crystal’s atoms are arranged in a highly organized, repeating pattern. This pattern is the defining feature of a crystal, and isn’t restricted to minerals— sand, ice, sugar, chocolate, ceramics, metals, DNA, and even some liquids have crystalline structures. Each crystalline material’s atomic arrangement falls into one of six different families: cubic, tetragonal, orthorhombic, monoclinic, triclinic, and hexagonal. Given the appropriate conditions, crystals will grow into geometric shapes that reflect the arrangement of their atoms. Take galena, which has a cubic structure composed of lead and sulfur atoms. The relatively large lead atoms are arranged in a three-dimensional grid 90 degrees from one another, while the relatively small sulfur atoms fit neatly between them. As the crystal grows, locations like these attract sulfur atoms, while lead will tend to bond to these places. Eventually, they will complete the grid of bonded atoms. This means the 90 degree grid pattern of galena’s crystalline structure is reflected in the visible shape of the crystal. Quartz, meanwhile, has a hexagonal crystalline structure. This means that on one plane its atoms are arranged in hexagons. In three dimensions, these hexagons are composed of many interlocking pyramids made up of one silicon atom and four oxygen atoms. So the signature shape of a quartz crystal is a six-sided column with pointed tips. Depending on environmental conditions, most crystals have the potential to form multiple geometric shapes. For example, diamonds, which form deep in the Earth’s mantle, have a cubic crystalline structure and can grow into either cubes or octahedrons. Which shape a particular diamond grows into depends on the conditions where it grows, including pressure, temperature, and chemical environment. While we can’t directly observe growth conditions in the mantle, laboratory experiments have shown some evidence that diamonds tend to grow into cubes at lower temperatures and octahedrons at higher temperatures. Trace amounts of water, silicon, germanium, or magnesium might also influence a diamond’s shape. And diamonds never naturally grow into the shapes found in jewelry— those diamonds have been cut to showcase sparkle and clarity. Environmental conditions can also influence whether crystals form at all. Glass is made of melted quartz sand, but it isn’t crystalline. That’s because glass cools relatively quickly, and the atoms do not have time to arrange themselves into the ordered structure of a quartz crystal. Instead, the random arrangement of the atoms in the melted glass is locked in upon cooling. Many crystals don’t form geometric shapes because they grow in extremely close quarters with other crystals. Rocks like granite are full of crystals, but none have recognizable shapes. As magma cools and solidifies, many minerals within it crystallize at the same time and quickly run out of space. And certain crystals, like turquoise, don’t grow into any discernible geometric shape in most environmental conditions, even given adequate space. Every crystal’s atomic structure has unique properties, and while these properties may not have any bearing on human emotional needs, they do have powerful applications in materials science and medicine.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=739)

翻译人员: Carol Wang 校对人员: Cynthia Li在黄石公园的间歇喷泉和温泉中，有一个由地壳中的热点 形成的岩浆室。当岩浆向地球表面移动时，它结晶形成年轻、炽热的火成岩，这些岩石的热量将地下水推向地表。当水冷却时，离子 以矿物晶体方式沉淀出来，包括硅和氧组成的石英晶体、钾、铝、硅和氧组成的长石、铅和硫组成的硫化铅。许多晶体都有标志性的形状——比如瀑布般的尖石英 或堆状硫化铅立方体。但是，什么原因导致它们 一次次长成这样的形状呢?部分原因就在于它们的原子。每类晶体的原子都按 高度有序的模式重复排列，这就是晶体的标志性特征，这种模式并非仅限于矿物——沙、冰、糖、巧克力、 陶瓷、金属、DNA，甚至某些液体也有晶体结构。晶体材料的原子排列分为六个不同系列：立方体、正方三八面体、斜方晶体、 单斜晶体、三斜晶体和六方晶体。在适当的条件下，晶体会长成反映其原子排列的几何形状。以铅、硫原子组成 立方结构的硫化铅为例。相对较大的铅原子按彼此呈 90 度的三维网格排列，而相对较小的硫原子 正好能塞进铅原子之间。随着晶体的生长，这些 铅原子的位置会吸引硫原子，铅原子易于结合到这些硫原子周围，最终，他们将完成 粘结原子的网格排列。也就是说，硫化铅 90 度网格图案的晶体结构反映在晶体的可见形状中。而石英则是有六方晶体结构，也就是说，在一个平面上， 原子按六边形排列。在三维中，这些六边形 由许多互锁金字塔组成，每个金字塔由 1 个硅原子和 4 个氧原子组成。因此，石英晶体的标志性形状是尖顶六面体。根据环境条件，多数晶体可能形成多个几何形状。例如，在地球地壳深处形成的钻石具有立方晶体结构， 也可以长成立方体或八面体。特定钻石的生长形状取决于其生长条件，包括压力、温度和化学环境。虽然我们不能直接观察 钻石在地壳下的生长条件，但实验室实验的一些证据显示，钻石往往在低温下长成立方体，在较高温度下长成八面体。微量的水、硅、钛或镁也可能影响钻石的形状。钻石永远不会自然 长成珠宝中的形状——那些钻石被切割成那样的形状， 以最佳展示光彩和净度。环境条件也会影响晶体形成与否，玻璃由熔化的石英沙制成，但它不是固体结晶。这是因为玻璃冷却相对较快，原子没有时间将自己安排成石英晶体的有序结构。相反，熔化玻璃中的原子随机排列在冷却过程中被锁定。因为它们与其他晶体一同生长。像花岗岩这样的岩石充满了水晶，但没有一个可以辨认的形状。随着岩浆冷却和凝固，岩浆中的许多矿物同时结晶， 并快速塞满了空间。而某些晶体，如绿松石，在大多数环境条件下， 不会长成任何可识别的几何形状,即使有足够的空间也不会。每个晶体的原子结构 都有独特的特性，虽然这些特性可能对 人类情感需求没有任何影响，但它们确实在材料科学和医学中 具有强大的应用。

**P740 2019-06-03 Underwater farms vs. climate change - Ayana Elizabeth Johnson and Meg**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=740)

For 3 billion people around the world, seafood provides a significant source of protein and nutrition. But recent studies show that 33% of wild fisheries are overfished, while another 60% are fished at their maximum capacity. In fact, over half the seafood we eat– from finfish and shellfish to seaweed and algae– isn’t caught in the wild. It’s grown through aquaculture, or aquatic farming. Farmed seafood is one of the fastest-growing food industries, expanding in volume by 5.8% each year. But different methods of aquaculture come with different advantages and issues– some of which echo the serious problems we’ve seen in industrial agriculture. So how can we avoid repeating the mistakes we’ve made on land, at sea? What aquaculture approaches are we currently using, and what does a sustainable way to farm the ocean really look like? One of the most common aquaculture methods involves large pens made of nets, where fish are farmed offshore in floating cages roughly 1000 square meters in size. Commonly employed off the coast of Chile and in the fjords of Norway, these fish, like many industrially farmed animals, occupy stressful, overcrowded pens. They produce massive amounts of waste, polluting the surrounding areas and potentially spreading diseases to wild species. Worse still, since the antibiotics employed to fight disease aren’t fully absorbed by the fish, they get excreted back into the environment. Net pens are also susceptible to escapes, unleashing huge numbers of fish which compete for resources and weaken the local gene pool with genes adapted for captivity. Escaped fish can even disrupt local ecosystems as invasive species. Other techniques, such as man-made coastal ponds commonly used for shrimp farming in Southeast Asia, create additional environmental problems. Just like net pens, these ponds are prone to spreading pollution and disease. Their construction also frequently destroys important ecosystems like mangroves and marshes, which protect coastal areas from storms, provide habitats, and absorb tons of greenhouse gases. One way to solve these problems is to farm fish on land in completely contained systems. Tanks and raceways can recirculate and filter water to prevent pollution. But even fully contained facilities still contend with another major hurdle: fishmeal. About 10% of the seafood caught globally is used to feed animals, including carnivorous farmed fish. Researchers are working on fish feed made of insects and plant-based proteins, but for now many inland fish farms are connected to overfishing. All these obstacles can make sustainable aquaculture feel a long way off, but innovative farmers are finding new ways to responsibly farm the seas. The most promising solution of all may be to look lower on the food chain. Instead of cramming large, carnivorous fish into pens, we can work with natural ocean systems to produce huge amounts of shellfish and seaweeds. These low-maintenance flora and fauna don’t need to be fed at all. In fact, they naturally improve water quality, filtering it as they feed off of sunlight and nutrients in the seawater. By absorbing carbon through photosynthesis, these farms help battle climate change, and reduce local ocean acidification while creating habitats for other species to thrive. Shifting to restorative ocean farming could provide good jobs for coastal communities, and support healthy plant and shellfish-based diets that have an incredibly low carbon footprint. In just 5 months, 4,000 square meters of ocean can produce 25 tons of seaweed and 250,000 of shellfish. With the right distribution network, a series of small farms, collectively the size of Washington State could feed the planet. Farms like these are already popping up around the globe, and a new generation of farmers is stepping up to pursue a more sustainable future. Done properly, regenerative ocean farming could play a vital role in helping our oceans, our climate, and ourselves.

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翻译人员: Cecilia Zhang 校对人员: Carol Wang世界上有三十亿人以海产品为重要的 蛋白质和营养来源。而近期研究显示， 有 33% 的野生渔场遭到过度捕捞，还有 60% 已经达到了极限。事实上，我们食用的海产品——鱼类、贝类、海草、水藻——一半以上不是野生的，而是水产养殖的产物。水产养殖是食品工业界 发展最快的分支之一，每年产量增加 5.8%。但是不同类型的水产养殖 各有优点和问题，其带来的问题与工业化农业 不无相似之处。我们应该如何避免陆上问题 在海域重演？现今水产养殖是如何进行的？可持续的养殖方式 又应该是什么样的？一种最常见的养殖方式是网圈养殖，在海里大约 1000 平方米的 漂浮笼子里养殖鱼。这种养殖方式常见于 智利海域和挪威峡湾，这些鱼就像工业化农业养殖的牲畜，生活环境狭小、拥挤。他们产生的大量排泄物污染着附近的海域，还可能把疾病传播给野生生物。更糟糕的是，养殖鱼不能完全吸收人们控制疫情所用的抗生素，抗生素会被排放到周边环境中。同时，鱼很容易从这种网笼中逃出，大量逃出的鱼会与野生鱼争夺资源、其适合圈养的基因 也会削弱当地鱼类基因库，出逃的鱼作为外来物种 就此扰乱了生态系统。其他的养殖方法，例如东南亚养虾业常用的 人造近海水塘，也会带来环境问题。和网制鱼笼一样，这些水塘 很容易造成污染、传播疾病，建造水塘也经常会 破坏重要的生态系统，比如红树林和沼泽地，它们可保护近海免受风暴袭击、为生物提供栖息地、 以及吸收大量温室气体。解决问题的方法之一，就是在陆地上、 全封闭环境中养殖水产。人工蓄水池和水道可以 循环过滤，以防污染。但即使是全封闭的系统 也面临另一个主要困难：鱼粉（一种饲料）供给。世界上水产捕捞的 10% 是用来饲养动物的，包括养殖的肉食鱼。研究人员正在尝试 用昆虫和植物蛋白质制造鱼食，但是，目前很多内陆渔场 都与过度捕捞有关。所有这些困难让可持续的 水产养殖看起来遥不可及，但是富有创意的渔农们 正在寻求改进海洋养殖的方法。最有希望的一种方法是 到食物链底端去找答案。无需再把体型大的食肉鱼类 养在笼子里，我们可以在自然海域中养殖大量贝类和藻类。这些低维护的动植物群不需要喂养，事实上，它们自然地改善了水质，它们从海水中摄取阳光 和养分的同时，也过滤了海水。这些养殖场通过光合作用 吸收二氧化碳，帮助对抗气候变化，并减少当地海域水体酸化，同时也为其它生物的繁荣 提供了生存空间。这种可自我修复的海洋养殖方法，可以为近海地区提供良好就业，并提供以素食和贝类 为基础的健康饮食，它们的碳排放量非常低。仅仅 5 个月内，四千平方米的海域 就可以产出 25 吨海藻、和 25 万个贝类。如果合理分配，总面积与华盛顿州相当的一群小渔场就可以满足全球食物供给。类似渔场已在世界一些地区出现，新一代渔民们正在努力追求一个更加可持续发展的未来。如若方法得当，再生型海洋养殖可在帮助 我们的海洋、气候和我们自己方面发挥至关重要的作用。

**P741 2019-06-04 The Romans flooded the Colosseum for sea battles - Janelle Peters**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=741)

The cry of the crowd. The roar of a lion. The clash of metal. Starting in 80 CE these sounds rang through the stands of the Colosseum. On hundreds of days a year, over 50,000 residents of Rome and visitors from across the Roman Empire would fill the stadiums’ four stories to see gladiators duel, animals fight, and chariots race around the arena. And for the grand finale, water poured into the arena basin, submerging the stage for the greatest spectacle of all: staged naval battles. The Romans’ epic, mock maritime encounters, called naumachiae, started during Julius Caesar’s reign in the first century BC, over a hundred years before the Colosseum was built. They were held alongside other aquatic spectacles on natural and artificial bodies of water around Rome up through Emperor Flavius Vespasian, who began building the Colosseum in 70 CE on the site of a former lake. The Colosseum was intended to be a symbol of Rome’s power in the ancient world, and what better way to display that power than a body of water that could drain and refill at the Emperor’s command? Vespasian’s son Flavius Titus fulfilled his father’s dream in 80 CE when he used war spoils to finish the Colosseum– or as it was known at the time, the Flavian Amphitheater. The grand opening was celebrated with 100 days of pageantry and gladiatorial games, setting the precedent for programming that included parades, musical performances, public executions, and of course, gladiatorial combat. Unlike the games in smaller amphitheaters funded by wealthy Romans, these lavish displays of Imperial power were financed by the Emperor. Parades of exotic animals, theatrical performances, and the awe-inspiring naumachiae were all designed to bolster faith in the god-like Emperor, who would be declared a god after his own death. It’s still a mystery how engineers flooded the arena to create this aquatic effect. Some historians believe a giant aqueduct was diverted into the arena. Others think the system of chambers and sluice gates used to drain the arena, were also used to fill it. These chambers could’ve been filled with water prior to the event and then opened to submerge the stage under more than a million gallons of water, to create a depth of five feet. But even with all that water, the Romans had to construct miniature boats with special flat bottoms that wouldn’t scrape the Colosseum floor. These boats ranged from 7 to 15 meters long, and were built to look like vessels from famous encounters. During a battle, dozens of these ships would float around the arena, crewed by gladiators dressed as the opposing sides of the recreated battle. These warriors would duel across ships; boarding them, fighting, drowning, and incapacitating their foes until only one faction was left standing. Fortunately, not every watery display told such a gruesome story. In some of these floodings, a submerged stage allowed chariot drivers to glide across the water as though they were Triton, making waves as he piloted his chariot on the sea. Animals walked on water, myths were re-enacted by condemned prisoners, and at night, nude synchronized swimmers would perform by torchlight. But the Colosseum’s aquatic age didn’t last forever. The naval battles proved so popular they were given their own nearby lake by Emperor Domitian in the early 90s CE. The larger lake proved even better for naumachiae, and the Colosseum soon gained a series of underground animal cages and trap doors that didn’t allow for further flooding. But for a brief time, the Flavian Emperors controlled the tides of war and water in a spectacular show of power.

**P741 2019-06-04 The Romans flooded the Colosseum for sea battles - Janelle Peters**

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翻译人员: Cynthia Li 校对人员: Liu Qi观众的欢呼声，狮子的咆哮声， 还有刀剑交兵的铿锵之声。自公元 80 年，这些声音 常在古罗马竞技场回荡。每年里有几百天，会有超过五万罗马居民及 罗马帝国全国各地的游客坐满整个四层竞技场， 来观看角斗士决斗，动物厮斗，以及环竞技场的战车大赛。而最后压轴节目是 将水注入竞技场盆地，淹没整个舞台，为所有人 带来最壮观的景象：海战表演。罗马人史诗般的模拟海上 遭遇战，又称海战表演，始于公元前一世纪 尤利乌斯·恺撒的统治时期，比罗马竞技场建成早了一百多年。那时海战表演与其他 水上表演一起进行，在罗马附近天然 及人工水体上举行。直到弗拉维乌斯·维斯帕先皇帝上位，他于公元 70 年时在一湖泊的原址上 开始着手建造古罗马竞技场。罗马竞技场旨在成为罗马 在古代世界的权力象征，没有什么比以皇帝之令，掌控水位涨退更能彰显权力呢？维斯帕先的儿子弗拉维乌斯·提图斯 在公元 80 年完成了他父亲的愿望，他用战利品来完成罗马竞技场的建造，或是按当时的称呼来讲： 弗拉维安圆形竞技场。竞技场盛大开幕，足足举行了 一百天的欢庆盛典以及角斗士比赛，开创先河，设计了一系列节目：包括游行，音乐表演，公开处决， 当然还有角斗士决斗。不似那些罗马富商所开设的 小型圆形露天剧场的把戏，这些彰显皇权的奢华节目 是由皇帝资助的。设计异域动物游行、戏剧表演、以及令人惊叹的海战表演，都是为了强化对神一样的皇帝的信仰，而他将在死后被尊为神。至于工程师们是如何水淹斗兽场 来创造这种水战效果的，仍然是个谜。一些历史学家认为是把一个 巨大的渡槽改道引入竞技场。另外一些认为用于排水的 阀室和水闸系统，也被用来向竞技场注水。这些阀室在表演前就已蓄满水，之后只需打开就可以淹没舞台，需要超过一百万加仑的水， 使场内水深达到 5 英尺。但即使已注入大量的水，罗马人仍要建造小型的平底船只，以免刮到斗兽场的地板。这些船长度为 7 至 15 米不等，且外型酷似著名战役中的船只。在一场战役中，数十艘船 会在竞技场中作战，船员由角斗士担任， 打扮成当年战役中对立双方。这些战士会在船上决斗；登陆敌船、与之战斗、 淹溺对手并使之丧失战斗力，直到一方最终剩下。幸运的是，并不是所有的水上表演 讲述的都是这样恐怖的故事。在这些水上表演中，水下舞台使战车驾驶员 可以在水面上滑行，像海神特里同一样： 在海上驾驶着战车，掀起层层海浪。动物在水上行走， 被判刑的囚犯重演神话，晚上，裸体花样游泳运动员 将在火炬的光照下表演。但是古罗马竞技场的 水上时代没有维持下去。事实证明，海战表演非常受欢迎，在公元 90 年代早期，多米蒂安皇帝 曾在附近的湖中举行过海战演出。事实证明，大湖泊更加适合海战演出，而且不久竞技场安装了 一些地下兽笼和暗门，于是不再满足注水条件。但是在这一短暂的时期内，弗拉维王朝的皇帝们 在一场壮丽权力表演中，掌控着战争的胜负和水位的起伏。

**P742 2019-06-13 Why should you read 'Hamlet' - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=742)

"Who’s there?" Whispered in the dark, this question begins a tale of conspiracy, deception and moral ambiguity. And in a play where everyone has something to hide, its answer is far from simple. Written by William Shakespeare between 1599 and 1601, "Hamlet" depicts its titular character haunted by the past, but immobilized by the future. Mere months after the sudden death of his father, Hamlet returns from school a stranger to his own home, and deeply unsure of what might be lurking in the shadows. But his brooding takes a turn when he’s visited by a ghost that bears his father’s face. The phantom claims to be the victim of a “murder most foul,” and convinces Hamlet that his uncle Claudius usurped the throne and stole queen Gertrude’s heart. The prince’s mourning turns to rage, and he begins to plots his revenge on the new king and his court of conspirators. The play is an odd sort of tragedy, lacking either the abrupt brutality or all-consuming romance that characterize Shakespeare’s other work in the genre. Instead it plumbs the depths of its protagonist’s indecisiveness, and the tragic consequences thereof. The ghost’s revelation draws Hamlet into multiple dilemmas– what should he do, who can he trust, and what role might he play in the course of justice? These questions are complicated by a tangled web of characters, forcing Hamlet to negotiate friends, family, court counselors, and love interests– many of whom possess ulterior motives. The prince constantly delays and dithers over how to relate to others, and how he should carry out revenge. This can make Hamlet more than a little exasperating, but it also makes him one of the most human characters Shakespeare ever created. Rather than rushing into things, Hamlet becomes consumed with the awful machinations of thinking itself. And over the course of the play, his endless questions come to echo throughout our own racing minds. To accomplish this, Shakespeare employs his most introspective language. From the usurping king’s blazing contemplation of heaven and hell, to the prince’s own cackling meditation on mortality, Shakespeare uses melancholic monologues to breathtaking effect. This is perhaps best exemplified in Hamlet’s most famous declaration of angst: "To be or not to be—that is the question: Whether ’tis nobler in the mind to suffer The slings and arrows of outrageous fortune, Or to take arms against a sea of troubles And, by opposing, end them." This monologue personifies Hamlet’s existential dilemma: being torn between thought and action, unable to choose between life and death. But his endless questioning raises yet another anxiety: is Hamlet’s madness part of a performance to confuse his enemies, or are we watching a character on the brink of insanity? These questions weigh heavily on Hamlet’s interactions with every character. And since he spends much of the play facing inward, he often fails to see the destruction left in his wake. He’s particularly cruel to Ophelia, his doomed love interest who is brought to madness by the prince’s erratic behavior. Her fate is one example of how tragedy could have been easily avoided, and shows the ripple effect of Hamlet’s toxic mind games. Similar warning signs of tragedy are constantly overlooked throughout the play. Sometimes, these oversights occur because of willful blindness– such as when Ophelia’s father dismisses Hamlet’s alarming actions as mere lovesickness. At other points, tragedy stems from deliberate duplicity– as when a case of mistaken identity leads to yet more bloodshed. These moments leave us with the uncomfortable knowledge that tragedy evolves from human error– even if our mistake is to leave things undecided. For all these reasons, perhaps the one thing we never doubt is Hamlet’s humanity. But we must constantly grapple with who the “real” Hamlet might be. Is he a noble son avenging his father? Or a mad prince creating courtly chaos? Should he act or observe, doubt or trust? Who is he? Why is he here? And who’s out there– waiting in the dark?

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=742)

翻译人员: 晓彤 纪 校对人员: 潘 可儿“是谁在那儿？”黑暗中，有人悄声问，一个有关阴谋、欺骗和道德模糊的故事 由这个问题开始。在剧中每个人都有所隐瞒，因此答案并不简单。《哈姆雷特》由威廉·莎士比亚 写于 1599 至 1601 年，它讲述了主人公哈姆雷特被过去所困，面对未来又踌躇不前。他父亲突然去世的仅仅几个月后，他从学校回到家， 像一个陌生人一样归来，他很不确定黑暗中有什么在潜行。但在一个顶着他父亲的脸的鬼魂 找过他后，他的忧虑发生了转变。鬼魂声称死于一场“最狠毒”的谋杀，还使哈姆雷特相信 他叔叔克劳狄斯篡夺了王位，还勾引了皇后乔特鲁德。王子哈姆雷特的悲痛转为愤怒，他开始策划一场 对新国王和他同谋的朝廷的复仇。这部戏剧是一部有些奇怪的悲剧，它缺少突然爆发的暴力， 以及不顾一切的爱情，而这些都是莎士比亚同类作品的特点。相反，它极力表现了主人公的犹豫不决以及由此引发的悲剧。鬼魂对真相的揭露 使哈姆雷特陷入了许多困境——他应该做什么， 可以相信谁,在伸张正义的过程中， 他可以扮演什么角色。这些问题因复杂的人物关系 变得更为复杂，迫使哈姆雷特与朋友、家人、朝臣、爱人周旋，这些人中很多人都别有用心。哈姆雷特在如何理解别人、 如何实施复仇的问题上，一直在拖延和犹豫不决，这令他显得非常令人生气，但又让他成为莎士比亚笔下 最有人性的人物之一。哈姆雷特没有冲动地做事，而是沉浸在思考复仇计划本身。并且，在整部剧中，他的无数问题 也在我们飞快的思绪中引起了共鸣。为了达到这样的效果，莎士比亚运用了他最内省的语言。从篡位国王对天堂和地狱的激烈思考，到王子对死亡必然性的反复思索。莎士比亚用忧郁的独白打动人心。也许，最经典的例子就是 哈姆雷特最著名的那段忧虑的宣言：“生存还是毁灭—— 这是一个值得考虑的问题：是默然忍受命运的暴虐的毒箭，或是挺身反抗人世间的无涯的苦难，通过斗争把它扫清，哪一种更高贵？”这段独白体现了哈姆雷特 关于存在的困境：在想法和行动间左右为难，无法选择生还是死。但他无休止的疑问引起了另一个忧虑：哈姆雷特疯癫的表现是为了迷惑敌人，还是真的处于精神失常边缘？哈姆雷特的疑问深深影响了 他与每个角色的交往。由于他花了很多时间向内思考，常常看不到自己造成的破坏。他对欧菲利亚特别残酷，他绝望的爱人 因他难以捉摸的行为变疯。她的命运反映了悲剧本应可轻易避免，也表现了哈姆雷特致命心理游戏的 连锁反应。在整部戏剧中， 类似的悲剧警示一直被忽视。有时，这些疏忽是因为有意的无视——比如欧菲利亚的父亲不理会 哈姆雷特可怕的行为，只把它当作相思病。在其它方面，悲剧源于故意的欺骗——比如因为一次认错人，引发更多的死亡。这些情况让我们难过地认识到，悲剧是由人们的错误演变而来的。即使我们只是错在不去做决定。综上，也许我们唯独不应怀疑的 是哈姆雷特的人性，但我们应该不断设法想出 “真正的”哈姆雷特可能是谁。他是一个为父报仇的贵族子弟吗？还是一个制造宫廷混乱的疯掉的王子？他应该行动还是观察， 怀疑还是相信？他是谁？为什么在这里？还有谁在外面——在黑暗中等待？

**P743 2019-06-14 The secret language of trees - Camille Defrenne and Suzanne Simard**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=743)

Most of the forest lives in the shadow of the giants that make up the highest canopy. These are the oldest trees, with hundreds of children and thousands of grandchildren. They check in with their neighbors, sharing food, supplies, and wisdom gained over their long lives. They do all this rooted in place, unable to speak, reach out, or move around. The secret to their success lies under the forest floor, where vast root systems support the towering trunks above. Partnering with these roots are symbiotic fungi called mycorrhizae. These fungi have countless branching, thread-like hyphae that together make up the mycelium. The mycelium spreads across a much larger area than the tree root system and connect the roots of different trees together. These connections form mycorrhizal networks. Through mycorrhizal networks, fungi can pass resources and signaling molecules between trees. We know the oldest trees have the largest mycorrhizal networks with the most connections to other trees, but these connections are incredibly complicated to trace. That’s because there are about a hundred species of mycorrhizal fungi– and an individual tree might be colonized by dozens of different fungal organisms, each of which connects to a unique set of other trees, which in turn each have their own unique set of fungal associations. To get a sense of how substances flow through this network, let’s zoom in on sugars, as they travel from a mature tree to a neighboring seedling. Sugar’s journey starts high above the ground, in the leaves of the tallest trees above the canopy. The leaves use the ample sunlight up there to create sugars through photosynthesis. This essential fuel then travels through the tree to the base of the trunk in the thick sap. From there, sugar flows down to the roots. Mycorrhizal fungi encounter the tips of the roots and either surround or penetrate the outer root cells, depending on the type of fungi. Fungi cannot produce sugars, though they need them for fuel just like trees do. They can, however, collect nutrients from the soil much more efficiently than tree roots— and pass these nutrients into the tree roots. In general, substances flow from where they are more abundant to where they are less abundant, or from source to sink. That means that the sugars flow from the tree roots into the fungal hyphae. Once the sugars enter the fungus, they travel along the hyphae through pores between cells or through special hollow transporter hyphae. The fungus absorbs some of the sugars, but some travels on and enters the roots of a neighboring tree, a seedling that grows in the shade and has less opportunity to photosynthesize sugars. But why does fungus transport resources from tree to tree? This is one of the mysteries of the mycorrhizal networks. It makes sense for fungus to exchange soil nutrients and sugar with a tree— both parties benefit. The fungus likely benefits in less obvious ways from being part of a network between trees, but the exact ways aren’t totally clear. Maybe the fungus benefits from having connections with as many different trees as possible, and maximizes its connections by shuttling molecules between trees. Or maybe plants reduce their contributions to fungi if the fungi don’t facilitate exchanges between trees. Whatever the reasons, these fungi pass an incredible amount of information between trees. Through the mycorrhizae, trees can tell when nutrients or signaling molecules are coming from a member of their own species or not. They can even tell when information is coming from a close relative like a sibling or parent. Trees can also share information about events like drought or insect attacks through their fungal networks, causing their neighbors to increase production of protective enzymes in anticipation of threats. The forest’s health relies on these intricate communications and exchanges. With everything so deeply interconnected, what impacts one species is bound to impact others.

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翻译人员: Candace Hwang 校对人员: Carol Wang大部分森林生活在像巨人一样的最高树冠形成的阴影下，它们是最古老的树，并拥有成百上千的子孙。它们与邻居联系紧密， 与邻居分享食物、供给和长久一生中所获得的智慧。它们扎根一处，完成了这一切， 不能讲话、伸出去或四处移动，其成功的秘诀在于森林地面之下，巨大的根系统支持上面高耸的树干。与这些树根相配合的是共生真菌， 称为菌根。这些真菌有无数的分岔的线状菌丝，菌丝构成菌丝体。菌丝体扩散的区域比树根系统更大，并通过根把不同树连接在一起，这些联结形成了菌根网络。通过菌根网络，真菌可以在树木之间 传递资源和信号分子。我们知道最古老的树有 最大的菌根网络，与其他树的联系最多，但这些联系追踪起来非常的复杂。因为大约有一百种菌根真菌——一棵树可被几十种 不同的真菌生物所占领，每种真菌连接到特定的树种，因此每种树拥有特定的真菌组织。要了解物质如何在网络间流通，我们来观察一下糖类如何从成年的树传输到邻近幼苗。糖类旅行开始远高于地面，在树冠上方最高的树木的叶子。叶子利用充足的阳光 通过光合作用产生糖分，这种必要的养料通过树木进入树干底部的浓树液中。从那里，糖流到根部。菌根真菌遇到根尖，然后，根据真菌的类型，它们会围绕或穿透外根细胞。真菌不能产生糖，尽管它们 像树一样需要糖作为养分。然而，它们可以比树根更高效的 吸收土壤中的营养——并将这些营养素传递进树根里。通常，物质会从更丰富的地方 流向缺乏的地方，或者从源到库。也就是说，糖从树根流到真菌菌丝。一旦糖进入真菌，它们沿着菌丝穿过细胞间的气孔，或通过特殊的空心传送者菌丝。真菌吸收一部分糖分，但有些糖会继续进入相邻树的根，一棵树荫下生长的小树，它光合作用产生糖的机会少一些。但为何真菌要在树间传送营养呢？这是菌根网络的未解谜题之一。真菌与树交换土壤养分和糖——实现共赢，是说得通的。真菌可能以不明显的方式 从树间网络中获益，但确切的方法并不完全清楚。也许这种真菌得益于与尽可能多的、不同的树建立联系，并通过在树间来回运输分子 以实现其联系最大化。如果真菌不促进树间的养分交流，树可能会减少对真菌的供给。无论何因，这些真菌在树间传递了大量的信息。通过菌根，树可以分辨出养分或信号分子是否来自它们自己物种的成员。它们甚至可以判断信息 是否来自近亲，像手足或父母。树还可以通过真菌网络分享信息，如干旱或昆虫的袭击，在威胁来临前，引起邻近树木增加保护酶的产量。森林的健康仰赖这些 复杂的沟通和交换。由于万物紧密的相互联系，影响一个物种的因素 必然会影响其他物种。

**P744 2019-06-24 Can you solve the dark matter fuel riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=744)

It’s an incredible discovery: an ancient, abandoned alien space station filled with precursor technology. But now, every species in the galaxy is in a mad dash to get there first and claim it for themselves. And right away, you’ve got a problem. Your ship’s faster-than-light jump drive consumes 1 unit of fuel for every parsec of distance it takes you, and your ship holds only 15 units of fuel. But the space station is 23 parsecs away, and there’s only empty space between there and here. There’s one thing that can help you, though: dark matter fuel is stable in deep space. That means you can vent a cache of it from your fuel chamber, and then come back to pick it up again later. Even though your ship holds only 15 units of fuel, you’ve been granted use of all 45 units in your current location. With some strategic fuel caching along the way, you might be able to make it all 23 parsecs. So how can you reach the alien space station? Answer in 3, 2, 1. It’s possible to solve this riddle using as few as two cache points, and there are also valid solutions that use more. No matter how you go about it though, the key is determining exactly where to cache fuel along your route. Let’s work backwards from the alien space station. To reach 23 parsecs, you’ll have to leave the 8-parsec mark with a full tank of fuel. The 8-parsec point is too far from the start to use as a cache right away; you could jump there, but wouldn’t have enough fuel to return to the start, let alone store any for later. So that means you’ll need to find a cache somewhere between the start and 8. But where? There’s an interesting pattern that can help. At the start you have exactly 3 tanks’ worth of fuel. At 8 parsecs you need exactly 1. Is there a point, which we can call point X, where you could have exactly 2? That would be useful, because then you could refuel there exactly twice, making full use of your storage capacity without any waste. Wherever point X is, you’ll jump forward from it twice: once to deposit some fuel at the 8-parsec cache point, and a second time for good. So you’ll jump the distance between X and 8-parsecs 3 times in all. You’d have 2 tanks of fuel at point X, and need 1 left at the 8 parsec cache point, so you can spend one tank-- or 15 units-- going back and forth. Since 15 units divided by 3 trips is 5, we can place these two cache points 5 parsecs apart. Any farther, and you wouldn’t have enough fuel to reach the alien space station. So it looks like the earliest we can place point X is at the 3-parsec mark. Is it possible to transport 30 units of fuel there? Let’s try. You set out with a full tank of 15 units. You jump 3 parsecs, drop 9 units off at the cache point, and then jump the 3 units home, arriving with an empty tank. Repeating this process gets you 18 units of fuel at the cache point, and one more jump puts you at the 3-parsec cache with 30 total units of fuel. So far so good! Next, you jump to the 8-parsec mark, drop off 5 units of fuel, and jump back to the 3-parsec mark. You fill up your tank and jump forward again, arriving with 10 units of fuel in your tank. And now the end is in sight. You beam the 5 units of fuel in from deep space to fill your tank to capacity, and type in the coordinates of your final destination. A 15-parsec jump leaves you running on fumes, but ready to dock with the precursor space station. Time to put this alien tech to work and make life better for everyone in the galaxy.

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翻译人员: Carol Wang 校对人员: Candace Hwang这是个惊人的发现：一个古老、遭遗弃的外星人空间站， 里面装满了先驱的科技。可眼下，银河系所有物种 都疯狂的冲向空间站，想第一个抵达，并抢占它。而你马上就碰到问题了，你的飞船使用了超光速跳跃引擎，每行驶一个秒差距的距离， 就消耗1个单位的燃料，但仅能容纳 15 个单位的燃料。而空间站离你有 23 个秒差距，而且沿途空无一物。然而，有一样东西能帮到你：暗物质燃料在深空中是稳定的。即可从燃料箱里排出一批燃料，稍后再回来取走。尽管船仅可容纳 15 个单位燃料，但你已获准使用当前位置 全部45个单位燃料。只要沿途合理布置燃料缓存，你就有可能完成 23 个秒差距。那么，如何才能到 达外星人空间站呢？[若想自己解答，可暂停视频][答案倒计时：3 秒][ 2 秒][ 1 秒]至少需要两个缓存点才能解开谜题，也有设置更多缓存点的有效方案。不管你如何去做，关键是如何确定途中 缓存燃料的准确位置。我们就从外星人空间站开始倒推吧。要完成 23 个秒差距的距离，那么在 8 个秒差距的位置， 你必须有一整箱燃料。但 8 个秒差距的位置离起点太远， 无法用作缓存点;你能行驶到那里， 但燃料不足以返回到起点，更别提为以后储存燃料了。因此，必须在起点 和 8 个秒差距间找一个缓存点。但是，选哪呢？一个有趣的模式可能有用。在起点位置，你有 3 箱燃料，在 8 个秒差距位置， 你只需要 1 箱燃料。可否在点 X 位置存 2 箱燃料呢？这可能很有用，因为 你可在 X 处加 2 次燃料，从而充分利用燃料储备 而没有任何浪费。不论点 X 设在哪里，你会去那里两次：一次是在 8 秒差距缓存燃料， 第二次是取走后不再回来。所以在点 X 和 8 秒差距间 你一共飞行 3 次，你有 2 箱燃料放在点 X ， 8 个秒差距缓存处需留 1 箱燃料，因此，你在这两点之间来回 3 趟 可用 1 箱燃料——即 15 单位燃料，15 (单位燃料) 除以 3 (趟)等于 5，即两个缓存点的距离为5个秒差距，距离再大一点点的话，你将 没有足够燃料到达外星人空间站。因此，点 X 最近可设在 3 秒差距处。能将 30 单位燃料运到 X 处吗？ 一起试试看。你出发满载 15 单位燃料，跳到 3 秒差距处， 放下 9 单位燃料，接着，跳3个秒差距回原点， 燃料箱正好空了。重复此过程，并在 缓存处存 18 单位燃料，再跳一次到达 3 秒差距处时， 此时共有 30 单位燃料。目前一切很顺利!接下来，你跳到 8 秒差距处，扔下 5 单位燃料， 再跳回 3 秒差距处，燃料箱填满后，继续往前跳，再次到达 8 秒差距时， 燃料箱剩 10 单位燃料，此时，终点已近在眼前。你从深空抓取 5 单位燃料， 塞满燃料箱，并输入终点坐标。飞行 15 秒差距耗尽了所有燃料，但你已准备与先驱空间站对接。是时候发挥外星科技的作用，让银河系每个人的生活变得更美好了！

**P745 2019-06-26 Ancient Rome’s most notorious doctor - Ramon Glazov**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=745)

In the middle of the 16th century, a talented young anatomist named Andreas Vesalius made a shocking discovery: the most famous human anatomy texts in the world were wrong. They not only failed to account for many details of the human body, they also described the organs of apes and other mammals. While Vesalius knew he was right, announcing these errors would mean challenging Galen of Pergamon– the most renowned physician in medical history. But who was this towering figure? And why did doctors working more than 1,300 years later so revere and fear him? Born in 129 CE, Galen left home as a teen to scour the Mediterranean for medical wisdom. He returned home a gifted surgeon with a passion for anatomy and a penchant for showmanship. He gleefully entered public anatomy contests, eager to show up his fellow physicians. In one demonstration, he caused a pig to lose its voice by tying off one of its nerves. In another, he disemboweled a monkey and challenged his colleagues to repair it. When they couldn’t, he did. These grizzly feats won him a position as surgeon to the city’s gladiators. Eventually, he would leave the arena to become the personal physician to four Roman Emperors. While his peers debated symptoms and their origins, Galen obsessively studied anatomy. He was convinced that each organ had a specific function. Since the Roman government largely prohibited working with human cadavers, Galen conducted countless dissections of animals instead. Even with this constraint, his exhaustive investigations yielded some remarkably accurate conclusions. One of Galen’s most important contributions was the insight that the brain, not the heart, controlled the body. He confirmed this theory by opening the cranium of a living cow. By applying pressure to different parts of the brain, he could link various regions to specific functions. Other experiments allowed him to distinguish sensory from motor nerves, establish that urine was made in the kidneys, and deduce that respiration was controlled by muscles and nerves. But these wild experiments also produced extraordinary misconceptions. Galen never realized that blood cycles continuously throughout the body. Instead, he believed the liver constantly produces an endless supply of blood, which gets entirely depleted on its one-way trip to the organs. Galen is also credited with solidifying the popular theory of the Four Humours. Introduced by Hippocrates centuries earlier, this misguided hypothesis attributed most medical problems to an imbalance in four bodily fluids called humours. To correct the balance of these fluids, doctors employed dangerous treatments like bloodletting and purging. Informed by his poor understanding of the circulatory system, Galen was a strong proponent of these treatments, despite their sometimes lethal consequences. Unfortunately, Galen’s ego drove him to believe that all his discoveries were of the utmost importance. He penned treatises on everything from anatomy to nutrition to bedside manner, meticulously cataloguing his writings to ensure their preservation. Over the next 13 centuries, Galen’s prolific collection dominated all other schools of medical thought. His texts became the standard works taught to new generations of doctors, who in turn, wrote new essays extolling Galen’s ideas. Even doctors who actually dissected human cadavers would bafflingly repeat Galen’s mistakes, despite seeing clear evidence to the contrary. Meanwhile, the few practitioners bold enough to offer conflicting opinions were either ignored or ridiculed. For 1,300 years, Galen’s legacy remained untouchable– until renaissance anatomist Vesalius spoke out against him. As a prominent scientist and lecturer, his authority influenced many young doctors of his time. But even then, it took another hundred years for an accurate description of blood flow to emerge, and two hundred more for the theory of the Four Humours to fade. Hopefully, today we can reap the benefits of Galen’s experiments without attributing equal credence to his less accurate ideas. But perhaps just as valuable is the reminder that science is an ever-evolving process, which should always place evidence above ego.

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翻译人员: Carol Wang 校对人员: Yanyan Hong在 16 世纪中期，才华横溢的年轻解剖学家 安德烈亚斯·维萨里有了惊人发现：世上最著名的人体解剖理论是错的。它们不仅没有正确描述人体细节，还把描述人的器官描写成 猿人和其它哺乳动物的器官。维萨里知道自己是正确的，若宣布它是错误的话， 将意味着质疑帕加马的盖伦——医学史上最著名的医生。但这位权威人物是何许人呢？又为何 1300 年之后， 医生们依然尊敬和惧怕他呢？盖伦生于公元前 129 年，少年离家，前往地中海地区学医。回家时，已是一名 才华横溢的外科医生，热爱并喜欢表演解剖。他积极地参加公开解剖比赛，热心为同行们大展身手。在一次示范中，他阻断了猪的一条神经，猪就不叫了。另一次，他把一只猴子开了膛， 并挑战同行们去缝合它，当他们无法做到时，他却做到了。这些艰辛的壮举，为他赢得了 角斗士学校的外科医生职位。最终，他离开了竞技场，成为四位罗马皇帝的私人医师。盖伦的同龄人辩论症状及原因时，他则痴迷于研究解剖学，他相信每个器官都有特殊的功能。由于罗马政府严禁解剖尸体，所以，盖伦大量解剖动物。即使有这项限制，他的大量研究依然得出了 一些非常精确的结论。盖伦最重要的贡献之一是发现了控制身体的 是大脑，而不是心脏。他打开了一头活牛的头颅， 来证实了这一理论。通过对大脑不同部位施压，他得以将不同的区域 与特定功能联系起来。其它实验令他将感觉神经 与运动神经区分开来，确立了尿液是由肾脏产生的，并推断出呼吸由神经和肌肉控制。但是这些疯狂的实验 也产生了大量错误结论。盖伦从来没意识到 血液循环遍及全身，相反，他认为肝脏 产生源源不尽的血液，血液在流向器官途中耗尽。盖伦还被认为巩固了 “四体液学说”的流行理论，这个误导人的假设——由希波克拉底在几个世纪前提出，它将大多数医学病症 归因于四种体液的不平衡。为了纠正这些液体的平衡，医生采用了危险疗法， 例如，放血和净化。由于对循环系统了解不足，盖伦大力支持这些疗法，尽管这些疗法 有时带来致命后果。很遗憾，盖伦的自负令他认为他所有发现都很重要。他都撰写大量著作，涵盖解剖学、 营养学，以及医生对患者的态度，并精心编制目录以安全保存。在接下来的 13 个世纪里，盖伦的丰富著作主导了 所有其它医学思想流派。他的著作成为新一代医生的教科书，而后者又写出 赞扬盖伦理论的新文章。即使那些解剖人类尸体的医生，看到了与理论相左的确凿证据，也莫名其妙地重复盖伦的错误。同时，为数不多的大胆行医者 提出了与理论相左的意见，结局是被置之不理或成为笑柄。1300 年以来，盖伦理论 一直神圣不可侵犯——直到文艺复兴时期 解剖学家维萨里提出反对意见。盖伦作为杰出的科学家和讲师，他的权威性对当时的 许多年轻医生影响很大。但是即使到那时，一百年之后才出现了 对血流的准确描述，之后，又过了两百年， 四体液理论才逐渐消失。希望今天我们可对盖伦实验取其精华、去其槽粕。但也许同样有价值的是， 它提醒人们：科学是一个不断发展的过程，应始终将证据置于自我之上。

**P746 2019-06-26 Infinity according to Jorge Luis Borges - Ilan Stavans**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=746)

When Ireneo Funes looked at a glass of wine on a table, he saw “all the shoots, clusters, and grapes of the vine. He remembered the shapes of the clouds in the south at the dawn of the 30th of April of 1882, and he could compare them in his recollection with the marbled grain in the design of a leather-bound book which he had seen only once, and with the lines in the spray which an oar raised in the Rio Negro on the eve of the battle of the Quebrancho.” In the short story “Funes, the Memorious,” Jorge Luis Borges explores what it would be like to have a perfect memory. His character not only remembers everything he has ever seen, but every time he has seen it in perfect detail. These details are so overwhelming Funes has to spend his days in a dark room, and can only sleep by imagining a part of town he has never visited. According to Borges, Funes’s memories even rendered him incapable of real thought, because “To think is to forget a difference, to generalize, to abstract. In the overly replete world of Funes there were nothing but details.” Funes’ limitless memory was just one of Borges’s many explorations of infinity. Born in Argentina in 1899, he admired the revolutionaries of his mother’s family but took after his father’s bookish clan. His body of essays, poems, and stories, or, as he called them, ficciones pioneered the literary style of “lo real maravilloso,” known in English as Magical Realism— and each was just a few pages long. Though Borges was not interested in writing long books, he was an avid reader, recruiting friends to read to him after he went blind in middle age. He said his image of paradise was an infinite library, an idea he brought to life in “The library of Babel.” Built out of countless identical rooms, each containing the same number of books of the same length, the library of babel is its own universe. It contains every possible variation of text, so there are some profound books, but also countless tomes of complete gibberish. The narrator has spent his entire life wandering this vast labyrinth of information in a possibly futile search for meaning. Labyrinths appeared over and over in Borges’ work. In “The Garden of Forking Paths,” as Yu Tsun winds his way through country roads, he remembers a lost labyrinth built by one of his ancestors. Over the course of the story, he finds out the labyrinth is not a physical maze but a novel. And this novel reveals that the real Garden of Forking Paths is time: in every instant, there are infinite possible courses of action. And as one moment follows another, each possibility begets another set of divergent futures. Borges laid out infinite expanses of time in his labyrinths, but he also explored the idea of condensing all of time into a single moment. In “The God’s Script,” at the very beginning of the world the god writes exactly one message into the spots of the jaguars, who then “love and reproduce without end, in caverns, in cane fields, on islands, in order that the last men might receive it.” The last man turns out to be a tenacious old priest who spends years memorizing and deciphering the jaguar’s spots, culminating in an epiphany where he finally understands the god’s message. Imprisoned deep underground, he has no one to share this meaning with, and it changes nothing about his circumstances, but he doesn’t mind: in that one moment, he has experienced all the experience of everyone who has ever existed. Reading Borges, you might catch a glimpse of infinity too.

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翻译人员: Carol Wang 校对人员: Candace Hwang当伊利内奥·富内斯 看着桌上的一杯葡萄酒时，他看到了“所有葡萄藤上的 新芽、串串葡萄和葡萄粒。他记起了1882年4月30日南方黎明时云彩的形状，将它们与回忆中仅见过一次的一本真皮包装书的 大理石纹理图案作比较，与科布兰筹战役前夕内格罗河上 船桨溅起的层层水花作比较。”在短故事《博闻强记的富内斯》中，豪·路·博尔赫斯探索了 拥有完美记忆的感受。主人公不仅记得所见过的一切，而且每次都记得翔实细节。这些细节太强大，富内斯只得在一间黑屋度日，只能通过想象城镇里 没去过的地方才能入睡。据博尔赫斯的描述，富内斯的记忆力 甚至使他无法真正思考，因为“思考需要忘记差异 而去概括、抽象。在富内斯过分充实的 世界里只剩细节。”“富内斯的无限记忆”只是博尔赫斯 对“无限”的许多探索之一。1899年出生于阿根廷的他，钦佩母亲家族的革命者，但却成为父亲书香家族的一员。他称之为“科幻”的散文、 诗歌和故事，开创了 “lo real maravilloso” 文学风格，英文称之为“魔幻现实主义”——每一篇仅短短几页而已。虽然博尔赫斯对写长篇不感兴趣，但他是个书痴，中年失明后，他说服朋友读给他听。他说心目中的天堂形象 是一个无穷尽的图书馆，并把这个想法写进了 《巴别塔图书馆》一书。图书馆由无数相同的房间组成，每个房间书目数量相同、 每本书长度相同，巴别塔图书馆就是它自己的宇宙。它包含每种文本变化的各种可能性，所以，有些书籍很深奥，但也有无数的书完全是胡言乱语。叙述者在这个巨大的信息迷宫里游历了一生，近似徒劳地寻找意义所在。迷宫反复出现在博尔赫斯的作品中，在《小径分岔的花园》中，当孙瑜在乡间道路上蜿蜒而行时，他想起了一位祖先 建造的已遗失的迷宫。随着故事的进展，他发现它不是现实的迷宫， 而是一本小说。这部小说揭示出， 真正的小径分岔的花园是时间，在每一个瞬间， 都有无限可能的行动方案。随着时间的推移，每一种可能都会 产生一系列不同的未来。博尔赫斯在迷宫中 设置了无限的时间扩展，但他也探索了将全部时间凝结成一个瞬间的想法。在《上帝的手稿》中写到，世界之始，上帝把一条信息写在美洲豹的斑点中，“美洲豹们相爱并不断繁殖，在洞穴中、甘蔗田里、在岛上，以便最后的人类能收到这条信息。”最后的人是一个固执的老牧师，花了多年时间 去记住和解码美洲豹的斑点，他终于顿悟，明白了上帝的信息。被囚禁于地下深处的他，无法与人分享这条信息的含义，这条信息也没能改变其处境，但他并不在意：就在那一刻，他体验了所有曾生存过的人的经历。通过读博尔赫斯的作品， 你也可以一瞥无限的魅力。

**P747 2019-06-26 Romance and revolution - The poetry of Pablo Neruda - Ilan Stavans**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=747)

Pablo Neruda published his first collection of poems at age 19. He went on to win the Nobel Prize in Literature— and also rescue 2,000 refugees, spend three years in political exile, and run for president of Chile. A romantic and a revolutionary, Neruda was one of the most celebrated poets of the 20th century, but also one of the most accessible and controversial. Originally written in Spanish, his poems often use straightforward language and everyday experience to create lasting impact. Neruda was born Ricardo Eliezer Neftalí Reyes Basoalto in a small Chilean town in 1904. His father didn’t want him to be a poet, so at sixteen he began to write under the pen name “Pablo Neruda.” The poems in his early collection "Twenty Love Poems and a Song of Despair" were tender and perceptive, illuminating the subtleties of love and enchantment. In "Poem VI," for example, he writes: “Tu recuerdo es de luz, de humo, de estanque en calma!/ Más allá de tus ojos ardían los crepúsculos.” Later, he poured this attention to detail into poems of appreciation for everyday objects. Many of the 225 short poems in his collection "All the Odes" are dedicated to the assortment of small, apparently insignificant items that surround us, from a pair of shoelaces to a watermelon. An onion is más hermosa que un ave/ de plumas cegadoras, while a tuna in the market is a bala del profundo/ océano, proyectil natatorio, te vi, muerto. Despite this early literary success, Neruda struggled financially, and took a series of diplomatic jobs in places such as Burma, Indonesia, Singapore and Spain. In 1936, while Neruda was working at the consulate in Madrid, civil war broke out and the government was overthrown by a fascist military dictatorship. Neruda organized an evacuation of refugees from Spain to Chile, saving 2,000 lives. Over a period of twenty years, Neruda captured his experiences abroad in a three volume poetry collection titled "Residence on Earth." Many of these poems were experimental and surreal, merging epic landscapes, supernatural themes, and feelings of longing with discussion of political strife and a poet’s responsibility to speak out against injustice. In “I Explain a Few Things” he lingers on haunting details of the destruction of the Spanish Civil War. For the rest of his life, Neruda remained committed to revolutionary ideals. His politics led to several years of exile before he was able to return to Chile in 1952. While in exile, he published his influential "Canto General." The book attempts to retell the entire history of Latin America through poetry, touching on everything from its flora and fauna to its politics and wars, but above all paying homage to the common people behind its civilizations’ achievements. Although he continued to travel, after returning from exile Neruda lived in Chile for the rest of his life. In 1970, at age 66, Neruda ran for president of Chile before yielding to Salvador Allende and becoming his close advisor. But in 1973, Allende was overthrown in a military coup by General Augusto Pinochet. Neruda died in the hospital a couple of weeks later. Because of the timing of his death so soon after the coup, rumors swirled that he had died of sadness or even been assassinated, but the hospital recorded his cause of death as cancer. Today, Neruda’s lines are recited at protests and marches worldwide. Much like his life, Neruda’s poems bridged romance and revolution by emphasizing the everyday moments worth fighting for.

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翻译人员: Chloe Ma 校对人员: Erika Chen巴勃罗 · 聂鲁达（Pablo Neruda） 19 岁时发表了他的第一本诗集。他后来赢了诺贝尔文学奖，并且拯救了 2000 个难民，3 年的政治避难，当上智利的总统。一段浪漫与革命，聂鲁达是 20 世纪 最有名的诗人之一，同时也是最易懂与最有争议的。最初用西班牙语写作，他的诗通常使用 直接的语言和日常的经历来制造持久的影响。聂鲁达的原名是 Ricardo Eliezer Neftalí Reyes Basoalto生于 1904 的一个智利小镇。他父亲不愿让他成为诗人，于是 16 岁时他开始以 巴勃罗 · 聂鲁达为笔名。他早年的诗集 《二十首情诗和一首绝望的歌》温柔又感人，照亮了微妙的爱与魅力。用《诗歌四》为例，他写道：“你的记忆是光、烟与平静的湖面组成的在你的眼中， 世间万物都是炽热的。”后来，他的诗集 开始着重于欣赏日常的事物。在他诗集《全诗集》的 225 首诗中很多都是关于各种各样的小事物，那些我们身边无足轻重的事物，从鞋带到西瓜。一个洋葱 比一只长满炫目羽毛的鸟更美，市场上的金枪鱼是深海中的鱼雷，一只会游泳的导弹， 而现在躺在我面前的只有尸体。尽管他早期是成功的，聂鲁达却仍为金钱烦恼，并且在缅甸，印度尼西亚 做了很多的外交工作，包括新加坡和西班牙。1936 年，当聂鲁达 在马德里做咨询工作，内战爆发了政府被法西斯独裁的军队占领了，聂鲁达组织了从西班牙 到智利的难民疏离，拯救了两千条生命。在 20 年间，聂鲁达将他在海外的经历 汇成了三册的诗集名叫《地球居民》。这些很多的诗集都是 实验性，超现实主义，合并了史诗般的景观 与超自然的主题，渴望的感觉， 与对政治争论的讨论并且讲述了身为诗人 对政治不平等发声的责任。在《我解释了一些事》中他描述了西班牙内战中 令人难忘的摧毁细节。剩下的人生，聂鲁达仍然投入在 革命的理想中。他的政治理念使他 陷入了几年的流放1952 年， 在他能够返回智利之前。在流放的过程中，他发表了他的《将军之歌》这本书通过诗歌 重新讲述了拉丁美洲的历史，触及了一切事物， 从动植物到它的政治与战争，但是最重要的是对文明成就背后的普通人 最高的尊敬。尽管他结束流放之后也不断的旅行，聂鲁达在智利度过了 他剩下的人生。1970 年，在他 66 岁时，聂鲁达曾竞选智利总统，最后退出竞选， 让位萨尔维多 · 阿联徳（Salvador Allende），并且成为了他密切的顾问。但是 1973 年，阿联徳被奥古斯托 · 皮诺切特将军 （General Augusto Pinochet）的军事政变推翻了。聂鲁达几周后 在医院过世了。因为他过世的时间 就在军队政变之后，流言传说他死于悲伤 甚至是暗杀，但是医院记录了 他是死于癌症。今天，世界各地的游行与抗议 都会用到聂鲁达的诗句。就像是他的人生，聂鲁达的诗歌 连接了浪漫与革命强调了每一天 那些值得为之斗争的小事。

**P748 2019-06-28 Why should you read “Kafka on the Shore” - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=748)

“Sometimes fate is like a small sandstorm that keeps changing directions. You change direction but the sandstorm chases you. You turn again, but the storm adjusts. Over and over you play this out, like some ominous dance with death just before dawn. Why? Because this storm isn't something that blew in from far away… This storm is you. Something inside of you.” This quote, from the first chapter of Haruki Murakami’s "Kafka on the Shore," captures the teenage protagonist's turmoil. Desperate to escape his tyrannical father and the family curse he feels doomed to repeat, he renames himself Kafka after his favorite author and runs away from home. But memories of a missing mother, along with dreams that haunt his waking life, prove more difficult to outrun. Published in Japanese in 2002 and translated into English three years later, "Kafka on the Shore" is an epic literary puzzle filled with time travel, hidden histories, and magical underworlds. Readers delight in discovering how the mind-bending imagery, whimsical characters and eerie coincidences fit together. Kafka narrates every second chapter, with the rest centering on an old man named Satoru Nakata. After awakening from a coma he went into during the Second World War, Nakata loses the ability to read and write– but gains a mysterious knack for talking to cats. When he’s asked to tail a missing pet, he’s thrown onto a dangerous path that runs parallel to Kafka’s. Soon prophecies come true, portals to different dimensions open up– and fish and leeches begin raining from the sky. But what ties these two characters together– and is it a force either one of them can control? The collision of different worlds is a common thread in Haruki Murakami’s work. His novels and short stories often forge fantastic connections between personal experience, supernatural possibilities, and Japanese history. Born in Kyoto in 1949, Murakami grew up during the post-World War II American occupation of Japan. The shadow of war hung over his life as it does his fiction; "Kafka on the Shore" features biological attacks, military ghosts and shady conspiracies. Murakami’s work blurs historical periods and draws from multiple cultural traditions. References to Western society and Japanese customs tumble over each other, from literature and fashion to food and ghost stories. He has a penchant for musical references, too, especially in "Kafka on the Shore." As the runaway Kafka wanders the streets of a strange city, Led Zeppelin and Prince keep him company. Soon, he takes refuge in an exquisite private library. While he spends his days poring over old books and contemplating a strange painting and the library’s mysterious owner, he also befriends the librarian– who introduces him to classical music like Schubert. This musical sensibility makes Murakami’s work all the more hypnotic. He frequently bends the line between reality and a world of dreams, and is considered a master of magic lurking in the mundane. This is a key feature of magical realism. In contrast to fantasy, magic in this sort of writing rarely offers a way out of a problem. Instead, it becomes just one more thing that complicates life. In "Kafka on the Shore," characters are faced with endless otherworldly distractions, from a love sick ghost to a flute made from cat souls. These challenges offer no easy answers. Instead, they leave us marveling at the resourcefulness of the human spirit to deal with the unexpected. While Kafka often seems suspended in strangeness, there’s a tenderness and integrity at the heart of his mission that keeps him moving forward. Gradually he comes to accept his inner confusion. In the end, his experience echoes the reader’s: the deeper you go, the more you find.

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翻译人员: Boya Li 校对人员: 潘 可儿“有时，命运这东西就像 不断改变前进方向的局部沙尘暴。你改变方向力图躲避， 不料沙尘暴却始终紧紧追随。你再次改变方向 不料沙尘暴也跟着改变。如此无数次周而复始，恰如黎明前与死神的不祥之舞。为什么？这是因为，沙尘暴不是自远方刮来……而正是你本身，你本身的一部分。”上文引自村上春树所著 《海边的卡夫卡》的第一章，描绘了少年主人公内心的混乱。他拼命逃离自己暴君般的父亲，不想重复家族诅咒的命运，他给自己取了最爱的作家的名字“卡夫卡”， 并离家出走。但关于失踪母亲的回忆，以及在他清醒时仍不肯散去的梦境，却令他更难逃离。2002 年《海边的卡夫卡》 日文版出版，三年后被译成英语。这是一本充满谜团的文学史诗， 充斥着时空穿越、隐秘的历史以及魔法的地下世界。书中充满奇思妙想的意象，古里古怪的人物和神秘的巧合， 各种元素的交织让读者惊叹不已。卡夫卡的自述每隔一个章节展开，剩余的篇幅 则以一位名为中田的老人为中心。从二战时期陷入的昏迷中醒来时，田中失去了读写能力，却获得了能和猫对话的神秘能力。当他受人所托追踪失踪的宠物时，他便踏上了与卡夫卡相呼应的凶险之路。很快，预言成为现实， 通向不同空间的门打开了，水蛭和鱼像雨点般从天上落下。但是什么连结了这两位主角——是他们两个都无法控制的力量吗？不同世界间的碰撞 是村上春树作品中常见的线索，他的小说和短篇故事往往巧妙地结合起个人经历、超自然现象以及日本的历史。春上 1949 年生于京都，成长于二战后美国驻军日本的时代。战争的阴影充斥着他的生活和小说。《海边的卡夫卡》中写到了生化战、军人的鬼魂和阴谋诡计。村上的作品模糊了 不同历史时期的边界，借鉴了多种不同的文化传统。对西方社会和日本社会的映射 此起彼伏，从文学和时尚到食物和鬼怪故事。他对描写音乐尤为偏爱， 特别是在《海边的卡夫卡》里。离家出走后， 卡夫卡漫步在陌生城市的街道。“齐柏林飞艇”和“王子”陪伴着他。很快，他躲进了一家 考究的私人图书馆。在那里，他日复一日地阅读旧书，并思索着墙上奇怪的画作 和图书馆的神秘主人。同时，他跟管理员成了朋友。管理员使他了解到 舒伯特等古典音乐家。对音乐的敏感性 使村上的作品更具迷惑性。他经常扭曲现实世界和梦境的界限，擅长将魔法隐藏在单调日常中。这是魔幻现实主义的主要特点。与奇幻小说不同，这类文学中的魔法 不仅无法帮人解决问题，反倒使生活变得更加复杂。在《海边的卡夫卡》中，人物面临着无尽的 来自另一个世界的骚扰，从相思成疾的鬼魂， 到由猫的灵魂制成的笛子。这些问题没有简单的答案。反之，它们让我们惊叹于 人类在面临不可预测之物时，精神能有多强大。虽然卡夫卡经常陷于神秘事件中，他使命核心中温柔和正直的品质，使他能够一直前进。渐渐地，他接受了自己内心的困惑。在故事的最后， 他的经历与读者的相同：挖掘越深，收获越多。

**P749 2019-07-05 A brief history of cannibalism - Bill Schutt**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=749)

15th century Europeans believed they had hit upon a miracle cure: a remedy for epilepsy, hemorrhage, bruising, nausea, and virtually any other medical ailment. This brown powder could be mixed into drinks, made into salves or eaten straight up. It was known as mumia and made by grinding up mummified human flesh. The word "cannibal" dates from the time of Christopher Columbus; in fact, Columbus may even have coined it himself. After coming ashore on the island of Guadaloupe, Columbus' initial reports back to the Queen of Spain described the indigenous people as friendly and peaceful— though he did mention rumors of a group called the Caribs, who made violent raids and then cooked and ate their prisoners. In response, Queen Isabella granted permission to capture and enslave anyone who ate human flesh. When the island failed to produce the gold Columbus was looking for, he began to label anyone who resisted his plundering and kidnapping as a Caribe. Somewhere along the way, the word "Carib" became "Canibe" and then "Cannibal." First used by colonizers to dehumanize indigenous people, it has since been applied to anyone who eats human flesh. So the term comes from an account that wasn't based on hard evidence, but cannibalism does have a real and much more complex history. It has taken diverse forms— sometimes, as with mumia, it doesn't involved recognizable parts of the human body. The reasons for cannibalistic practices have varied, too. Across cultures and time periods, there's evidence of survival cannibalism, when people living through a famine, siege or ill-fated expedition had to either eat the bodies of the dead or starve to death themselves. But it's also been quite common for cultures to normalize some form of eating human flesh under ordinary circumstances. Because of false accounts like Columbus's, it's difficult to say exactly how common cultural cannibalism has been— but there are still some examples of accepted cannibalistic practices from within the cultures practicing them. Take the medicinal cannibalism in Europe during Columbus's time. Starting in the 15th century, the demand for mumia increased. At first, stolen mummies from Egypt supplied the mumia craze, but soon the demand was too great to be sustained on Egyptian mummies alone, and opportunists stole bodies from European cemeteries to turn into mumia. Use of mumia continued for hundreds of years. It was listed in the Merck index, a popular medical encyclopedia, into the 20th century. And ground up mummies were far from the only remedy made from human flesh that was common throughout Europe. Blood, in either liquid or powdered form, was used to treat epilepsy, while human liver, gall stones, oil distilled from human brains, and pulverized hearts were popular medical concoctions. In China, the written record of socially accepted cannibalism goes back almost 2,000 years. One particularly common form of cannibalism appears to have been filial cannibalism, where adult sons and daughters would offer a piece of their own flesh to their parents. This was typically offered as a last-ditch attempt to cure a sick parent, and wasn't fatal to their offspring— it usually involved flesh from the thigh or, less often, a finger. Cannibalistic funerary rites are another form of culturally sanctioned cannibalism. Perhaps the best-known example came from the Fore people of New Guinea. Through the mid-20th century, members of the community would, if possible, make their funerary preferences known in advance, sometimes requesting that family members gather to consume the body after death. Tragically, though these rituals honored the deceased, they also spread a deadly disease known as kuru through the community. Between the fictionalized stories, verifiable practices, and big gaps that still exist in our knowledge, there's no one history of cannibalism. But we do know that people have been eating each other, volunteering themselves to be eaten, and accusing others of eating people for millennia.

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翻译人员: Harper Chang 校对人员: Yolanda Zhang15 世纪的欧洲人相信 他们偶然发现了一种神奇解药，能治疗癫痫、出血、挫伤、呕吐，几乎包治百病。这种棕色粉末可掺进饮料里、做成药膏、或者直接口服。它被称作 “mumia”， 由人肉干磨碎制成。“食人族”一词起源于哥伦布时代，实际上，这个词可能 是哥伦布创造的。在登陆瓜达鲁佩岛后，哥伦布在给西班牙女王 的首次报告中，描绘了当地土著人的友善与和平，但他也提到了加勒比族的传言，据说他们会暴力袭击并煮食俘虏。作为回应，伊莎贝拉女王颁布了允许抓捕和奴役食人者的命令。当岛上的黄金被掠夺得所剩无几后，他开始将抵抗者归为加勒比人，久而久之，“加勒比人（Carib）”变成了 “Canibe”，最后演变为“食人族（Cannibal）”。这个词一开始被殖民者 用来对原住民去人性化，之后成为对所有食人者的统称。虽然词语的由来缺乏有力证据，但人类相食确实有着 漫长而复杂的历史。食人有多种形式， 比如像 mumia 的粉末，这种形式无法辨别出 所用的人体部位。食人的理由也多种多样。历史上许多时期都有过 为了生存的食人记载，当遭受饥荒、受到封锁 或者远征途中遭遇不幸时，人们只能选择吃死人 或是成为死人。但在很多文化中，食人在日常生活中也不足为奇。由于类似哥伦布的错误记载，我们很难透彻了解 食人在文化中有多常见，但可以知道的是，有些文化接受食人行为。比如中世纪的医用食人法。在 15 世纪，mumia 供不应求，一开始，商人从埃及偷盗木乃伊，但不久后，木乃伊无法 应对需求的激增，投机者便从欧洲的墓园 偷盗尸体制成药粉。mumia 疗法持续了几百年，它被列在著名医药百科全书 《默克索引》中，进入了二十世纪。欧洲常见的人肉制品远不止磨碎的木乃伊：液体和粉状的人血 都曾被用来治疗癫痫，肝脏、胆结石、人脑提炼的油、以及磨碎的心脏 都是很受欢迎的药方。在中国，文字记载的食人现象 要追溯到 2000 年前，最具代表性的是父母食用子女的肉。成年的子女会献出身上一部分肉给父母吃。这通常作为治疗 病危父母的最后手段，但对于子女并不是致命的，这些肉来自于大腿， 也有较少的情况下来自手指。食人葬礼仪式是另一种 被文化认同的食人形式。或许最著名的例子是 新几内亚的法雷人：20 世纪中期，很多法雷人会尽可能提前公布 自己的葬礼偏好，有时会请求家庭成员们 在自己死后一同吃掉尸体。不幸的是，虽然这些仪式 表达了对死者的敬意，但也传播了一种 致命的疾病：库鲁病。在虚构故事、可证实的做法、和我们贫瘠的知识中，食人的历史尚未有统一的说法。但我们知道，人类同类相食，自愿被吃，以及指控他人吃人已有数千年之久。

**P750 2019-07-05 The rise and fall of the Mongol Empire - Anne F. Broadbridge**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=750)

It was the largest contiguous land empire in history— stretching from Korea to Ukraine and from Siberia to southern China, and was forged on the open plains. In the 12th century CE, before the Mongol Empire formed, the East Asian steppe was home to scattered groups of Mongol and Turkic pastoral nomads led by Khans. The people herded sheep, cattle, yaks and camels. They lived in felt tents and moved between summer and winter campsites. Nomadic women held significant authority, managing these migrations, many of the flocks and trade. Meanwhile, men specialized in mounted warfare. These nomadic groups often fought each other. That was to change under Temujin, who was born into an aristocratic Mongol family. Despite losing his father at an early age and growing up in poverty, he quickly rose to power by forging strategic alliances with other leaders. Unlike those khans, Temujin promoted soldiers based on merit and distributed spoils evenly among them. His most brilliant move was to scatter the nomads he conquered among his own soldiers so they couldn't join together against him. These innovations made him unstoppable, and by 1206, he had united the people of the felt-walled tents and become Chinggis Khan. The Mongols were shamanists, believing that the spirits of nature and their ancestors inhabited the world around them. Over all arched the Sky god Tenggeri. Chinggis Khan believed that Tenggeri wanted him to conquer the entire world in his name. With the nomads of the Mongolian plain united, this seemed within reach. Anyone who resisted the Mongols was resisting Tenggeri's will, and for this insubordination, had to die. Under Chinggis Khan, the Mongols first subdued northern China and the eastern Islamic lands. After his death in 1227, the Divine Mandate passed to his family, or the Golden Lineage. In the 1230s, Chinggis Khan's sons and daughters conquered the Turks of Central Asia and the Russian princes, then destroyed two European armies in 1241. In the 1250s, the Mongols seized Islamic territory as far as Baghdad, while in the East their grasp reached southern China by 1279. Life within the Mongol Empire wasn't just war, pillage and destruction. Once the Mongols conquered a territory, they left its internal politics alone and used local administrators to govern for them. The Mongols let all religions flourish, as long as the leaders prayed for them. Although they routinely captured artisans, scholars and engineers, they appreciated what those specialists could do and forcibly settled them across Asia to continue their work. The most valuable produce in the Empire was gold brocade, which took silk from China, gold from Tibet and weavers from Baghdad. Gold brocade clothed the Mongol rulers, covered their horses and lined their tents. The Mongols particularly prized gunpowder technicians from China. With much of Eurasia politically unified, trade flourished along the Silk Road, helped by an extensive system of horse messengers and relay posts. Robust trade continued at sea, especially in blue-and-white porcelain, which combined white pottery from Mongol China with blue dye from Mongol Iran. But this was not to last. Succession to the Great Khan didn't automatically go to the eldest son, but rather allowed brothers, uncles and cousins to vie for leadership with senior widows acting as regents for their sons. By the 1260s, Chinggis Khan's grandsons were in a full- blown civil war over inheritance and fragmented the realm into four separate empires. In China, Kublai Khan's Yuan Dynasty is remembered as a golden age of science and culture. In Iran, the Ilkhanate inaugurated the development of new monumental architecture and Persian miniature painting. In Central Asia, the Chagatai Khanate brought forth leaders like Timur and his descendant Babur, who founded the Mughal Empire in India. And in Eastern Europe, the Golden Horde ruled for years until a trading post named Muscovy grew into a major world power. Even though the Empire lasted only a short while, the Mongols left a legacy of world- domination that remains unmatched today.

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翻译人员: Carol Wang 校对人员: Jiasi Hao纵观历史， 蒙古是最大的大陆帝国——东到韩国、西至乌克兰， 北至西伯利亚、南抵中国南部，整个帝国建立在开阔的平原上。公元十二世纪， 在蒙古帝国建成之前，东亚大草原是分散的蒙古族群和可汗率领的 突厥游牧民族的根据地。人们牧养牛羊、牦牛和骆驼，他们居住在毛毡帐篷中， 来回迁徙于夏天与冬天的营地。游牧民族的女性拥有至高的权力，负责部族的迁徙， 管理成群的牲口及其买卖；与此同时，男性则专攻于马背上的战争。这些游牧部落之间常常发生争斗，直到铁木真上台， 这种局面得以改变。铁木真出生在一个蒙古贵族家庭，尽管他早年丧父，幼年贫困，但通过与各族首领战略结盟， 他迅速取得了强权。与其他可汗不同，铁木真 根据战士的功绩来晋升战士，并将战利品平均地分发给他们。他最聪明的是，把征服的牧民 分散安插到他自己的士兵中，以防止他们联合反抗。这些壮举使他势不可挡，到 1206 年， 他统一了各游牧部落，成为了成吉思汗。蒙古人信奉萨满教，相信自然神灵和他们的先祖居住在他们之上的世界。万物之上则是天神腾格里，成吉思汗相信，腾格里希望自己 能以他的名义征服整个世界。随着蒙古平原各游牧民族的统一，征服世界也是唾手可得的事。但凡有人反抗蒙古人， 则是在违抗腾格里的意愿，因为反叛，他的下场只有一死。在成吉思汗的率领下，蒙古人首先征服了中国北部 和伊斯兰国土东部。成吉思汗于 1227 年去世，其王权传至他的家族， 即黄金家族。十三世纪三十年代，成吉思汗的子女们战胜了 中亚的土耳其人和俄罗斯各诸侯，随后，在 1241 年， 摧毁了两支欧洲军队。十三世纪五十年代，蒙古人占据了 整个伊斯兰疆域，远至巴格达，1279 年，他们军队在东部 一路攻打到中国南部。蒙古帝国的生活 并不仅仅是战争、掠夺和毁灭。一旦蒙古人打下新领土， 他们会保留其本身的内部政治，雇佣当地的行政人员来治理当地。蒙古人带领各个宗教兴盛繁荣， 只要各宗教领袖为其祈祷颂德。尽管他们例常抓捕 工匠、学者和工程师，但很重视这些能工巧匠们的专长，强制派遣他们到亚洲各地 去继续他们的工作。蒙古帝国最珍贵的产品是金线锦缎，其技艺揉合了中国的丝绸、 西藏的金线和巴格达的织布。金线锦缎用来为蒙古统治者制衣、 装饰他们的马骑，以及装裱他们的帐篷。蒙古人尤为重视中国的火药技术。随着欧亚政治上的统一， 且凭借强大的马上信使和中转站。贸易沿着丝绸之路遍地开花，海上的贸易依然强健， 尤其是青花瓷贸易，青花瓷将蒙古中国的白陶 和蒙古伊朗的蓝染结合在一起。不止如此，大可汗的继承权 并非自动传给长子，相反，则是让兄弟、叔伯 和表兄弟一起争夺领导权，年长的寡妇则为她们的儿子摄政。十三世纪六十年代，成吉思汗的孙子们 因为继承权发动全面战争，将整个疆域分为四个独立帝国。在中国，忽必烈统治的元朝被人们认为是科学文化的黄金时代；在伊朗的伊儿汗国，则开始了新式纪念性建筑 和波斯彩细密画的发展；在中亚，察合台汗国 出现了一些伟大的领导者，诸如帖木儿和他的后裔 在印度建立了莫卧儿帝国的巴布尔。在欧洲东部，钦察汗国统治数年，直到一个名为莫斯科的商贸站 变成了世界强权。尽管蒙古帝国存续之短，蒙古人为世界留下了伟大的遗产—— 迄今世界难以达到的统治范围。

**P751 2019-07-12 Can you solve the multiverse rescue mission riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=751)

It was a normal Tuesday at the superconductor, until a bug in the system created a small situation. Now your team is trapped in eleven separate pocket dimensions. Luckily for you, there’s a half-finished experimental teleportation robot that may be able to get you all home, if you can figure out how to work through the quirks of its design. Over interdimensional radio, your engineers explain that the robot can teleport into the alternate universes you’re trapped in, but it’ll do so completely at random. The robot has two levers and one big button. When it appears, you just switch the position of one of the levers from A to B or vice versa, and then the robot will note your dimensional position and teleport to another of the eleven dimensions at random. If it shows up again, you’ll have to pull a lever before it’ll teleport away. When anyone presses the button, the robot will bring everyone who pulled a lever back home. Anyone who didn’t will be lost in the multi-verse forever. The challenge is to make sure everyone has pulled a lever before anyone hits the button. While you can talk to each other now over the interdimensional radio and agree on a plan, the robot’s teleportation technology will interfere with all attempts at communication once it arrives. You won’t be able to attach messages to the robot or scratch notes into its superstrong alloy body. Your only way to communicate information is to change the position of exactly one lever or hit the button. What plan will make sure everyone gets home? Pause the video now if you want to figure it out for yourself. Answer in 3 Answer in 2 Answer in 1 It would be nice if you could set different combinations of the levers to indicate who’s already been visited by the robot. But it has only two levers. That gives four combinations— far too few to communicate about 11 people, especially when you’re forced to flip one to send the robot onward. There must be another way. The critical insight is that not everyone has to know when every pocket dimension has been visited. If one person accepts responsibility ahead of time for hitting the button, then only they need to know who the robot has visited. In fact, they don’t even need to know exactly who’s been visited… just how many people have been. You volunteer to be the person in charge of pressing the button when the moment is right, and give the following directions to everyone else. Your plan is simple: you’ll use the left lever to count visits, and the right lever will have no meaning, so there’s no harm in moving it up or down. Each of the others will pull the left lever from position A to position B exactly once. If the robot appears with the left lever already pulled down, or if an individual has previously pulled the left lever down at any point in the past, then they should move the right lever. You, meanwhile, will be the only one who ever resets the left lever from position B to position A. This gives you a way to count how many people have been visited by the robot. Everyone needs to pull the left lever down exactly once, and you’re the only one to pull it back up. So you know that the tenth time the robot visits you with its left lever in the down position, it must have visited all ten of the others. And that means you’re safe to press the button and teleport everyone home. It may take a while– most likely the robot will need to teleport around 355 times; but better that than leave anyone behind. Your teammates phase back into your home dimension one at a time. The mission proves a great success. Well...mostly.

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翻译人员: Carol Wang 校对人员: Candace Hwang这是超导体实验室的一个普通星期二，但一个系统漏洞造成一个突发小状况，把你的团队困在 11 个 单独的空间维度里。幸运的是，有一个实验性 远距传送机​​器人半成品，若能弄懂其古怪设计和如何操控，它可能会把你们送回家。你的工程师通过跨维无线电解释说，机器人可以随机穿越到你们被困的另一个宇宙。机器人有两个控制杆和一个大按钮，当它出现时，你只需切换任意一个控制杆的位置， 从 A 到 B，或从 B 到 A，机器人就会记住你所在的维度位置，并随机穿越到 11 个空间维度中的一个。若它再次出现，你必须 变换控制杆的位置，它才会离开。当有人按下按钮时，机器人会把曾拉动控制杆的人全带回家。而没有拉过控制杆的人， 将会永远迷失在多元宇宙中。挑战在于，如何在按下按钮前，确保每个人都拉了控制杆。虽然你现在可以用跨维无线电互相交谈，并一起制定方案，但机器人一旦抵达，其远程传送技术会干扰所有的通信。你无法在机器人身上附加消息，也不能在其超强的合金体上刻字。你们沟通的唯一方式，就是改变一个控制杆的位置或按下按钮。什么样的计划将确保每人都能回家呢？[若想自己解题，请暂停播放][答案公布 3][答案公布 2][答案公布 1]用控制杆的位置组合 来代表机器人访问过谁，是个不错的主意，但它只有两个控制杆，即仅有四种组合——组合太少了，无法代表 11 人，特别是你必须用掉一个组合， 才能让机器人去其他人那里。肯定有另外一种方式。解题关键在于，并非每个人都必须了解 哪些空间维度已被访问过。如果某人提前接受按下按钮的任务，那么，只需他知道机器人访问过谁即可。其实，他甚至无须知道 机器人去过谁那里……只需知道去过多少人那里即可。你主动承担了任务，在一切就绪的时候按下按钮的任务，并给其他人下达如下的指示。你将用左控制杆来计算访问次数，而右控制杆没有任何用处，所以，移动右控制杆位置无所谓。其他每个人都会拉动左控制杆，从位置 A 到位置 B，仅一次。若机器人出现时左控制杆已拉到 B，或某人已在先前某时把左控制杆拉到 B 位置，这时，他们应该移动右控制杆的位置。而你，才是唯一重置左控制杆的人，从位置 B 重置到 A 。这就提供了计算 被机器人访问过的人数的方法。每个人只需将左控制杆 拉到 B 位置 1 次，而你是唯一能将位置重置回 A 的人。所以，当机器人第十次拜访你、且左控制杆处于下方位置 B 时，你就知道，它已访问过其他所有人了。也意味着，你可以安全地 按下按钮，传送每人回家。这可能需要一段时间——很可能机器人要传送约 355 次；但总比留下任何一个人要好。你的队友依次回到 你们家所在的维度空间，任务圆满完成。嗯……理论上如此。

**P752 2019-07-17 From pacifist to spy - WWII’s surprising secret agent - Shrabani Basu**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=752)

Noor Inayat Khan was in the midst of a desperate escape. She had been imprisoned for her activities as an Allied spy, but with the help of a screwdriver and two other prisoners, she was back under the Parisian stars. As she began to run, her thoughts leapt to the whirlwind of events that had brought her here… Born in Moscow in 1914 to an Indian Muslim father and an American mother, Noor was raised in a profoundly peaceful home. Her parents were Sufi pacifists, who put their faith in the power of music and compassion. They moved to Paris, where Noor studied child psychology and published children’s books. But all this changed with the advent of the Second World War. In May 1940, with the German army ready to occupy Paris, Noor and her brother were faced with a difficult choice. As pacifists, they believed that all disputes should be settled non-violently. But witnessing the devastation across Europe, they decided that standing on the sidelines was not an option. Traveling to England, Noor volunteered for the Women’s Auxiliary Air Force and trained as a radio operator. She immersed herself in wireless operations and Morse code– unaware that she was being monitored by a secret organization. The British Special Operations Executive was established to sabotage the Germans in Nazi-occupied countries. As a trained radio operator who knew Paris well and spoke fluent French, Noor was an attractive recruit. In her interview, she was warned that wireless operation was some of the most dangerous work in the intelligence field. Operators had to lug a conspicuous transmitter through enemy territory, and the clandestine agency couldn’t protect her if she was caught. Noor accepted her assignment immediately. While she was determined to take her pacifist principles as far as possible, Noor had to learn the art of espionage. She learned how to contact intelligence networks, pick a lock, resist interrogation and fire a gun. In June 1943 she landed in Angers, south of Paris, and made her way to the city armed with a false passport, a pistol and a few French francs. But her network was compromised. Within a week of her deployment, all her fellow agents were arrested, and Noor was called home. She convinced her supervisors to let her stay– which meant doing the work of six radio operators singlehandedly. Over the following months, she tracked and transported supplies to the French resistance, sent reports of Nazi activity back to London and arranged safe passage for allied soldiers. This work was essential to building the French resistance and Allied intelligence networks– and, ultimately, ending the war. Protected only by her quick thinking and charisma, she frequently talked her way out of questioning. When the Gestapo searched her on the train, she gave them a casual tour of her “film projector.” When an officer spotted her hanging her aerial, she chatted about her passion for listening to music on the radio– and charmed him into helping her set up the cable. In her entire four month tenure, her sharp wits and stealth never failed her. But her charm had inspired lethal jealousy. In October 1943, the sister of a colleague, in love with an agent that loved Noor, sold her address to the Gestapo. Noor refused to give away any information, focusing instead on her escape. Secreting a screwdriver away from the guards, they were able to loosen a skylight and slip out into the night. But just as the prisoners began to run for their lives, an air raid siren alerted her captors. Noor was caught once again and sent to a German prison. Then, on to Dachau concentration camp. Despite being tortured, deprived and isolated, Noor gave nothing away. In the moments before her execution she is thought to have shouted “Liberté!” Since her heroic sacrifice, Noor has been honoured as a hero who waged secret battles behind enemy lines– paving the way for freedom without ever taking a life.

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翻译人员: Carol Wang 校对人员: Candace Hwang努尔·艾娜雅特·汗正在拼命逃亡。她因作为盟军间谍的活动而被监禁，但在一把螺丝刀和另两名囚犯的帮助下，她又回到了巴黎的星空下。当她开始奔跑时，思绪回到将她带到这里的 一系列事件中……努尔 1914 年出生于莫斯科， 父亲是印度穆斯林，母亲是美国人，她在一个非常崇尚和平的 家庭里长大。她的父母是苏菲和平主义者，坚信音乐和同情的力量。后来，他们搬到巴黎，努尔在那里学习儿童心理学， 并出版了儿童书籍。但随着第二次世界大战的到来， 这一切都发生了变化。1940 年 5 月，随着 德国军队准备占领巴黎，努尔和弟弟面临艰难的选择。作为和平主义者，他们认为 所有争端都应以非暴力方式解决。但目睹了整个欧洲的灾难后，他们决定不能作旁观者。努尔前往英格兰，自愿参加了空军女子辅助部队，并受训成为一名报务员。她沉浸在无线电的操作 和摩尔斯电码中——毫无察觉自己正被秘密组织监控。成立英国特别行动署是为了破坏纳粹占领国家的 德国军队。努尔作为一名非常了解巴黎、 说流利法语、训练有素的报务员，无疑是该组织的绝佳人选。面试时，他们警告她说，无线报务工作是情报领域最危险的。报务员必须携带 显眼的发射器通过敌占区，若被抓住， 秘密机构根本无法保护她。努尔毫不犹豫地接受了任务。努尔虽然决心尽可能采取 和平主义原则，但她必须学习间谍技能。她学会了如何联系情报网络、开锁，学习抵制审讯技巧和开枪。1943 年 6 月， 她在巴黎南部的昂热着陆，随身携带假护照、手枪和一些法郎前往昂热市区。但她所在的法国情报网受到了损害，在她部署的一周内，她所有同事都被捕了， 英国军方命令她返回英国。她说服上司允许自己留下来 ——意味着她要承担六个报务员的工作。在接下来的几个月里，她追踪并运送物资到法国抵抗组织，将纳粹活动报告送回伦敦，并为盟军士兵安排通行道路。对于建立法国抵抗和 盟军情报网络来说，这项工作至关重要，并最终结束了战争。仅凭敏捷思维和个人魅力的保护，她经常不再受到盘问。当盖世太保在火车上搜查她时，她让他们随便看了看 她的“电影放映机”。当一名警察发现她正在悬挂天线时，她就聊起自己 对收听音乐广播的热爱——并哄骗他帮忙设置电缆。在她整整四个月的任期内，她敏锐的智慧和潜伏从未失手。但她的魅力引发了致命的嫉妒，在 1943 年的 10 月，同事的妹妹爱上了喜欢努尔的特工，她将努尔的住址卖给了盖世太保。努尔拒绝向纳粹透露任何信息，并想办法逃跑。用躲开卫兵偷拿的一把螺丝刀，他们打开天窗并趁夜晚逃跑了。但正当囚犯开始狂奔逃命时，警报响起，惊动了狱守，努尔再次被抓，被送进了德国监狱。然后，努尔被转到达豪集中营。尽管饱受严刑拷打、 被剥夺正当权利、被隔离，但努尔始终保持沉默。行刑前，她大喊“自由！”然后被杀害。自她英勇牺牲以来，努尔一直被尊为英雄， 她在敌人腹地发起秘密战斗——没有杀戮而为自由铺平了道路。

**P753 2019-07-17 How turtle shells evolved... twice - Judy Cebra Thomas**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=753)

Meet Odontochelys semitestacea. This little creature spends its days splashing in Late Triassic swamps with a host of other reptiles. Under the surface lies its best defense against attack: a hard shell on its belly. Odontochelys is an early ancestor of the turtle. Its half-shelled body illustrates an important point about the modern turtle: it actually has two shells that develop totally separately while the turtle is still an embryo. Both are extensions of the animal’s skeleton, and together they are made of almost 60 bones. Like other embryos, turtle embryos are made of undifferentiated cells that become specific cell types, and then organs and tissues, through gene activity and communication between cells. At first, turtle embryos look very similar to those of other reptiles, birds, and mammals, except for a bulge of cells called the carapacial ridge. The ridge expands around the body between the neck and lower back, creating a disc shape. It guides the formation of the upper part of the turtle’s shell, called the carapace, likely by attracting the cells that will become ribs. Instead of curving downwards to make a regular rib cage, the ribs move outwards towards the carapacial ridge. They then secrete a signaling protein that converts surrounding cells into bone-forming cells. These fifty bones grow until they meet and connect with sutures. A ring of bone solidifies the carapace’s edges. The outer layer of skin cells produces the scales, known as scutes, that cover the carapace. The development of the bottom half of the shell, the plastron, is driven by neural crest cells, which can produce a variety of different cell types including neurons, cartilage and bone. A thick shield of these cells spreads across the belly, coming together in regions that produce nine plate-like bones. Eventually, these connect to the carapace by sutures. A turtle’s shell has obvious advantages for guarding against predators, but the rigid casing also presents some challenges. As the turtle grows, the sutures between the bones of the carapace and plastron spread. Most mammals and reptiles rely on a flexible rib cage that expands to allow them to breathe, but turtles use abdominal muscles attached to the shell instead: one to breathe in, and one to breathe out. So how did the shell evolve? Though there are still gaps in the fossil record, the first step seems to have been a thickening of the ribs. The oldest known turtle ancestor, a creature called Eunotosaurus africanus, lived 260 million years ago and looked almost nothing like a modern turtle, but it had a set of broad, flat ribs that anchored the muscles of its powerful forearms. Eunotosaurus was likely a burrowing creature, digging homes for itself in what’s now southern Africa. Odontochelys semitestacea illustrates another, later step in turtle evolution, with thick ribs like Eunotosaurus plus a belly plate for protection. Our first fossil evidence of the full shell characteristic of modern turtles is about 210 million years old, and belongs to a species called Proganochelys quenstedti, whose ribs had fused. Proganochelys could move between water and land. Unlike modern turtles, it couldn’t retract its head into its shell, but had defensive spines on its neck. Modern turtle shells are almost as diverse as the turtles themselves. Sea turtles have flatter, lighter shells for streamlined gliding through the water. Land-dwelling tortoises, meanwhile, have domed shells that can slip free of predators’ jaws and help them turn right-side up if they fall on their backs. Leatherback and softshell turtles have shells without the ring of bone around the edge of the carapace or the tough scutes covering it, making it easier for them to squeeze into tight spaces.

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翻译人员: Carol Wang 校对人员: David Tang来认识一下半甲齿龟吧。这种小生物与其它爬行动物一起，游荡在三叠纪的沼泽中。在这表面之下， 是它应对攻击的最好防御：肚子上一层坚硬的壳。半甲齿龟是海龟们的先祖，它半边是壳的身体 体现了现代海龟重点：它实际上有两个分别生长的壳，海龟还是胚胎的时候，就分别发育了。两者都是动物骨头的延伸，两者总共有近 60 块骨头组成。和其它动物胚胎一样，海龟的胚胎是由同样的细胞组成，这些细胞逐渐分化，通过基因活动和细胞间的沟通，然后形成器官和组织。起初，海龟胚胎看上去与其它爬行动物、鸟类 和哺乳动物十分相似，除了一部分叫做甲脊的细胞。脊椎在脖子与背部下缘之间不断延伸，形成一个圆盘形。它主导了称为背甲的 海龟之背壳的形成，可能脊椎通过吸引肋骨细胞 逐渐结合在一起而形成。肋骨没有向下弯曲 长成正常胸廓，而是沿着甲脊方向向外长。它们然后分泌一种信号蛋白质，该蛋白质将周围的细胞 变为可形成骨头的细胞，这 50 根骨头继续生长， 直到彼此相遇并结合在一起，一条环状骨将背甲边缘硬化。最外层的皮肤细胞长成鳞甲，将背甲覆盖住。下半部分的龟壳是胸甲，它由神经嵴细胞主导形成，神经嵴细胞可以发育出多种细胞，像神经元、软骨和骨细胞。厚厚的一层这样的细胞 扩展到整个腹部，形成九块板状骨并聚在一起，并最终与背甲边缘连接起来。龟壳具有明显的防掠食者的优势，但坚固的外壳也带来了一些挑战。随着乌龟的成长，背甲和腹甲间的连接处也在延伸。多数哺乳动物和爬行动物都仰赖一个能扩张的弹性胸廓呼吸，而乌龟则用附在壳上的腹肌来呼吸：一组腹肌帮助吸气， 另一组则帮助呼气。那么龟壳如何演变的呢？尽管化石记录仍然存在断档，但第一步似乎是肋骨变厚。已知的最古老的龟祖先，是一种叫做非洲正南龟的生物，它生活在 2.6 亿年前， 看上去几乎不像现代龟，但它有一组固定其强大前臂肌肉的宽而扁平的肋骨。正南龟可能是穴居动物，在如今南部非洲的位置 为自己挖掘栖身之所。半甲齿龟则说明了 乌龟进化中后来的又一步，它有和正南龟一样的厚肋骨 和一块有保护作用的腹板。我们的第一个化石证据表明，现代海龟具有完整外壳特征 大约有 2.1 亿年的历史，化石是一种原颚龟物种，其肋骨已融合在一起。原颚龟可在水陆上行走，与现代海龟不同， 它无法将头缩回壳中，但脖子上有防御刺。现代龟的壳几乎和龟本身一样繁多，更扁更轻的龟壳 方便海龟在水中滑行。而陆龟具有圆顶状的外壳，方便其从掠食者的颚中滑脱，当它们仰面摔倒时， 圆壳也能帮它们翻身。棱皮龟和软壳龟的甲壳边缘没有骨环，也无硬鳞甲覆盖，使它们更容易挤入狭窄的空间。

**P754 2019-07-19 The high-stakes race to make quantum computers work - Chiara Decaroli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=754)

The contents of this metal cylinder could either revolutionize technology or be completely useless— it all depends on whether we can harness the strange physics of matter at very, very small scales. To have even a chance of doing so, we have to control the environment precisely: the thick tabletop and legs guard against vibrations from footsteps, nearby elevators, and opening or closing doors. The cylinder is a vacuum chamber, devoid of all the gases in air. Inside the vacuum chamber is a smaller, extremely cold compartment, reachable by tiny laser beams. Inside are ultra-sensitive particles that make up a quantum computer. So what makes these particles worth the effort? In theory, quantum computers could outstrip the computational limits of classical computers. Classical computers process data in the form of bits. Each bit can switch between two states labeled zero and one. A quantum computer uses something called a qubit, which can switch between zero, one, and what’s called a superposition. While the qubit is in its superposition, it has a lot more information than one or zero. You can think of these positions as points on a sphere: the north and south poles of the sphere represent one and zero. A bit can only switch between these two poles, but when a qubit is in its superposition, it can be at any point on the sphere. We can’t locate it exactly— the moment we read it, the qubit resolves into a zero or a one. But even though we can’t observe the qubit in its superposition, we can manipulate it to perform particular operations while in this state. So as a problem grows more complicated, a classical computer needs correspondingly more bits to solve it, while a quantum computer will theoretically be able to handle more and more complicated problems without requiring as many more qubits as a classical computer would need bits. The unique properties of quantum computers result from the behavior of atomic and subatomic particles. These particles have quantum states, which correspond to the state of the qubit. Quantum states are incredibly fragile, easily destroyed by temperature and pressure fluctuations, stray electromagnetic fields, and collisions with nearby particles. That’s why quantum computers need such an elaborate set up. It’s also why, for now, the power of quantum computers remains largely theoretical. So far, we can only control a few qubits in the same place at the same time. There are two key components involved in managing these fickle quantum states effectively: the types of particles a quantum computer uses, and how it manipulates those particles. For now, there are two leading approaches: trapped ions and superconducting qubits. A trapped ion quantum computer uses ions as its particles and manipulates them with lasers. The ions are housed in a trap made of electrical fields. Inputs from the lasers tell the ions what operation to make by causing the qubit state to rotate on the sphere. To use a simplified example, the lasers could input the question: what are the prime factors of 15? In response, the ions may release photons— the state of the qubit determines whether the ion emits photons and how many photons it emits. An imaging system collects these photons and processes them to reveal the answer: 3 and 5. Superconducting qubit quantum computers do the same thing in a different way: using a chip with electrical circuits instead of an ion trap. The states of each electrical circuit translate to the state of the qubit. They can be manipulated with electrical inputs in the form of microwaves. So: the qubits come from either ions or electrical circuits, acted on by either lasers or microwaves. Each approach has advantages and disadvantages. Ions can be manipulated very precisely, and they last a long time, but as more ions are added to a trap, it becomes increasingly difficult to control each with precision. We can’t currently contain enough ions in a trap to make advanced computations, but one possible solution might be to connect many smaller traps that communicate with each other via photons rather than trying to create one big trap. Superconducting circuits, meanwhile, make operations much faster than trapped ions, and it’s easier to scale up the number of circuits in a computer than the number of ions. But the circuits are also more fragile, and have a shorter overall lifespan. And as quantum computers advance, they will still be subject to the environmental constraints needed to preserve quantum states. But in spite of all these obstacles, we’ve already succeeded at making computations in a realm we can’t enter or even observe.

**P754 2019-07-19 The high-stakes race to make quantum computers work - Chiara Decaroli**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=754)

翻译人员: Yan Gao 校对人员: Yanyan Hong这个金属桶里的东西 可能会带来技术的革命，也可能完全没用——这要看我们能不能在极其小的尺度上控制物质的特性。这么做的最基本前提是精准地控制实验环境：用厚实的桌面和桌腿来对抗振动，来自脚步、附近电梯 和开门关门的振动。这个桶是真空腔体，没有任何空气成分。真空腔体内是一个更小的腔室，它温度极低，可以用微小激光束操作。小腔室里面是超敏感的粒子， 用这些粒子能做出量子计算机。为什么费力折腾这些粒子？理论上说，量子计算机能够 突破传统计算机的计算能力上限。传统计算机用比特来处理数据。每个比特在 0 和 1 两个状态之间切换。而量子计算机用的是量子比特，它的状态包括 0、1 以及叠加态。量子比特处于叠加态时，它的信息量远比 0 或 1 都多。可以把这些量子位想象成球体上的位置：北极和南极代表 1 和 0。比特只能在这两极之间切换，但当量子比特处于叠加态时，它可能处于球体上的任何位置。我们还不能确定它的精确位置——在我们去读它时， 量子比特已经回到了 0 或 1 。但是，即使不能观察叠加态的量子比特，我们还是能操纵量子比特， 让它在处于叠加态时执行特定的运算。随着要解决的问题越来越复杂，传统计算机需要更多比特来解题，而量子计算机在理论上可以处理更复杂的问题，而不需要像传统计算机那样 增加更多量子比特。量子计算机的独特性质来自于原子和次原子粒子的性质。这些粒子具有量子态。量子态就是量子比特的状态。量子态极度脆弱，温度和压力波动都能轻易消灭量子态，还有杂散电磁场，以及与附近粒子相撞。因此，量子计算机需要 非常精密的环境设置。这也是为什么迄今为止，量子计算机仍在很大程度上 处于理论阶段。目前，我们只能在同一时间地点 控制几个量子比特。要有效管理瞬息万变的量子态，涉及两个关键因素：量子计算机使用的粒子类型，和量子计算机操作这些粒子的方式。目前，有两种主流方法：离子阱和超导量子比特。离子阱量子计算机把离子用作所需粒子，用激光操纵离子。离子容纳在电场形成的陷阱中，输入的激光让量子比特态在球体上转动，以此来告诉离子该做什么工作。举个简单的例子，激光可以输入一个问题：15 的素因子是多少？离子在回答问题时会释放光量子——量子比特的状态决定了 离子是否释放光量子，以及发射多少个光量子。成像系统收集这些光量子， 加以处理而得出答案：3 和 5 。超导量子比特量子计算机 做的是同样一件事，但方法不同：它使用有电路的芯片，而不是量子阱。每个电路的状态都对应着量子比特态。可以用微波形式的电输入来操控。因此，量子比特来自离子或电路，用激光或者微波来操纵。两个方法各有优缺点。离子可以非常精确地控制，并且离子寿命长，但随着陷阱里离子越来越多，精确控制每个离子就越来越难。目前我们还不能在一个陷阱里 容纳足够的量子来做先进的计算，但一种办法是把很多较小的陷阱连起来，这些陷阱通过光量子互相通信，这样就不用费力做一个巨大的陷阱了。同时，超导电路的计算速度 比离子阱快很多，计算机中的电路数量也更容易扩增，比增加离子阱中的离子容易。但电路也比较脆弱，总寿命要短一些。并且随着量子计算机的发展，保存量子态所需的环境也会受到限制。但是，尽管困难重重，我们已经在一个进不去也看不到的世界成功实现了计算。

**P755 2019-07-22 The dust bunnies that built our planet - Lorin Swint Matthews**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=755)

Consider the spot where you’re sitting. Travel backwards in time and it might’ve been submerged at the bottom of a shallow sea, buried under miles of rock, or floating through a molten, infernal landscape. But go back far enough— about 4.6 billion years, and you’d be in the middle of an enormous cloud of dust and gas orbiting a newborn star. This is the setting for some of the biggest, smallest mysteries of physics: the mysteries of cosmic dust bunnies. Seemingly empty regions of space between stars actually contain clouds of gas and dust, usually blown there by supernovas. When a dense cloud reaches a certain threshold called the Jeans mass, it collapses in on itself. The shrinking cloud rotates faster and faster, and heats up, eventually becoming hot enough to burn hydrogen in its core. At this point a star is born. As fusion begins in the new star, it sends out jets of gas that blow off the top and bottom of the cloud, leaving behind an orbiting ring of gas and dust called a protoplanetary disk. This is a surprisingly windy place; eddies of gas carry particles apart, and send them smashing into each other. The dust consists of tiny metal fragments, bits of rock, and, further out, ices. We’ve observed thousands of these disks in the sky, at various stages of development as dust clumps together into larger and larger masses. Dust grains 100 times smaller than the width of a human hair stick to each other through what’s called the van der Waals force. That’s where a cloud of electrons shifts to one side of a molecule, creating a negative charge on one end, and a positive charge on the other. Opposites attract, but van der Waals can only hold tiny things together. And there’s a problem: once dust clusters grow to a certain size, the windy atmosphere of a disk should constantly break them up as they crash into each other. The question of how they continue to grow is the first mystery of dust bunnies. One theory looks to electrostatic charge to answer this. Energetic gamma rays, x-rays, and UV photons knock electrons off of gas atoms within the disk, creating positive ions and negative electrons. Electrons run into and stick to dust, making it negatively charged. Now, when the wind pushes clusters together, like repels like and slows them down as they collide. With gentle collisions they won’t fragment, but if the repulsion is too strong, they’ll never grow. One theory suggests that high energy particles can knock more electrons off of some dust clumps, leaving them positively charged. Opposites again attract, and clusters grow rapidly. But before long we reach another set of mysteries. We know from evidence found in meteorites that these fluffy dust bunnies eventually get heated, melted and then cooled into solid pellets called chondrules. And we have no idea how or why that happens. Furthermore, once those pellets do form, how do they stick together? The electrostatic forces from before are too weak, and small rocks can’t be held together by gravity either. Gravity increases proportionally to the mass of the objects involved. That’s why you could effortlessly escape an asteroid the size of a small mountain using just the force generated by your legs. So if not gravity, then what? Perhaps it’s dust. A fluffy dust rim collected around the outside of the pellets could act like Velcro. There’s evidence for this in meteors, where we find many chondrules surrounded by a thin rim of very fine material– possibly condensed dust. Eventually the chondrule pellets get cemented together inside larger rocks, which at about 1 kilometer across are finally large enough to hold themselves together through gravity. They continue to collide and grow into larger and larger bodies, including the planets we know today. Ultimately, the seeds of everything familiar– the size of our planet, its position within the solar system, and its elemental composition– were determined by an uncountably large series of random collisions. Change the dust cloud just a bit, and perhaps the conditions wouldn’t have been right for the formation of life on our planet.

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翻译人员: Jessie zhang 校对人员: Yolanda Zhang考虑你现在坐的地方，时光倒流，它可能被淹没在浅海底部，埋在几英里深的岩石下，或者漂浮在熔融的景观中。但是回到久远的46亿年前，你将置身于无边的尘埃 和气体云团中，围绕一个新的星球旋转。这是物理学最大，也是最小的谜团：宇宙尘埃的谜团。看似空旷的星际空间实际上存在着气体和尘埃云团，通常被超新星吹到那里。当云团密度达到临界值， 即金斯质量，它自身会坍塌。收缩的云团越转越快，逐渐升温，最后在内核点燃氢气。一个新的星球在此刻诞生。随着新的星球开始出现聚变反应，它喷发出的气体 将云团顶部和底部吹散，留下一个环绕星球旋转的 气体和尘埃环，被称为原行星盘。这个地方的风出奇的大；气流旋涡带动粒子分离， 使它们互相碰撞，宇宙尘埃由小的金属碎片， 岩石颗粒，以及冰块组成。我们可以在天空中观察到 数千个类似的原行星盘，它们处于不同的发展阶段，随着尘埃聚集成群，变成更大的云团尘埃颗粒比人类的一根 头发丝还小100倍，它们之间的引力被称为范德华力。那里电子云团会转移到分子的一侧，使得分子的一端产生正电荷， 一端产生负电荷。正负相吸，范德华力 将它们吸引在一起。但问题是：一旦尘埃团 增长到一定规模，星盘的多风空气层 总是会把它们打碎，它们随之相互碰撞。宇宙尘埃的一大谜题 就是它们如何继续膨胀。静电力理论也许能回答这个问题。高能伽马射线，X射线，紫外线光子使星盘中气体原子携带的电子减少，从而制造出正离子和负电子。电子与尘埃的结合使尘埃携带负电荷，当风把尘埃粒子聚在一起，同性相斥，碰撞也使得 粒子的运动速度降低。轻微的碰撞不会使它们碎裂，但是如果相斥力太强， 它们就没法长大。有一种理论说的是，高能量粒子可以使尘埃团的电子减少，使得它们携带正电荷。异性相吸，云团迅速增长，但不久我们就会发现另一组谜团。我们从陨石中找到了证据，证明这些蓬松的尘埃团 最终被加热，融化，之后冷却成固体的陨石颗粒。但我们并不知道这一过程 究竟是如何发生的。一旦颗粒团形成， 它们又是如何黏在一起的呢？之前的静电力很弱，小的石块不会在引力下结合在一起，万有引力随着物体的质量变大 按比例地增加。这就是为什么仅仅使用脚上的力量， 我们就可以毫不费力地从一个像小山一样大的小行星中逃逸。那么如果不是引力，又是什么？可能是尘埃。在颗粒团的外部收集 的蓬松的灰尘边缘可以像尼龙搭扣一样运动。在陨石中可以找到相关的证据，我们发现陨石颗粒上面有一层 薄薄的，质地细密的矿物质——可能是凝结的尘埃。最后陨石颗粒粘合在一起 形成更大的岩石，直径达1公里，最终大到足够在引力下支撑自己。它们继续撞击并增长到更大的体积，包括我们已知的行星。最终，所有的事情开始变得熟悉——行星的规模，它们在太阳系的位置，以及它们的元素组成——是由无数随机的碰撞形成的。稍微改变一下尘埃云，也许我们星球上的环境就不再适合生命的形成。

**P756 2019-07-23 How do viruses jump from animals to humans - Ben Longdon**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=756)

At a Maryland country fair in 2017, the prize pigs were not looking their best. Farmers reported feverish hogs with inflamed eyes and running snouts. But while fair officials worried about the pigs, the Maryland department of health was concerned about a group of sick fairgoers. Some had pet the pigs, while others had merely been near their barns; but soon, 40 of these attendees would be diagnosed with swine flu. More often than not, sick animals don’t infect humans. But when they do, these cross-species infections, or viral host jumps, have the potential to produce deadly epidemics. So how can pathogens from one species infect another, and what makes host jumps so dangerous? Viruses are a type of organic parasite infecting nearly all forms of life. To survive and reproduce, they must move through three stages: contact with a susceptible host, infection and replication, and transmission to other individuals. As an example, let’s look at human influenza. First, the flu virus encounters a new host and makes its way into their respiratory tract. This isn’t so difficult, but to survive in this new body, the virus must mount a successful infection before it’s caught and broken down by an immune response. To accomplish this task, viruses have evolved specific interactions with their host species. Human flu viruses are covered in proteins adapted to bind with matching receptors on human respiratory cells. Once inside a cell, the virus employs additional adaptations to hijack the host cell’s reproductive machinery and replicate its own genetic material. Now the virus only needs to suppress or evade the host’s immune system long enough to replicate to sufficient levels and infect more cells. At this point, the flu can be passed on to its next victim via any transmission of infected bodily fluid. However, this simple sneeze also brings the virus in contact with pets, plants, or even your lunch. Viruses are constantly encountering new species and attempting to infect them. More often than not, this ends in failure. In most cases, the genetic dissimilarity between the two hosts is too great. For a virus adapted to infect humans, a lettuce cell would be a foreign and inhospitable landscape. But there are a staggering number of viruses circulating in the environment, all with the potential to encounter new hosts. And because viruses rapidly reproduce by the millions, they can quickly develop random mutations. Most mutations will have no effect, or even prove detrimental; but a small proportion may enable the pathogen to better infect a new species. The odds of winning this destructive genetic lottery increase over time, or if the new species is closely related to the virus’ usual host. For a virus adapted to another mammal, infecting a human might just take a few lucky mutations. And a virus adapted to chimpanzees, one of our closest genetic relatives, might barely require any changes at all. It takes more than time and genetic similarity for a host jump to be successful. Some viruses come equipped to easily infect a new host’s cells, but are then unable to evade an immune response. Others might have a difficult time transmitting to new hosts. For example, they might make the host’s blood contagious, but not their saliva. However, once a host jump reaches the transmission stage, the virus becomes much more dangerous. Now gestating within two hosts, the pathogen has twice the odds of mutating into a more successful virus. And each new host increases the potential for a full-blown epidemic. Virologists are constantly looking for mutations that might make viruses such as influenza more likely to jump. However, predicting the next potential epidemic is a major challenge. There’s a huge diversity of viruses that we’re only just beginning to uncover. Researchers are tirelessly studying the biology of these pathogens. And by monitoring populations to quickly identify new outbreaks, they can develop vaccines and containment protocols to stop these deadly diseases.

**P756 2019-07-23 How do viruses jump from animals to humans - Ben Longdon**

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翻译人员: Candace Hwang 校对人员: Carol Wang在马里兰州 2017 年的郡博览会上，获奖的猪看起来状态并不好。农民报告说，这些发烧的猪 眼睛红肿、鼻涕直流。但是，虽然展会官员担心这些猪，但马里兰州卫生部门 则对一组生病的参会者很重视。有些人摸过这些猪， 而有些人仅从它们的圈旁路过;但很快，这些参与者中 40 人将被诊断患猪流感。生病动物通常不会感染人类，但是当它们传染时，这些跨物种感染，也叫病毒宿主转移，可能产生致命的流行病。那么一个物种的病原体 如何感染另一个物种的？什么使宿主转移如此危险呢？病毒是一种感染几乎所有 生命形式的有机寄生物。为了生存和繁殖， 它们必须经历三个阶段：与易感宿主接触、感染和复制、以及传递给其他人。举个例子，我们来看看人类流感。首先，流感病毒遇到了新的宿主，并进入他们的呼吸道。进入并不困难， 但要在这个新的身体中生存，在病毒被免疫反应捕获并消灭前，它必须成功感染宿主。要完成这项任务，病毒进化出与宿主物种的特定互动。人流感病毒覆盖着蛋白质，这种蛋白质可以与人类 呼吸细胞上的匹配受体结合。一旦进入细胞， 病毒就会采用其他适应措施来劫持宿主细胞的分裂机制。并复制自己的基因物质。现在病毒只需压制 或躲避宿主的免疫系统，一直繁殖到足够多的水平 来感染更多的细胞。此时，流感可通过 任何传染性体液传播，并传递给其下一个受害者。然而，简单一个喷嚏还会使病毒与宠物、 植物甚至你的午餐接触。病毒不断遇到新物种 并试图感染它们，这通常会以失败告终。多数情况下，两个宿主间的 遗传基因差异太大，对于已经适应感染人类的病毒，莴苣细胞则是外来的、 且不适宜生存的环境。但环境中传播的病毒数量惊人，极有可能遇到新的宿主。而且，因为病毒以数百万级迅速繁殖，他们可以快速发生随机突变。大多数突变都没有效果， 甚至证明是有害的;但一小部分变异可使病原体 更容易感染新物种。获得这种破坏性基因的几率 会随着时间的推移而增加，或者新物种与病毒的常见宿主相似。对于适应一种哺乳动物的病毒，感染人类可能只需一些幸运的突变。一种适应离我们最近的 遗传近亲黑猩猩的病毒，一个宿主成功转移所需要的不仅仅是时间和基因相似性，有些病毒可以轻易感染新宿主细胞，但是无法逃避免疫反应。其他病毒可能较难传染到新宿主。比如，它们可能使宿主的血液具传染性，而非唾液具有传染性。但是，一旦宿主转移到传播阶段，病毒变得更加危险。现在病原体可在两个宿主中孕育，其变异为成功病毒的概率提高两倍，且每个新的宿主都会 增加全面流行病的可能性。病毒学家一直在寻找可能令流感类病毒 更易产生宿主转移的突变。然而，预测下一个潜在的流行病 是一项重大挑战。病毒种类繁多， 我们才刚刚开始研究。研究人员正在不知疲倦地 研究这些病原体生物学，并通过监测人群来快速识别新的爆发，他们可以开发疫苗和控制措施 来阻止这些致命的疾病。

**P757 2019-07-25 The mysterious origins of life on Earth - Luka Seamus Wright**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=757)

Billions of years ago on the young planet Earth simple organic compounds assembled into more complex coalitions that could grow and reproduce. They were the very first life on Earth, and they gave rise to every one of the billions of species that have inhabited our planet since. At the time, Earth was almost completely devoid of what we’d recognize as a suitable environment for living things. The young planet had widespread volcanic activity and an atmosphere that created hostile conditions. So where on Earth could life begin? To begin the search for the cradle of life, it’s important to first understand the basic necessities for any life form. Elements and compounds essential to life include hydrogen, methane, nitrogen, carbon dioxide, phosphates, and ammonia. In order for these ingredients to comingle and react with each other, they need a liquid solvent: water. And in order to grow and reproduce, all life needs a source of energy. Life forms are divided into two camps: autotrophs, like plants, that generate their own energy, and heterotrophs, like animals, that consume other organisms for energy. The first life form wouldn’t have had other organisms to consume, of course, so it must have been an autotroph, generating energy either from the sun or from chemical gradients. So what locations meet these criteria? Places on land or close to the surface of the ocean have the advantage of access to sunlight. But at the time when life began, the UV radiation on Earth’s surface was likely too harsh for life to survive there. One setting offers protection from this radiation and an alternative energy source: the hydrothermal vents that wind across the ocean floor, covered by kilometers of seawater and bathed in complete darkness. A hydrothermal vent is a fissure in the Earth’s crust where seawater seeps into magma chambers and is ejected back out at high temperatures, along with a rich slurry of minerals and simple chemical compounds. Energy is particularly concentrated at the steep chemical gradients of hydrothermal vents. There’s another line of evidence that points to hydrothermal vents: the Last Universal Common Ancestor of life, or LUCA for short. LUCA wasn’t the first life form, but it’s as far back as we can trace. Even so, we don’t actually know what LUCA looked like— there’s no LUCA fossil, no modern-day LUCA still around— instead, scientists identified genes that are commonly found in species across all three domains of life that exist today. Since these genes are shared across species and domains, they must have been inherited from a common ancestor. These shared genes tell us that LUCA lived in a hot, oxygen-free place and harvested energy from a chemical gradient— like the ones at hydrothermal vents. There are two kinds of hydrothermal vent: black smokers and white smokers. Black smokers release acidic, carbon-dioxide-rich water, heated to hundreds of degrees Celsius and packed with sulphur, iron, copper, and other metals essential to life. But scientists now believe that black smokers were too hot for LUCA— so now the top candidates for the cradle of life are white smokers. Among the white smokers, a field of hydrothermal vents on the Mid-Atlantic Ridge called Lost City has become the most favored candidate for the cradle of life. The seawater expelled here is highly alkaline and lacks carbon dioxide, but is rich in methane and offers more hospitable temperatures. Adjacent black smokers may have contributed the carbon dioxide necessary for life to evolve at Lost City, giving it all the components to support the first organisms that radiated into the incredible diversity of life on Earth today.

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翻译人员: Meng Ren 校对人员: Lipeng Chen几十亿年前，在年轻的地球上，简单的有机化合物 形成了复杂的化合物，进而可以发育和繁衍。它们是地球上出现的第一批生命，从那时起，这些生命逐渐进化出 今天栖息在地球上的数十亿个物种。以今天的标准而言， 彼时的地球环境几乎不适宜任何生物的生存。地球上布满了活火山，空气条件极其恶劣。那么，生物是何时出现的呢？要想弄清生命的起源，就必须明白所有生命形式所必须的 基本生存条件。它们是一些生命必不可少的 元素和化合物，包括氢、甲烷、氮、 二氧化碳、磷酸盐以及氨。为了混合这些物质， 并使之发生化学反应，我们需要一种液体溶剂：水。为了进行发育繁衍，所有生命都需要能量源。生命形式分为两大类：一类为自养生物，例如植物， 它们能自行产生能量，另一类为异养生物，例如动物， 它们通过消耗其他生物产生能量。当然，地球上出现的第一个生物 没有其他生物可以消耗，它必定是自养生物，依靠太阳能或化学梯度 产生能量。那么，哪里符合这样的标准呢？陆地和海洋表面有利于接受阳光。然而在生命初始期， 过强的紫外线辐射将威胁到生命的存活。有一种场景，既能 保护生命不受紫外线伤害又能提供替换的能量源：那就是遍布于海床上的海底热泉，覆盖于几千公里深的海水和 伸手不见五指的漆黑之中。海底热泉是由海水渗透进 地壳表面产生的裂痕中与滚烫的岩浆混合后以极高的温度喷涌而出产生的，并带出丰富的矿物质和简单化合物。在海底热泉陡峭的化学梯度中聚集着大量的能量。另一个证据也指向海底热泉：即，最近普适共同祖先， 简称 LUCA。这并非初始生命形式， 而是人类能追溯到的生命最早形态。我们不知道它长什么样——也没人见过化石， 更不存在活着的生物——实际上，科学家们从现存的三种 生命形式的所有物种中找到了共存的基因。也就是说，如果这些基因存在于 所有物种和生命形式之中，那么它们必然继承于 一个共同的祖先。从这些基因可以得知，最后共同祖先 生存在高温无氧的环境中，并从化学梯度中获取能量——海底热泉正好符合。海底热泉拥有两种形态：黑烟囱和白烟囱。黑烟囱释放出富含 二氧化碳的酸性液体，温度可高达几百摄氏度 并含有大量的硫、铁、铜等生命必须的金属元素。但科学家们认为黑烟囱温度过高， 不利于 LUCA 存活——所以他们更倾向于白烟囱。而在所有白烟囱之中，位于大西洋中脊 素有“失落之城”之称的那儿的一处海底热泉呼声最高。这里的海水呈强碱性 二氧化碳含量低，但甲烷含量高 温度也更适合生存。附近的黑烟囱可能贡献了 必要的二氧化碳，使生命得以萌发并演化，所有的元素汇集后， 世界上第一个生物诞生了，并演变成如今地球上 无与伦比的生物多样性。

**P758 2019-07-27 The murder of ancient Alexandria's greatest scholar - Soraya Field Fi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=758)

In the city of Alexandria in 415 CE, the bishop and the governor were in a fight. It started with a disagreement over the behavior of a militia of monks, and ended with an accusation of witchcraft leveled against one of the most powerful figures in the city. Hypatia of Alexandria was a prominent mathematician, philosopher, and advisor to the city’s leaders. In the centuries since she lived, the details of her life have been the subject of much dispute and have taken on an almost mythical status. But while none of Hypatia’s own writings survive, her contemporaries’ and students’ accounts of her work and life paint a picture of the qualities that made her renowned as a scholar, beloved as a teacher, and ultimately led to her downfall. Hypatia was born around 355 in Alexandria, then part of the Egyptian province of the Eastern Roman Empire, and an intellectual center. Her father Theon was an accomplished Greek mathematician and astronomer; her mother is unknown. Hypatia was likely an only child, and Theon educated her himself. By adulthood, she had surpassed her father in both mathematics and philosophy, becoming the city’s foremost scholar and taking over his position at the head of the Platonic school, similar to a modern university. She refined scientific instruments, wrote math textbooks, and developed a more efficient method of long division. But perhaps her most significant contributions to intellectual life in Alexandria came through her teaching. The philosophy Hypatia taught drew from the legacy of Plato and Aristotle, as well as the mystical philosopher Plotinus and the mathematician Pythagoras. The convergence of these influences merged to form a school called Neoplatonism. For the Neoplatonists, mathematics had a spiritual aspect, divided among the four branches of arithmetic, geometry, astronomy and music. These subjects were not studied merely for the sake of curiosity or practical utility, but because they authenticated the belief that numbers were the sacred language of the universe. In the repeated patterns of algebraic formulas and geometric shapes, the orbits of the planets, and the harmonious intervals of musical tones, the Neoplatonists saw a rational cosmic force at work. Students delved into this ordered mathematical world to achieve higher unity with this force, known as “the One.” While Hypatia was considered pagan— a term for traditional Roman belief before Christianity— she worshipped no particular deity or deities, and her ideas could be applied alongside multiple religious viewpoints. Jewish and Christian as well as pagan students travelled from the farthest reaches of the empire to study with her. The nonpartisan environment Hypatia fostered, where all students could feel comfortable, was especially remarkable given the religious and political turmoil that was fracturing the city of Alexandria at the time. Christianity had recently become the Empire’s state religion. The local archbishop Cyril had steadily gained political power, commanding zealous militias of Christian monks to destroy pagan temples and harass the Jewish population. In doing so, he encroached on the secular authority of the Roman governor Orestes, himself a moderate Christian, leading to a bitter public feud between the two men. Because she was seen as a wise and impartial figure, governor Orestes consulted Hypatia, who advised him to act with fairness and restraint. But when a group of Cyril’s monks incited a riot, badly injuring Orestes in the process, he had their leader tortured to death. Cyril and his followers blamed Hypatia, accusing her of witchcraft to turn Orestes against Christianity. In March 415, as Hypatia was traveling through the city, the bishop’s militia of monks dragged her from her carriage and brutally murdered and dismembered her. Hypatia’s death was a turning point in the politics of Alexandria. In the wake of her murder, other philosophers in the Greek and Roman tradition fled, and the city’s role as a center of learning declined. In a very real way, the spirit of inquisition, openness, and fairness she fostered died with her.

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翻译人员: Yizhuo He 校对人员: Lauren Zou在公元 415 年的亚历山大城，主教和城市统治者 进行了激烈的争吵。一切都源于他们对于修道士民兵的 种种行为而产生的意见分歧，并最终导致了针对 城市中其中一位最有影响力的人物的巫术指控。亚历山大城的希帕蒂娅（Hypatia） 是一名杰出的数学家，哲学家，以及城市领导者的谋士。在她过世后的几个世纪中，她的生平往事成了 众人争论的焦点，并几乎被认为是虚构的传说。尽管希帕蒂娅自己 并没有留存下来的著作，她的同代人及学生 对她的作品及生活的记述描绘出了她的诸多品质，正是这些品质 使她被誉为一名备受尊敬的学者，深受学生喜爱的老师， 但也最终致使了她的陨落。希帕蒂娅生于公元 355 年的 亚历山大城，这里在当时是东罗马帝国 埃及地区的一部分，也是一座科学文化中心。她的父亲席昂是一位颇有建树的 希腊数学家和天文学家；她的母亲身份不详。希帕蒂娅极有可能是席昂的独女， 由席昂亲自教导。在她成年时，她已远超其父 在数学与哲学方面的成就，成为了城市中最著名的学者， 并取代了父亲在柏拉图学院 （类似近代大学）的院长职位。她改进了诸多科学仪器， 撰写了数学课本，并发明了一种更有效的长除法。但她在亚历山大城的 学术生涯中最杰出的贡献或许要归功于她的教学生涯。希帕蒂娅所传授的哲学不仅包括了 柏拉图与亚里士多德遗留下来的思想，还包括了神秘主义哲学家 普洛丁与数学家毕达哥拉斯的观点。这些思想融合成了一个新学派： 新柏拉图主义。对于新柏拉图主义学者来说， 数学被认为具有一种宗教思想，这种思想被划分为算术，几何， 天文与音乐这四个方面。而人们研究这些学科 并不只是出于好奇或其实用性，而是因为它们证实了“数字是宇宙的神圣语言”这一信仰。在代数公式与几何图形的重复模式、行星的轨道、音乐的和谐音程中，新柏拉图主义学者看到了 一种运行中的宇宙理性力量。学生们通过钻研这种 有序的数学世界以求达到与这种被称作 “太一”的宇宙力量的统一。希帕蒂娅被视作 非基督徒（pagan）——一个用以描述基督教之前的 传统罗马信仰的称谓——她既不信仰一神， 也不信仰多神，她的思想可被应用于多种 宗教观点中。信仰犹太教、基督教， 甚至是不信教的学生都从帝国的各个角落 赶至此地向她学习。她所培养的这种 不分派系的学术氛围使她所有的学生都能畅所欲言，这在当时试图分裂亚历山大城的 政治宗教动乱中显得尤为可贵。后来，基督教一跃成为了 罗马帝国的国教。当地大主教西瑞尔逐步掌权，他命令由狂热的基督修道士 所组成的民兵组织去摧毁异教徒的寺庙，并侵扰犹太民族。此举侵犯了罗马总督—— 一名温和的基督徒，欧瑞斯提斯的世俗权威， 导致了二人之间的公开不和。于是总督欧瑞斯提斯去找 睿智且持中立态度的希帕蒂娅商量，希帕蒂娅建议他 采取公正克制的举措。但随后，一群西瑞尔的修道士 煽动了一场暴乱，导致欧瑞斯提斯身负重伤， 于是欧瑞斯提斯将他们的首领折磨致死。西瑞尔及其追随者将一切 都怪到希帕蒂娅的头上，指控她施行了巫术， 使欧瑞斯提斯与基督教反目。公元 415 年三月， 希帕蒂娅的马车正在城中行驶，主教的修道士民兵将她拖出马车，并残忍地谋杀，肢解了她。希帕蒂娅之死成了亚历山大城 政坛的转折点。她被谋杀后，其他信奉传统希腊罗马思想的 哲学家纷纷逃离此地，亚历山大城作为 学术中心地位也日渐衰落了。在某种意义上，希帕蒂娅所推动的那种 求知、开放与公正的精神也随她一同逝去了。

**P759 2019-07-29 Can you solve the secret sauce riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=759)

One of the top chefs from Pasta Palace has been kidnapped by operatives from Burger Bazaar hoping to learn the location of their secret sauce recipe. Little do they know that a third party— Sausage Saloon— has sent you to take advantage of the situation. As their top spy, your skills range from infiltration and subterfuge, to safecracking and reading faces for signs of deception. You’ve tracked the captors to where they’re holding the chef prisoner. From your hiding spot, you can see him on the other side of the glass, while in front of you an interrogator wearing headphones speaks into a microphone. “We already know the recipe is on the 13th floor of the bank vault, in a safe deposit box numbered between 13 and 1300. Now tell us… Is the number less than 500?” You can’t hear the chef’s answer, but you can see that he’s lying. The interrogator, however, falls for it. He follows up by asking, “Is it a perfect square?” Again you can’t hear the answer but can tell the chef is lying, while the interrogator takes him at his word. He then asks, “Is it a perfect cube?” This time the chef answers truthfully. The interrogator thinks for a minute and says, “Good. Now if you just tell me whether or not the number’s second digit is a one, we’ll be done here.” But as the chef starts to answer, the interrogator stands up, blocking your view. Within moments he rushes out of the room, announcing that he’s got the answer and is sending agents to retrieve the recipe. You know that the Burger Bazaar people have the wrong box number. But can you figure out the right one and retrieve the recipe yourself? Pause the video to figure it out for yourself. Answer in 3 Answer in 2 Answer in 1 The key here is to work backwards. We don’t know what the chef answers to the final question or whether he answers truthfully. But we do know that by the time the interrogator asks it, he’s narrowed the options down to two numbers– one where the second digit is 1, and one where it isn’t. Our goal, then, is to find answers to the previous questions that lead to just two possibilities. Of the three constraints offered, the one that narrows our options the most is if the number is a perfect cube. That leaves us with only eight answers between 13 and 1300. So let’s assume the answer to the third question was a truthful YES. Now, let’s look at the second question. If the chef answered YES to the number being a perfect square, it would narrow the interrogator’s options to just 64 and 729– the only numbers in our range that are both a square and a cube. But neither of these has a 1 as the second digit. So the given answer to the second question must’ve been NO. And that also means we can eliminate these two squares from the interrogator's list, leaving only six numbers. Now for the first question, which allows us to divide this list. If the chef answered YES to the number being less than 500, we’d have four options, which is too many. But a NO leaves us with two numbers greater than 500, one of which does have a 1 as its second digit. We don’t know which of these numbers the interrogator thinks is correct. But that doesn’t matter– remember, his conclusion was based on lies. You, on the other hand, are now in a position to reconstruct the truth. First, the chef said the number was greater than 500 but lied, meaning it’s actually less than 500. Second, the chef said it wasn’t a perfect square but lied again, meaning the number is indeed a square. And finally, he truthfully confirmed that it was also a cube. And as we’ve already seen, the only number under 500 that’s both a square and a cube is 64. You find the secret recipe and are gone before anyone’s the wiser. Corporate espionage is not an easy game— but sometimes, that’s just how the sausage is made.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=759)

翻译人员: Carol Wang 校对人员: Heze Ma意粉宫餐厅的顶级厨师之一被汉堡殿餐厅工作人员绑架，他们想获知其秘制酱汁配方藏在哪里。他们有所不知，第三方餐厅热狗城也派他们的最高间谍， 也就是你，前来打探。作为他们的顶级间谍，你精通卧底、诡计、 开保险箱和读心术。你跟踪到他们关押厨师的地方，从你的藏身之处， 能看到玻璃另一边的厨师，而在你的面前，戴耳机的审讯者正对着麦克风说话。“我们得知配方在银行金库 13 楼，在编号 13 到 1300 间的保险箱里。现在告诉我们， 这个数字小于 500 吗？”你听不到厨师的回答， 但你可以看出他在撒谎，但审讯者相信了厨师的话。他接着问道： “这个数是完全平方吗？”你听不见答案， 但能看出厨师又撒谎了，而审讯者相信了他的话。然后他问：“它是完全立方吗？”这一次，厨师如实回答了。审讯者想了一会儿，说道：“好。 现在只要你告诉我 第二位数字是不是 1 ，你就没事了。”但当厨师开始回答时，审讯者站起来，挡住了你的视线。不一会儿，他就冲出了房间，宣布他得到了答案，并派人去取配方。你知道汉堡殿餐厅的人 得到的箱号是错的，但你能想出正确的号码 并拿到配方吗？[ 若想自己解题，请暂停播放 ][ 答案公布：3 ][ 答案公布：2 ][ 答案公布：1 ]解题的关键是倒推。我们不知道最后问题的回答，以及厨师是否撒谎了，但我们确实知道，当审讯者提问时，他将范围缩小到两个数——一个数的第二位为 1，而另一个不是。那么，我们的目标是找出导致仅 2 个数的 先前问题的答案。在提问的三个问题中，最能缩小我们选项的， 是该数是否为完全立方，而 13 到 1300 之间 只有 8 个数符合要求。假设第三个问题的答案是真的，接着看第二个问题。如果厨师回答说它是完全平方，那么审讯者的选项 缩小为 64 和 729——只有这两个数 同时是完全平方完全立方。但这两个数的第二位都不是 1，所以，第二个问题的答案 肯定是否定的，也就是说，可以把这两个数 从审讯者的选项中删掉，这样，只剩下六个数字。现在回到第一个问题， 可以把候选答案一分为二。数字是否小于 500 的问题， 如果厨师回答“是”，我们有四个选项，太多了。若厨师的回答是“否”的话， 则只有两个数字大于 500，其中一个数的第二位是 1。我们不知道审讯者选了哪个数，但没关系——记住，他的结论是基于谎言得出的，也就是说，你现在可以得出正确结论。首先，厨师谎称数字大于 500，这意味着它实际上小于 500；其次，厨师谎称它不是完全平方，而实际上它是完全平方；最后，他承认它完全立方。正如我们已经看到的那样，小于 500 的数中，只有 64 同时完全平方和完全立方。在其他人弄明白前， 你成功拿到秘方后离开了。企业间谍活动并非易事 ——但有时，就是仅为得到香肠配方。

**P760 2019-07-31 The myth of Jason and the Argonauts - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=760)

Hercules, the strongest man alive with a mighty heart to match. Orpheus, charmer of nature and master of music. Castor and Pollux, the twin tricksters hatched from an egg. The Boreads, sons of the North Wind who could hurtle through the air. For untold times these heroes had roamed ancient Greece, creating new legends wherever they went. But none of their adventures was so great as when they joined forces for the sake of a young man named Jason. Years before, Jason’s uncle Pelias had ruthlessly usurped the throne of Thessaly from Jason’s grandfather. When Jason returned to his father’s stolen court, the cowardly king set him a seemingly impossible task: cross the teeming seas to Colchis, and steal the golden fleece of a flying ram under King Aeetes’ nose. If Jason retrieved the Fleece, Pelias promised to relinquish the throne. Touched by his heroic mission, the Gods spread Jason’s call for help, and soon he had assembled a not-so-motley crew. These heroes, alongside countless sailors, soothsayers, and rebel demigods, named themselves the Argonauts after their sturdy ship. But the path ahead was marked with untold terrors– enough to test even the fiercest heroes. Their first stop was Lemnos, an isle of women who had killed all the island’s men. As punishment, Aphrodite had cursed them with a sickening stench– but that didn’t stop Jason fathering twins with the queen. The rest of the crew also found themselves embroiled in new romances; until Hercules chastised them for not behaving like heroes. Eventually, they sailed on to the Mount of Bears, an island where a group of ancient, six-armed monsters lived alongside the peaceful Doliones. While the clan welcomed the Argonauts with open arms, the monsters surged down from the mountains and hurled rocks at the docked ship. Hercules held them off single-handedly, before his comrades joined the fray. Bolstered by their victory, the triumphant heroes sailed onward– only to be blown back to the island several stormy nights later. In the tempest, the Doliones thought these new arrivals invaders. The Argonauts were similarly unaware of their surroundings, and fought blunderingly in the dark, slaying wave after wave of foe. But the morning light revealed a horrible truth: their victims were none other than their previous hosts. Yet again, Jason had allowed the crew to be distracted, this time at a terrible cost. Ashamed at his conduct, he resolved to focus only on the Fleece, but even this haste proved ruinous. When Hercules’ squire was abducted by a water nymph, Jason sailed on– oblivious to the absence of his most powerful crewmate. The remaining Argonauts continued their quest, until stopping at the sight of an old man surrounded by a swirl of harpies. This was Phineas, a seer cursed by Zeus to endure old age, blindness, and endless torture for giving away his prophecies. Moved by his plight, the wind brothers set upon the flock, providing Phineas with a brief respite from his punishment. In return, the seer told them how to overcome the terrifying trial that lay ahead: the Symplegades, a pair clashing rocks that reduced ships to splinters. But first, the Argonauts would have to maneuver past the mouth of hell, around the island of the bloodthirsty Amazons, and under psychedelic skies. These adventures cost the crew both in men and morale– and some feared they might be losing their minds. Upon reaching the clashing rocks, the exhausted crew quaked with fear. But Phineas’ advice rang in their heads. The Argonauts released a single dove and sped through in its wake to emerge unscathed. With this narrow escape, the Argonauts finally had Colchis in their sights. Yet while Jason rested and celebrated with his crew, he could feel his time among them was drawing to a close. As the fleece gleamed in his mind, he knew he would have to retrieve it alone. But he could not guess that this final task would have the most horrible price of all.

**P760 2019-07-31 The myth of Jason and the Argonauts - Iseult Gillespie**

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翻译人员: Yisi Zhu 校对人员: Yanyan Hong大力士赫拉克勒斯， 对战场有极大的热忱。天生的歌手俄耳甫斯， 具有非凡的音乐才能。同卵孕育出的的双胞胎骗子， 卡斯托和普尔尤克斯，能够自如地在空中翱翔的 北风神之子玻瑞阿代兄弟。这些英雄无数次漫游古希腊，在他们所到之处创造着 新的传说。但是他们的冒险中没有一个 能比得上他们聚首为一团队时。这个队伍的核心， 是一个年轻的男人，伊阿宋。多年前，伊阿宋的叔叔珀利阿斯 残暴地从伊阿宋的祖父那里篡夺了色萨利的宝座。当伊阿宋重返他父亲那 被偷走的王宫时，懦弱的国王给他布置了 一个看起来不可能完成的任务：穿过浩瀚的大海去到科尔喀斯，在国王埃厄忒斯的眼皮底下 偷走一只飞羊的金羊毛。珀利阿斯许诺， 如果伊阿宋能拿回金羊毛，他就交还王位。受到伊阿宋英雄使命的感召，众神也帮着散播求助、寻找援手，很快他就集结了一队 算是有素的人马。这些英雄们，和数不清的水手、 预言家及反叛半神人一起，在他们坚固不摧的船“阿尔戈号” 上自称为阿尔戈英雄。但是他们前方的道路 满是不为人知的危险——恐怖到足以挑战 这些最为英勇的英雄们。他们的第一站是利姆诺斯岛， 岛上的女人杀光了所有的男人。作为惩罚，阿佛洛狄忒诅咒她们， 使她们恶臭难耐——但这并没有阻止伊阿宋 与女王一起生育双胞胎。队伍其他人也纷纷发现自己 陷入新的浪漫关系；直到赫拉克勒斯指责他们 没有一个英雄该有的样子。最后，他们驾驶船只到了熊之山，一个住着一群古老的 六臂怪物的岛屿。崇尚和平的杜利奥纳人 也住在这个岛上。当杜利奥纳人张开双臂欢迎 阿尔戈船英雄时，怪物们却从山上冲下来，往抛了锚定船扔石头。赫拉克勒斯单枪匹马地出战，并在他的同伴们加入战局之前， 将他们制服了。受到胜利的鼓舞， 英雄们扬帆起航——却在几个暴风雨后的夜晚被吹回岛上。在暴风雨中，杜利奥纳人却以为 这些人是入侵者。同样，阿耳戈英雄们也没有 意识到他们的处境，在黑暗中大打出手， 一波又一波的击退敌人。但是晨曦却 揭示了一个可怕的事实：他们的对手不是谁， 正是以前接待他们的主人。又一次，伊阿宋允许 他的船员分心了，而这一次他们付出了巨大的代价。愧于自己的举止， 他下定决心只专注于金羊毛。但是即便如此，结果也是毁灭性的。当赫拉克勒斯的护卫 被水仙女绑架时，伊阿宋起航了——却浑然不知 他最强大队友的缺席。其余的阿尔戈英雄 则继续他们的远征，直到看到一个被鸟身女妖们 团团包围的老人。这是菲尼亚斯，因泄露天机 被宙斯诅咒的先知，他忍受着衰老，双目失明， 和无休止的折磨。风兄弟很同情他的困境， 于是拔剑追逐神鸟，给了菲尼亚斯惩罚中短暂的喘息。作为回报，先知告诉他们如何克服 即将发生的可怕挑战：叙姆普勒加得斯，一对碰撞的岩石， 能把船只撞成碎片。但是阿尔戈英雄必须 先在嗜血亚马逊岛周围，和迷幻的天空下越过地狱之口。这些冒险折损了 大量人马和士气——有些人还担心他们会失去理智。之后，到达碰撞的岩石时， 精疲力尽的船员因恐惧而颤抖。但是菲尼亚斯的建议在他们脑海中浮现。阿尔戈英雄们放出一只鸽子，并在其后加速 毫发无损地从岩石间穿过。在窄缝中逃生后，阿尔戈英雄 终于看到了科尔喀斯。然而，当伊阿宋休息 并和他的船员庆祝时，他也意识到自己与这群伙伴 共处的时光也要告一段落了。当羊毛在他的脑海中闪烁时， 他知道他不得不独自取回它。但他没能猜到的是他将为最后的任务付出最可怕的代价。

**P761 2019-08-01 A brief history of chess - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=761)

The attacking infantry advances steadily, their elephants already having broken the defensive line. The king tries to retreat, but enemy cavalry flanks him from the rear. Escape is impossible. But this isn’t a real war– nor is it just a game. Over the roughly one-and-a-half millennia of its existence, chess has been known as a tool of military strategy, a metaphor for human affairs, and a benchmark of genius. While our earliest records of chess are in the 7th century, legend tells that the game’s origins lie a century earlier. Supposedly, when the youngest prince of the Gupta Empire was killed in battle, his brother devised a way of representing the scene to their grieving mother. Set on the 8x8 ashtapada board used for other popular pastimes, a new game emerged with two key features: different rules for moving different types of pieces, and a single king piece whose fate determined the outcome. The game was originally known as chaturanga– a Sanskrit word for "four divisions." But with its spread to Sassanid Persia, it acquired its current name and terminology– "chess," derived from "shah," meaning king, and “checkmate” from "shah mat," or “the king is helpless.” After the 7th century Islamic conquest of Persia, chess was introduced to the Arab world. Transcending its role as a tactical simulation, it eventually became a rich source of poetic imagery. Diplomats and courtiers used chess terms to describe political power. Ruling caliphs became avid players themselves. And historian al-Mas’udi considered the game a testament to human free will compared to games of chance. Medieval trade along the Silk Road carried the game to East and Southeast Asia, where many local variants developed. In China, chess pieces were placed at intersections of board squares rather than inside them, as in the native strategy game Go. The reign of Mongol leader Tamerlane saw an 11x10 board with safe squares called citadels. And in Japanese shogi, captured pieces could be used by the opposing player. But it was in Europe that chess began to take on its modern form. By 1000 AD, the game had become part of courtly education. Chess was used as an allegory for different social classes performing their proper roles, and the pieces were re-interpreted in their new context. At the same time, the Church remained suspicious of games. Moralists cautioned against devoting too much time to them, with chess even being briefly banned in France. Yet the game proliferated, and the 15th century saw it cohering into the form we know today. The relatively weak piece of advisor was recast as the more powerful queen– perhaps inspired by the recent surge of strong female leaders. This change accelerated the game’s pace, and as other rules were popularized, treatises analyzing common openings and endgames appeared. Chess theory was born. With the Enlightenment era, the game moved from royal courts to coffeehouses. Chess was now seen as an expression of creativity, encouraging bold moves and dramatic plays. This "Romantic" style reached its peak in the Immortal Game of 1851, where Adolf Anderssen managed a checkmate after sacrificing his queen and both rooks. But the emergence of formal competitive play in the late 19th century meant that strategic calculation would eventually trump dramatic flair. And with the rise of international competition, chess took on a new geopolitical importance. During the Cold War, the Soviet Union devoted great resources to cultivating chess talent, dominating the championships for the rest of the century. But the player who would truly upset Russian dominance was not a citizen of another country but an IBM computer called Deep Blue. Chess-playing computers had been developed for decades, but Deep Blue’s triumph over Garry Kasparov in 1997 was the first time a machine had defeated a sitting champion. Today, chess software is capable of consistently defeating the best human players. But just like the game they’ve mastered, these machines are products of human ingenuity. And perhaps that same ingenuity will guide us out of this apparent checkmate.

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翻译人员: Carol Wang 校对人员: Lipeng Chen进攻步兵正稳步推进，他们的大象已攻破敌人的防线。国王试图撤退， 但敌方骑兵已从后方包抄，逃跑是不可能的了。但这不是真正的战争——也不仅仅是一场游戏。在其存在的大约一千五百年中，国际象棋被称为军事战略工具、对人类事务的隐喻 和天才的衡量标准。虽然对国际象棋的 最早记录是在 7 世纪，而传说中游戏的起源 还要早一个世纪。据说，当古普塔帝国 最年轻的王子在战斗中丧生时，为向悲伤的母亲讲述王子牺牲的场景， 他的兄弟就设计了这种方式。一款使用 8x8 的八条棋盘的 娱乐用新游戏面世了，它有两个主要特点：不同类型棋子有不同的移动规则，王者棋子的命运将决定胜负。该游戏最初被称为“恰图兰卡”——梵语中的意思是“四部”。但它传播到萨珊王朝的波斯后，就获得了现在的名称和术语——“国际象棋”源自“shah”，意思是国王，而“将军”来自“shah mat”， 意思是“国王孤立无援”。七世纪伊斯兰征服波斯之后，国际象棋被引入阿拉伯世界，并逐渐超越其作为战术模拟的作用，成为诗歌意象的丰富来源。外交官和朝臣们使用 国际象棋术语来描述政治权力，执政的回教主们也成了狂热的玩家。历史学家艾马斯迪认为， 与机会博弈相比，国际象棋是人类自由意志的证明。沿丝绸之路，中世纪贸易 将国际象棋带到了东亚和东南亚，并衍生了许多本地版本。在中国，就像本土战略游戏围棋一样，国际象棋棋子下在棋盘交叉点， 而不是下在格子内；而蒙古征服者帖木儿统治时期，11x10 的棋盘上带有 叫做大本营的安全岛；在日本的将棋中， 对手可以使用被俘的棋子。但在欧洲，国际象棋 开始采用其现代形式。到公元 1000 年，游戏 已成为宫廷教育的一部分。国际象棋被用来比喻履行各自职责的不同社会阶层，并且在新的背景下， 棋子功能被重新定义。与此同时，教会仍对游戏持怀疑态度。道德主义者告诫 不要花太多时间玩游戏，国际象棋甚至在法国被短暂禁止。然而，这款游戏迅速传播，在 15 世纪，它演变成 我们今天所知的游戏形式。相对较弱的顾问 被重塑为更强大的女王——也许受近期强势女性领导人的启发。这种变化加快了游戏的节奏，并随着其它规则的普及，出现了分析常见 游戏开局和结束的论文。由此，诞生了国际象棋理论。随着启蒙时代的到来， 游戏从宫廷搬到了咖啡馆。国际象棋现在被视为创造力的表达，鼓励大胆的举动和戏剧性的下法。这种“浪漫”风格在 1851 年的 “不朽对局”中达到了顶峰，比赛中，阿道夫·安德森 在牺牲了女王和两只车后，成功把对手将死。但 19 世纪后期正式竞争游戏的出现，意味着战略考虑最终 会战胜戏剧性的天赋。随着国际竞争的兴起，国际象棋有了新的地缘政治重要性。在冷战期间，苏联投入了大量资源培养国际象棋人才，并通揽该世纪剩余时间里的冠军。但真正打破俄罗斯统治地位的玩家不是另一个国家的公民，而是名为“深蓝”的 IBM 计算机。国际象棋游戏计算机已开发了几十年，但 1997 年， “深蓝”战胜加里·卡斯巴罗夫是机器第一次击败当代冠军。如今，国际象棋软件能够轻松击败最优秀的人类玩家。但就像它们掌握的游戏一样，这些机器是人类聪明才智的产物。也许同样的人类聪明才智， 将引导我们走出这个明显的死局。

**P762 2019-08-01 Why should you read “Midnight’s Children” - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=762)

It begins with a countdown. On August 14th, 1947, a woman in Bombay goes into labor as the clock ticks towards midnight. Across India, people hold their breath for the declaration of independence after nearly two centuries of British occupation and rule. And at the stroke of midnight, a squirming infant and two new nations are born in perfect synchronicity. These events form the foundation of "Midnight’s Children," a dazzling novel by the British-Indian author Salman Rushdie. The baby who is the exact same age as the nation is Saleem Sinai, the novel’s protagonist. His narrative stretches over 30 years of his life, jumping backwards and forwards in time to speculate on family secrets and deep-seated mysteries. These include the greatest enigma of all: Saleem has magic powers, and they’re somehow related to the time of his birth. And he’s not the only one. All children born in and around the stroke of midnight are imbued with extraordinary powers; like Parvati the Witch, a spectacular conjurer; and Saleem’s nemesis Shiva, a gifted warrior. With his powers of telepathy, Saleem forges connections with a vast network of the children of midnight— including a figure who can step through time and mirrors, a child who changes their gender when immersed in water, and multilingual conjoined twins. Saleem acts as a delightful guide to magical happenings and historical context alike. Although his birthday is a day of celebration, it also marks a turbulent period in Indian history. In 1948, the leader of the Indian independence movement, Mahatma Gandhi, was assassinated. Independence also coincided with Partition, which divided British-controlled India into the two nations of India and Pakistan. This contributed to the outbreak of the Indo-Pakistani Wars in 1965 and 1971. Saleem touches on all this and more, tracing the establishment of Bangladesh in 1971 and the emergency rule of Indira Gandhi. This vast historical frame is one reason why "Midnight’s Children" is considered one of the most illuminating works of postcolonial literature ever written. This genre typically addresses the experience of people living in colonized and formerly colonized countries, and explores the fallout through themes like revolution, migration, and identity. Rushdie, who like Saleem was born in 1947, was educated in India and Britain, and is renowned for his cross-continental histories, political commentary, and magical realism. He enriches "Midnight’s Children" with a plethora of Indian and Pakistani cultural references, from family traditions to food, religion and folktales. Scribbling by night under the watchful eyes of his lover Padma, Saleem’s frame narrative echoes that of "1001 Nights," where a woman named Scheherazade tells her king a series of stories to keep herself alive. And as Saleem sees it, 1001 is “the number of night, of magic, of alternative realities.” Over the course of the novel, Rushdie dazzles us with multiple versions of reality. Sometimes, this is like reading a rollercoaster. Saleem narrates: “Who what am I? My answer: I am everyone everything whose being-in- the-world affected was affected by mine. I am anything that happens after I’ve gone which would not have happened if I had not come. Nor am I particularly exceptional in this matter; each 'I,' every one of the now-six- hundred-million-plus of us, contains a similar multitude. I repeat for the last time: to understand me, you’ll have to swallow a world.” Saleem’s narrative often has a breathless quality— and even as Rushdie depicts the cosmological consequences of a life, he questions the idea that we can ever condense history into a single narrative. His mind-bending plot and shapeshifting characters have garnered continuing fascination and praise. Not only did "Midnight’s Children" win the prestigious Man Booker Prize in its year of publication, but in a 2008 competition that pitted all 39 winners against each other, it was named the best of all the winners. In a masterpiece of epic proportions, Rushdie reveals that there are no singular truths— rather, it’s wiser to believe in several versions of reality at once, hold many lives in the palms of our hands, and experience multiple moments in a single stroke of the clock.

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翻译人员: Carol Wang 校对人员: Harper Chang故事开篇是倒计时场景。1947年8月14日的孟买，临近午夜，一个女人正在分娩。在被英国占领和统治近两个世纪后，整个印度都屏住呼吸， 等待宣布独立的时刻。午夜钟声敲响时分，一名呱呱坠地的婴儿 和两个新国家同时诞生了。这些事件构成了《午夜之子》的基础，英籍印度作家萨尔曼·鲁西迪 写就了这部引人入胜的小说。这个与印度同龄的婴儿，就是小说的主角撒利姆·撒奈伊。他的自述涵盖了他三十多年的生活，以探寻家庭秘密和深层谜团为主线，回忆和正叙穿插进行。这些秘密就包括最大的谜团： 撒利姆拥有神奇力量，这与他的出生时间有某种关联。他并非唯一，所有午夜时分和接近午夜出生的孩子都被赋予了非凡的能力。比如女巫帕瓦缇，超棒的魔术师；撒利姆的对手希瓦，天生的斗士。撒利姆借助心灵感应能力，能与午夜之子的 庞大网络建立联系——包括能穿越时间和镜面的人、能在水中改变性别的人、和会多种语言的连体双胞胎。撒利姆以亲和的解说者身份，讲述了那些神奇事件 和当时的历史背景。虽然他的生日是举国庆祝日，但它同时也标志着 印度历史上的动荡时期。在 1948 年，印度独立运动领袖圣雄甘地被暗杀。印巴分治日恰好与印度独立同日，它将原来由英国控制的印度分为印度和巴基斯坦两个国家，这导致了 1965 和 1971 年 印巴战争的爆发。除此之外，撒利姆的讲述 延伸到了更广的时空，追溯到 1971 年孟加拉国的建立和英迪拉·甘地的紧急统治。如此庞大的历史框架使得《午夜之子》成为 有史以来最具启发性的后殖民文学作品之一。这种题材通常聚焦于 殖民地和前殖民地国家的人民的生活经历，并通过革命、移民和身份等主题， 探讨其长远的社会后果。和撒利姆一样，鲁西迪生于 1947 年， 曾在印度和英国接受教育，以其跨东西方的历史及政治评论和魔幻现实主义而闻名。他用大量的印巴文化充实了《午夜之子》的内容，涵盖家庭传统、饮食、 宗教文化和民间故事。在爱人帕德玛的密切注视下， 撒利姆利用夜间勤奋写作，其故事的叙事结构 呼应了《一千零一夜》，其中一位叫山鲁佐德的女子 通过每夜给国王讲故事以活下来。正如撒利姆所理解的，1001 这个数字代表了 “黑夜、魔法、多重现实的数量”。在小说的进展中，鲁西迪以多种版本的现实 令我们目不暇接；有时，故事情节 就像过山车一样跌宕起伏。撒利姆叙述说：“我是谁？我是什么呢？ 我的答案是：我是在这个世界上受到 我的影响的每一个人，每一件事。我是我离开后发生的任何事，那些如果我不来 就不会发生的事。在这件事上我也不例外；每个“我”，和我们现在 六亿多人中的每一个一样，都包含着类似的个体。我最后一次重申：要想了解我， 必须要了解整个世界。”萨利姆的叙事方式 往往具有震撼人心的效果 ——即使当鲁西迪在描绘 生命的宇宙学后果时，他也在质疑将历史 浓缩成单一事件的可能性。其离奇古怪的故事情节和变形人物获得了持续不断的关注和赞美。《午夜之子》出版当年，即获享誉小说界的布克奖；2008 年，在 39 位获胜者角逐 布克奖四十年来最重要的小说评比中，《午夜之子》拔得头筹。在这部史诗般的杰作中，鲁西迪揭示出， 没有单一的真理 ——相反，更为明智的做法是 同时相信几个版本的现实，用手握住多重生命，在每次时间滴答声中， 体验多重的生命时刻。

**P763 2019-08-09 The secret student resistance to Hitler - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=763)

In 1943 Allied aircraft swooped over Nazi Germany, raining tens of thousands of leaflets on people below. Written by anonymous Germans, the leaflets urged readers to renounce Hitler, to fight furiously for the future— and to never give up hope. Their call to action rippled through homes and businesses— and news of their message even reached concentration camps and prisons. It was only after the war had ended that the authors’ identities, stories, and tragic fate would come to light. When Hitler seized power 10 years earlier, Hans and Sophie Scholl were teenagers in the town of Forchtenberg. At that time, fear, propaganda, and surveillance kept all aspects of life for the Scholl family and millions of other Germans under Nazi control. The government specifically targeted young people, setting up institutions to regulate their behavior and police their thoughts. As teenagers, Hans was a member of the Hitler Youth and Sophie joined The League of German Girls. Hans rose through the ranks and oversaw the training and indoctrination of other young people. In 1936, he was chosen to carry the flag at a national rally. But when he witnessed the zeal of Nazi rhetoric, he began to question it for the first time. Meanwhile, Sophie was also starting to doubt the information she was being fed. Their parents Robert and Magdalena, who had feared they were losing their children to Nazi ideology, encouraged these misgivings. At home, Robert and Magdalena listened to foreign radio stations that the government first discouraged and later banned. While the government churned out national broadcasts which denied Nazi atrocities, the Scholls learned shocking truths. And yet, they were still subject to the rules of life in Hitler’s Germany. After the outbreak of war, Sophie reluctantly worked for the national effort, and Hans had to take on army duties while attending medical school in Munich. That was where Hans met Christoph Probst, Willi Graf and Alexander Schmorell. Day by day, each grew more sickened by Nazi ideology. They longed to share their views. But how could they spread them, when it was impossible to know who to trust? And so, the friends decided to rebel anonymously. They pooled their money and bought printing materials. An acquaintance let them use a cellar under his studio. In secret, they began drafting their message. In June 1942, mysterious anti-Nazi leaflets began appearing all over Munich. They were signed: the White Rose. The first leaflet denounced Hitler and called for Germans to sabotage the war effort: “Adopt passive resistance… block the functioning of this atheistic war machine before it is too late, before the last city is a heap of rubble… before the last youth of our nation bleeds to death... Don’t forget that each people gets the government it deserves!” At a time when a sarcastic remark could constitute treason, this language was unprecedented. It was written mostly by Hans Scholl. In 1942, Sophie came to Munich knowing nothing of her brother’s activities. She soon encountered the leaflets at school. But it was not until she discovered evidence in Han’s room that she realized who’d written them. Her shock soon gave way to resolve: she wanted in. For both siblings, it was time to escalate the fury that had been brewing for years. From June 1942 to February 1943, the group worked feverishly. While the Gestapo searched for leads, the White Rose were constantly on guard. The war raged on. Regulations tightened, and Munich suffered air raids. But the White Rose ventured deeper into conspiracy. They graffitied buildings and braved trains swarming with Gestapo. In the winter of 1942, Hans made a treacherous journey to the Czechoslovakian border to meet anti-Nazi rebels. On February 18, 1943, Sophie and Hans brought a suitcase of leaflets to their university. A custodian noticed what they were doing and reported them to the Gestapo. Both calmly denied any involvement— until the police gathered all the leaflets and placed them back in the empty case, where they fit perfectly. When Hans and Sophie confessed, they were immediately led to court and sentenced to death by guillotine. Despite a grueling interrogation, the two refused to betray their co-conspirators. Before her execution, Sophie declared her fury at the state of her country. But she also spoke to a more hopeful future: “How can we expect righteousness to prevail when there is hardly anyone willing to give himself up individually to a righteous cause? Such a fine, sunny day, and I have to go, but what does my death matter, if through us, thousands of people are awakened and stirred to action?”

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=763)

翻译人员: Harper Chang 校对人员: Liang Shuo1943 年，同盟国的飞机 在纳粹德国上空俯冲，洒下数万张传单。这些来自匿名德国人的传单 鼓励人们反抗希特勒政权，并奋力争取未来，永不放弃希望。这些呼吁在家庭和企业间扩散开来，甚至传入了监狱和集中营。直到战争结束后，传单作者 的身份、 故事和悲惨命运才为大众所知。10年前，也就是希特勒掌权之时，汉斯·朔尔和索菲·朔尔 是福希滕堡小镇的少年兄妹。当时，恐惧、政治宣传和监视全方位包围着纳粹控制下的千万德国公民与家庭。纳粹政府针对青年设立了专门机构以监控其行为，管制其思想。汉斯曾是希特勒青年团的成员，索菲也曾加入德国女青年联盟。随着汉斯不断升官，他开始负责监督 对青年的训练和教化。1936 年，他被选为 国家集会上的举旗手。但当他目睹了狂热的纳粹口号后，他第一次对此产生了质疑。同时，索菲也开始 怀疑她被灌输的信息，他们的父母， 罗伯特和马格达琳娜，因害怕纳粹思想会夺走孩子，也鼓励他们勇敢质疑。在家里，罗伯特和马格达琳娜 收听外国的广播电台，这些电台先是被政府抵制， 然后被禁止。同时，政府大量推出 否认纳粹暴行的全国广播，但朔尔一家已然知晓震惊的真相。不过，他们仍服从着 纳粹德国的生存法则。战争爆发后，索菲不得不为国家效力，汉斯被迫在慕尼黑大学 求学医学期间担下军职。就在此时，汉斯遇到了克里斯托夫·普罗布斯特、 维利·格拉夫和亚历山大·施莫雷尔。随着时间流逝， 他们对纳粹思想的愤怒越发深重。他们渴望向民众分享观点。但如何在一个遍布眼线的 社会传播信息呢？于是他们决定秘密反抗。他们共同筹钱购买印刷材料，在一位熟人提供的地下室里，他们开始秘密地起草传单内容。1942 年 6 月，神秘的反纳粹传单 开始在慕尼黑出现，传单的署名为：白玫瑰。第一份传单指责了希特勒的恶行，并呼吁德国人破坏纳粹的战争准备：“……采取消极抵抗，阻止这个无视神明的战争机器， 在无法挽回之前，在最后一座城市沦为废墟之前，在祖国最后一个青年 葬身血泊之前……别忘了，每个公民都有权 得到想要的政府！”在那个讽刺都能构成叛国罪的年代，这样激进的话语无疑是前所未有的，其中大部分出自汉斯之手。1942 年，索菲来到了慕尼黑， 当时她对哥哥的活动一无所知。不久，她便在学校得到了传单。直到在汉斯的房间里发现证据，她才意识到传单由谁攥写。她的决心战胜了震惊：她要加入。对于这对兄妹，是时候 释放他们积攒多年的愤怒了。从 1942 年 6 月到 1943 年 2 月， 白玫瑰组织不知疲倦地工作。盖世太保开始搜查传单的主谋，白玫瑰必须时刻保持戒备。战火蔓延，规定愈发严格， 慕尼黑惨遭空袭，但白玫瑰做出了更大胆的冒险行动。他们在建筑物上涂鸦， 勇敢地面对挤满盖世太保的火车。1942 年冬天，汉斯正式踏上了叛变之旅，他到捷克斯洛伐克的边境 会见了反纳粹的反抗军。在 1943 年 2 月 18 日，索菲和汉斯带着 装满传单的行李箱进入大学。一个看门人注意到了他们在做什么， 于是报告给了盖世太保。兄妹二人都冷静地 否认进行了任何活动，直到警察收集了所有传单， 并放回空行李箱，发现正好装满。索菲和汉斯坦承后，他们立刻被送上法庭，被判处砍头处决。尽管受到残酷的审问， 两人都拒绝出卖同伴。行刑之前，索菲表示了 对祖国现状的愤怒，但她也希冀着光明的未来：“若无人为正义献身，又如何期望正义胜利呢？天气真好，阳光明媚，我得走了。我的死亡无足挂齿，惟愿以我之死， 换千万人之觉醒奋战。"

**P764 2019-08-12 What makes neon signs glow A 360° animation - Michael Lipman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=764)

When the Hoover Dam was completed in 1936, it created a huge source of hydroelectric power and zapped a sleepy desert town to life: Las Vegas, Nevada. With the power supply from the dam, Las Vegas soon exploded with vibrant displays. The source of these dazzling lights was electrified neon gas. There are two tricky obstacles to making lighted signs out of this naturally clear, odorless gas: capturing it and making it glow. French inventor Georges Claude came up with techniques to do both. In 1902, he developed a way of liquefying and separating specific gases from the air, producing neon on an industrial scale for the first time. By 1910, he had come up with a way to trap the gas in a glass tube with a special electrode at either end, and neon lighting was born. In workshops like Claude's, artisans known as tube-benders made neon signs by hand. The tube-benders heated small sections of a long, hollow glass tube and quickly bent them into shape. After the glass cooled, they attached electrodes to each end and removed the air with a vacuum pump. Then, they passed a high voltage current through the tube to remove any impurities on the inside of the glass. Finally, they pumped the neon gas in and sealed off the electrodes. When a neon sign is turned on, the electric current causes some of the neon atoms' electrons to accelerate and break free of their orbits, leaving behind positively charged ions. As these free electrons rush from one electrode to the other, they collide with more neon atoms, causing them to ionize as well. When these excited electrons fall back to their normal energy levels, their excess energy is carried away by photons, or particles of light. All this happens in an instant, and the glow from the photons is what we see when we switch on a neon sign. Though it's common to call any gas-filled sign a "neon" sign, there are actually 5 different gases used in production. Each gas emits photons of a different wavelength when electrified, which correspond to different colors of light. Neon gives off an orange-red glow, argon glows a pale lavender, helium a dusty pink, krypton a silver- white, and xenon a light purple. These 5 gases can be combined with color-coated tubing to create an electrified rainbow of text and images. Business owners soon realized how effective these colorful beacons were for attracting customers. And unlike a light bulb, a neon sign has no incandescent filaments to burn out, and can shine continuously for 40 years before the gas depletes. By the 1930s, neon signs were lighting up storefronts all over the world. Because of the glass tubes' fragile nature, it usually wasn't feasible to ship them over long distances. Instead, most neon signs were created by local neon shops and then installed nearby. Signs with humor, personality, and intricate designs proliferated, no two exactly alike. But by the end of World War II, plastics had become widely available and inexpensive, and plastic signs supplanted neon as messengers of modernity. Many towns removed neon signs they viewed as old-fashioned. Today, neon sign production is only a fraction of what it was at its peak, but the craft of tube bending lives on relatively unchanged. New creations hand-crafted by local artisans join survivors from the heyday of neon, hiding in plain sight in city streets around the world.

**P764 2019-08-12 What makes neon signs glow A 360° animation - Michael Lipman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=764)

翻译人员: Rich Lee 校对人员: Jiasi Hao当胡佛水电站于 1936 年建成后，它成为了水力发电的巨大源头并使一座寂静的沙漠小镇恢复了生机： 内达华州的拉斯维加斯。拥有了来自水坝的电力供应后，色彩鲜艳的广告牌很快 在拉斯维加斯涌现。这些耀眼的灯光来源于带电的氖气。用这种无色无味的天然气体 来制作灯光标志，会面临两个棘手的障碍：那就是获取，以及使它发光。法国发明家乔治 · 克劳德（Georges Claude） 想出了能解决那两个问题的技术。在 1902 年，他研发出了一种能从空气中液化 并分离特定气体的方法，第一次以工业规模生产氖气。1910 年，他想出了一种方法： 将气体充满玻璃管，并一种特殊的电极接在玻璃管两端， 霓虹灯就这样诞生了。在像克劳德这样的工作间中，是由被称为弯管匠的手工艺人 来制作霓虹灯广告牌。弯管匠加热长而中空的 玻璃管的一小部分然后快速将它们塑形。玻璃管冷却后， 他们会将电极固定在两端然后用真空泵抽除气体。接着，他们让高压电流通过管子以除去玻璃内部的杂质。最后，他们将氖气注入 并将电极封住。当霓虹灯广告牌被打开，电流使一些氖原子的电子 加速并脱离轨道，留下大量带正电荷的离子。当这些自由电子 从电极的一端涌向另一端，它们会与更多的氖原子碰撞， 并使自身也离子化。当这些激发态的电子 回到它们的正常能级时，它们多余的能量 会被光子或光粒子带走。这些全部发生在一瞬间，光子所发出的光 便是我们看到的开启的霓虹灯广告牌。我们通常把充满气体的灯 统称为“霓虹灯”，但事实上， 有五种不同的气体用于填充。每种气体在带电时 会发射不同波长的光子，这些光子对应着不同的颜色。氖气发出橙红色的光， 氩气发出淡紫色的光，氦气是浅灰粉色，氪气是银白色， 氙气是亮紫色。这五种气体可以和彩色涂层管结合创造出由文字和图像组成的彩虹。商人们很快意识到 这些五彩斑斓的灯标能够非常有效地吸引顾客。不像电灯泡， 霓虹灯广告牌不需要燃烧白炽灯丝，并且能在气体耗尽前持续工作 40 年。到了 20 世纪 30 年代， 霓虹灯广告牌在世界各地的店铺亮起。因为玻璃管易碎的性质，长距离的运输 对于霓虹灯来说通常是不可行的。所以大多数霓虹灯广告牌 是由当地的霓虹灯商店制造并在附近安装。幽默、个性和复杂的 广告牌设计不断涌现，没有两个一模一样的。但是到第二次世界大战的尾声时，塑料普遍变得可用且便宜，塑料广告牌作为现代化的信使 取代了霓虹灯广告牌。很多城镇移除了 在他们看来已经过时的霓虹灯广告牌。如今，霓虹灯广告牌的生产 仅是之前高峰时期的零头，但弯管的手艺， 相对而言依然如故地继续存在着。当地工匠手工制作的创新产品加入了霓虹灯全盛时期的 幸存广告牌中，躲藏在世界各地城市街道 平淡无奇的地方。

**P765 2019-08-13 A day in the life of a Celtic Druid - Philip Freeman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=765)

As the sun rises on a fall morning in 55 BCE, Camma lays two pigeons on the altar at the center of her village. She offers a prayer to Matrona mother goddess of the Earth, and Lugus chief of the gods. Then, she wrings the birds’ necks and cuts them open to examine their entrails for divine messages. Camma is a druid. This means she conducts religious rites, but she also serves as a judge, healer, and scholar, teaching children and mediating conflict between Celtic tribes. She began her studies as a child, memorizing the countless details necessary to perform her many roles, since the druids’ knowledge is considered too sacred to record in writing. Like many druids, she spent years studying in Britain. Now, she is a resident Druid of the Veneti tribe in a small farming village near the western coast of Gaul, in what is now France. Since returning to Gaul, she has received many offers of marriage– but she has decided to devote herself to her work, at least for now. This morning, the omens are troubling. They tell of war and strife, as they often have in recent months. A neighboring tribe, the Redones, have raided their village and stolen cattle in broad daylight twice this fall. The children have gathered around to watch her work. Camma plays her lyre and sings to them. She weaves stories of the powerful kings who once ruled their land – brave warriors who were slain naked in combat but who will be reborn, as will all the Celts. When the children go off to help in the fields, Camma heads across the village to visit an old woman with an eye infection. On the way to the old woman’s hut, she passes men salting pigs for the winter food supply and women weaving clothing from dyed wool. She delivers a remedy for the injured eye– it’s made from mistletoe, a sacred healing plant, but deadly if used incorrectly. From there, Camma visits the chieftain to discuss the omens. She convinces him to go and talk through their problems with their neighbors. Accompanied by several warriors, they head through the forest and demand a meeting outside the Redones’ village walls. The Redones’ representatives bring their own druid, who Camma recognizes from the annual gathering in central Gaul where head druids are elected. The chieftains immediately begin to argue and threaten each other. Camma steps between the opposing sides to stop them from fighting— they must honor her authority. Finally, the Redones agree to pay Camma’s tribe several cattle. In spite of this resolution, Camma still feels uneasy on the long walk home. As they approach the village walls, a bright streak shoots across the sky— another omen, but of what? Back home, Camma sits among the elders for her evening meal of porridge, a bit of meat, and a cup of wine. While they were out during the day, an intercepted parchment arrived. Camma recognizes the writing immediately. Although the druids are forbidden from recording their knowledge, she and many other young druids can read Latin. From the message, she learns that the Romans are drawing closer to their lands. Some of the elders say that the tribe should flee to the nearby hills and hide, but Camma counsels them to trust in the gods and remain in their home. Privately, she has her doubts. Should the Romans reach them, her power to help might be limited. Unlike the other Celtic tribes, Roman legions have no regard for the druids’ sacred role as peacemakers. Before going to bed, she observes the course of the planets and consults her charts, trying to make sense of the meteor she saw earlier. The signs are converging on a larger threat than their neighbors.

**P765 2019-08-13 A day in the life of a Celtic Druid - Philip Freeman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=765)

翻译人员: Carol Wang 校对人员: Thomas Tam公元前 55 年的秋日， 清晨的太阳正冉冉升起，卡玛把两只鸽子 放在村中央的祭坛上，她向大地之母玛特罗娜 和众神之主鲁格斯祈祷。然后，她扭断鸟脖，打开鸟体以检查其内脏 有无神的旨意。卡玛是一位德鲁伊，负责主持宗教仪式，还是法官、治疗师和学者，她教孩子们学习，并调解凯尔特人部落之间的冲突。她从小就开始学习，要记住行使她诸多职能 所必需的无数细节，因为德鲁伊的知识太神圣了， 不允许用书面形式记录。像许多德鲁伊一样， 她在英国学习了多年。现在，她是威尼蒂部落的 常驻德鲁伊，该部落位于高卢西海岸 附近的一个小农村，位于现在的法国。回到高卢后，她收到了许多求婚——她仍然决心全身投身工作， 至少现在是这样。今天早上的预兆令人不安，关乎战争与纷争， 这也是近几个月经常发生的。一个邻近的部落雷诺斯，今年秋天，竟然在光天化日之下 两次袭击他们村，还偷走了牛。孩子们聚在她身边，看她工作。卡玛弹起里拉琴并唱歌给孩子们听，歌词讲述那些曾经统治过 他们土地的强大国王的故事——战斗中赤膊上阵的 勇敢斗士将会重生，所有的凯尔特人也会像他们一样。当孩子们散开去田间帮忙时，卡玛穿过村庄去探望 一位眼睛感染的老妇人。在前往老妇人小屋的路上，她路遇男人们 在用盐腌猪肉准备过冬、女人们用染色羊毛编织衣服。她送去了治疗受伤眼睛的疗法——它是由神圣的治疗植物槲寄生制成，但如果使用不当，则会致命。在那里，卡玛去拜访酋长 讨论那个预兆，并说服酋长去和邻近部落 探讨他们之间存在的问题。在几个斗士的陪同下，他们一行人穿过森林，要求在雷诺斯村庄的墙外会谈。雷诺斯的代表也带了他们的德鲁伊，卡玛认识她，是在选举产生德鲁伊首领的 年度聚会上认识的。酋长们立即开始争辩并互相威胁，卡玛走到对立双方之间， 阻止他们打起来——他们必须尊重她的权威。最后，雷诺斯部落 同意赔偿卡玛的部落几头牛。尽管争端解决，走在漫长回家路上， 卡玛还是觉得内心不安。当他们快抵达村庄的墙时， 一道明亮线条穿过夜空——有另一个预兆，但是什么呢？卡玛回到家里， 坐在长辈中间一同晚餐，有粥、一点肉和一杯葡萄酒。他们白天外出时， 有人送来了截获的羊皮纸，卡玛立刻认出上面写了什么。虽然禁止德鲁伊们记录所学知识，但她和许多其他年轻的德鲁伊 都可以阅读拉丁语。从这个消息中，她得知 罗马人离他们的土地越来越近。部分长老认为，整个部落 应逃到附近山上藏起来，但是卡玛告诉他们 要相信众神、并留在家中。私底下，她还是疑虑重重。要是罗马人到来， 她能帮的忙可能有限。与其他凯尔特人部落不同，罗马军团并不尊重德鲁伊 作为和平缔造者的神圣角色。在睡觉之前，她观察了行星轨迹并查阅图表，试图解释之前看到的流星，这些迹象标明， 这次的威胁比邻国要大很多。

**P766 2019-08-13 A day in the life of a Cossack warrior - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=766)

Despite a serene sunset on the Dnipro river, the mood is tense for the Zaporozhian Cossacks. The year is 1676, and the Treaty of Żurawno has officially ended hostilities between the Polish-Lithuanian Commonwealth and the Ottoman Empire. But as Stepan and his men ride towards their stronghold, peace is far from their minds. Having made their home in the Wild Fields north of the Black Sea, these cossacks— derived from a Turkic word for "free man"— are renowned as one of Europe’s most formidable military forces. Composed of hunters, fishermen, nomads and outlaws, the Cossacks found freedom in these fertile unclaimed lands. Yet this freedom has proven increasingly difficult to maintain. Their decades-long strategy of shifting alliances between Poland and Moscow has led to the partitioning of their lands. In a desperate bid to reclaim independence and reunite the fractured Cossack state, their most recent leader, hetman Petro Doroshenko allied with the Ottoman Empire. This alliance successfully freed the Zaporozhian Cossacks in the west from Polish dominion, but their victory was a bitter one. Doroshenko’s Ottoman allies ravaged the countryside, carrying off peasants into slavery. And outrage at allying with Muslims against fellow Christians cost him any remaining local support. Now, with Doroshenko deposed and exiled, the Cossacks are at odds, disagreeing on what their next move should be. Until then, Stepan must keep order. With his musket and curved saber, he cuts an imposing figure. He surveys his battalion of 180 men. Most are Orthodox Christians and speak a Slavic language that will become modern Ukrainian. But there are also Greeks, Tatars, and even some Mongolian Kalmyks, many with different opinions on recent events. Officially, all of Stepan’s men have sworn to uphold the Cossack code by undergoing seven years of military training and remaining unmarried. In practice, some are part-timers, holding more closely to their own traditions, and maintaining families in nearby villages, outside Cossack lands. Thankfully, the tenuous peace is not broken before they reach the Sich— the center of Cossack military life. Currently located at Chortomlyk, the Sich’s location shifts with the tide of military action. The settlement is remarkably well- organized, with administrative buildings, officers’ quarters, and even schools, as Cossacks prize literacy. Stepan and his men make their way to the barracks where they live and train alongside several other battalions or kurins, all of which make up a several hundred man regiment. Inside, the men dine on dried fish, sheep’s cheese, and salted pork fat— along with plenty of wine. Stepan instructs his friend Yuri to lighten the mood with his bandura. But before long, an argument has broken out. One of his men has raised a toast to Doroshenko. Stepan cuts him off. The room is silent until he raises his own toast to Ivan Sirko, the new hetman who favors an alliance with Moscow against the Turks. Stepan plans to support him, and he expects his men to do the same. Suddenly, one of Sirko’s men rushes in, calling an emergency Rada, or general council meeting. Stepan and the others make their way towards the church square— the center of Sich life. Ivan Sirko welcomes the confused crowd with exciting news— scouts have located a large Ottoman camp completely vulnerable on one side. Sirko vows that tomorrow, they will ride against their common enemy, defend the Cossacks’ autonomy, and bring unity to the Wild Fields. As the men cheer in unison, Stepan is relieved at their renewed sense of brotherhood. Over the next 200 years, these freedom fighters would take on many foes. And tragically, they would eventually become the oppressive hand of the Russian government they once opposed. But today, these 17th century Cossacks are remembered for their spirit of independence and defiance. As the Russian painter Ilya Repin once said: “No people in the world held freedom, equality, and fraternity so deeply.”

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翻译人员: Carol Wang 校对人员: Shanshan (Alice) Lin虽然聂伯河上的落日十分宁静，扎波罗热哥萨克人依然情绪紧张。时值 1676 年， 茹拉夫诺条约签订正式终结了波兰立陶宛联邦 和奥斯曼帝国间的敌对关系。但当史戴潘与他的人马 朝他们的据点前进时，就没想过“和平”二字。在黑海北方的大草原定居之后，这些哥萨克人 —— 来自突厥语"自由人"一词 ——成为了一支闻名欧洲的 让人畏惧的强劲之旅。这些哥萨克人由猎人、渔民、 游牧民族和亡命徒组成，在这些无人认领的沃土上， 他们找到了自由。可是，这自由越来越难以维持，在波兰和莫斯科之间 长达数十年变换同盟关系的战略，导致他们的土地被分割。他们不顾一切地想要恢复独立 并使破碎的哥萨克重新统一，新领导人盖特曼·多罗申科指挥官 和奥斯曼帝国结为同盟。这个联盟成功地解放了 西方被波兰统治的札波罗结哥萨克人，但这场胜利也付出了惨重代价。多罗申科的奥斯曼盟友劫掠乡间，抓走农夫、迫其为奴。因为多罗申科和穆斯林结盟 来对抗基督教徒引发众怒，致使他失去了原有的当地支持。多罗申科被罢免、放逐，哥萨克人四分五裂， 对下一步行动难以达成共识。在达成共识之前， 史戴潘必须维持秩序。他带着毛瑟枪和弧形军刀， 塑造了使人印象深刻的形象。他调查了自己的 180 人营队，大部分是东正教基督徒，讲斯拉夫语，即现代的乌克兰语。但是也有希腊人、鞑靼人， 甚至一些蒙古卡尔梅克人，很多人对当时的局势 持着不同的意见。理论上，所有史戴潘的人 都要宣誓遵守哥萨克法典，接受七年军事训练，并保持未婚。但实际上，有些人是兼差的， 更倾向于遵从他们自己的传统，并在哥萨克土地外 附近的村庄里成立家庭。值得庆幸的是，在到达塞契前， 脆弱的和平并没有被打破——塞契是对哥萨克 军事生活中心的称呼。目前赛契设在乔尔托姆利克，但会随着军事行动而迁址。这个定居地的组织良好， 设有行政大楼、军官的总部，甚至学校， 因为哥萨克人很重视识字。史戴潘和他的人马抵达了 他们居住和训练的兵营，营中还有数支其他军队，每支军队都是数百人的军团。在营中，大家吃的是晒干的鱼、 羊乳起司、咸猪肥肉 ——还有许多葡萄酒。史戴潘指示他的朋友尤里 用班杜拉琴来活跃气氛。但不久就起了争执。他的手下之一举杯敬多罗申科，史戴潘阻止了他。房间中一片寂静， 直到他举杯致敬伊万·西尔科，一名新的指挥官， 倾向与莫斯科结盟对抗突厥人。史戴潘打算要支持他， 他也期望自己的手下会跟进。突然， 西尔科的一名手下冲进来，传达要召开紧急拉达， 即全体会议。史戴潘和其他人赶到教堂广场——塞契生活的中心地点。伊万西尔科向困惑的人群 宣布了振奋人心的消息——侦察兵发现一大型奥斯曼营地， 且营地一侧的防守特别薄弱。西尔科誓言，明天， 他们要出征对抗他们共同的敌人，保卫哥萨克的自治权， 并一统乌克兰原野。当大家一致欢呼时，这种重新找回的兄弟情感 让史戴潘松了一口气。在接下来的两百年里， 这些自由斗士会面对许多敌手。他们曾经对抗过俄国政府，但不幸的是，他们最后会成为 俄国政府镇压施政的帮手。但现今，大家记得这些 十七世纪的哥萨克人，是因为他们的独立与反抗精神。俄国画家伊利亚·列宾曾说过：“世界上没有其他人对自由、 平等和友爱抱着如此深切的感情。 ”

**P767 2019-08-28 Why should you read “The God of Small Things” by Arundhati Roy - Laur**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=767)

“A few dozen hours can affect the outcome of whole lifetimes/ And that when they do, those few dozen hours, like the salvaged remains of a burned clock… must be resurrected from the ruins and examined.” This is the premise of Arundhati Roy’s 1997 novel "The God of Small Things." Set in a town in Kerala, India called Ayemenem, the story revolves around fraternal twins Rahel and Estha, who are separated for 23 years after the fateful few dozen hours in which their cousin drowns, their mother’s illicit affair is revealed, and her lover is murdered. While the book is set at the point of Rahel and Estha’s reunion, the narrative takes place mostly in the past, reconstructing the details around the tragic events that led to their separation. Roy’s rich language and masterful storytelling earned her the prestigious Booker prize for "The God of Small Things." In the novel, she interrogates the culture of her native India, including its social mores and colonial history. One of her focuses is the caste system, a way of classifying people by hereditary social class that is thousands of years old. By the mid-20th century, the original four castes associated with specific occupations had been divided into some 3000 sub-castes. Though the caste system was Constitutionally abolished in 1950, it continued to shape social life in India, routinely marginalizing people of lower castes. In the novel, Rahel and Estha have a close relationship with Velutha, a worker in their family’s pickle factory and member of the so-called “untouchable” caste. When Velutha and the twins’ mother, Ammu, embark on an affair, they violate what Roy describes as the “love laws” forbidding intimacy between different castes. Roy warns that the tragic consequences of their relationship “would lurk forever in ordinary things,” like “coat hangers,” “the tar on roads,” and “the absence of words.” Roy’s writing makes constant use of these ordinary things, bringing lush detail to even the most tragic moments. The book opens at the funeral of the twins’ half-British cousin Sophie after her drowning. As the family mourns, lilies curl and crisp in the hot church. A baby bat crawls up a funeral sari. Tears drip from a chin like raindrops from a roof. The novel forays into the past to explore the characters’ struggles to operate in a world where they don’t quite fit, alongside their nation’s political turmoil. Ammu struggles not to lash out at her beloved children when she feels particularly trapped in her parents’ small-town home, where neighbors judge and shun her for being divorced. Velutha, meanwhile, balances his affair with Ammu and friendship with the twins not only with his employment to their family, but also with his membership to a budding communist countermovement to Indira Ghandi’s “Green Revolution.” In the 1960s, the misleadingly named “Green Revolution” introduced chemical fertilizers and pesticides and the damming of rivers to India. While these policies produced high-yield crops that staved off famine, they also forced people from lower castes off their land and caused widespread environmental damage. When the twins return to Ayemenem as adults, the consequences of the Green Revolution are all around them. The river that was bursting with life in their childhood greets them “with a ghastly skull’s smile, with holes where teeth had been, and a limp hand raised from a hospital bed.” As Roy probes the depths of human experience, she never loses sight of the way her characters are shaped by the time and the place where they live. In the world of "The God of Small Things," “Various kinds of despair competed for primacy… personal despair could never be desperate enough... personal turmoil dropped by at the wayside shrine of the vast, violent, circling, driving, ridiculous, insane, unfeasible public turmoil of a nation.”

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翻译人员: Chong Liu 校对人员: Yanyan Hong短短几十个小时的时间 可能影响人生的轨迹。当这种情况发生了，这几十个小时就像 烧毁的时钟内部的残渣，需要从废墟中复生，并被重新审视。这是阿兰达蒂 · 洛伊（Arundhati Roy） 写于 1997 年的小说《微物之神》的核心概念。故事发生在印度喀拉拉邦 一座名叫艾曼南的小镇，情节围绕着一对异卵双胞胎 拉海儿和艾斯沙展开，两人在经历了命运攸关的 几十个小时，他们的表亲溺水，他们母亲的外遇被揭露， 而她的情人被谋杀，之后开始了长达 23 年的分离。虽然小说从拉海儿 和艾斯沙的重逢写起，主要讲述的却是过去，以重现那场造成 他们分离的悲剧的细节。洛伊丰富的语言和巧妙的叙事，使她的《微物之神》一书 获得了知名的布克奖。在书中，她审视了印度的本土文化，包括社会风俗与殖民历史，其中的一个聚焦点是种姓制度一种通过世袭社会阶层 来划分人民的方式。其存在已有数千年之久，二十世纪中叶以前，原本与特定职业相关的四大种姓，被划分成 3000 个亚种姓。虽然种姓制度在 1950 年 被从宪法中废除，它仍持续影响着印度的社会生活，一如既往地边缘化低种姓人群。小说中，拉海尔和艾斯沙与一个 名叫维鲁沙的人有着密切的关系。维鲁沙是他们家 腌菜工厂的一名工人，并且来自所谓的“贱民”种姓，当维鲁沙和双胞胎的 母亲阿慕进入恋情时，他们违反了洛伊书中提到的“爱的法则”，通过禁止不同种姓的人建立亲密关系。洛伊警示着两人关系的悲剧后果，“将永远隐藏在平凡的事物里”， 像是“挂衣钩”、“路上的焦油沥青”以及“无言的缄默”。洛伊在写作中时常 运用这些平凡的事物，即便是最具悲剧性的时刻 也用丰富的细节描绘。这本书是在双胞胎的同父异母，英国表亲索菲溺水后的葬礼上开始的。当家人在哀悼时， 百合花在炎热的教堂里卷曲着，一只小蝙蝠爬上了葬礼的纱丽，眼泪从下巴上滴落下来， 就像雨滴从屋顶上滴落下来。这部小说通过对过去的探索，展现了主人公们在一个 不太适应的世界里的挣扎，以及他们国家的政治动荡。阿慕努力不猛烈抨击她心爱的孩子，当她感觉自己被困在 她父母的小镇的家，那里的邻居评判和躲避她的离婚，与此同时，维鲁沙平衡了 他与阿慕的关系以及他与双胞胎的友谊。不仅因为他在他们家工作，还因为他加入了一个 正在萌芽的共产主义反运动，以对抗英迪拉 · 甘地的“绿色革命”。20 世纪 60 年代，名称很容易 造成误导的“绿色革命”的运动，将化肥、杀虫剂和河流筑坝，引入了印度。虽然这些政策生产了 高产量作物，避免了饥荒，但它们也迫使来自较低种姓的 人们离开他们的土地，并造成了大面积的环境污染。当这对双胞胎成年后 回到阿伊梅尼姆时，四处可见绿色革命造成的后果，他们童年时，生气勃勃的河流现在却用“可怕的骷髅般的笑容， 掉了牙的模样，从病床上抬起 一只软弱无力的手”来迎接他们。当罗伊深入探究人类的经历时，她从未忘记她笔下的人物是如何被时间和居住地所塑造的，在《微物之神》的世界里，“各种各样的绝望竞相 争得至高无上的地位，个人的绝望永远深陷卑微……个人的混沌被遗弃在一个国家 巨大、暴力、流转、强劲、荒谬、疯狂、不当的公共混乱中的路边神社。”

**P769 2019-09-06 Are we living in a simulation - Zohreh Davoudi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=769)

We live in a vast universe, on a small wet planet, where billions of years ago single-celled life forms evolved from the same elements as all non-living material around them, proliferating and radiating into an incredible ray of complex life forms. All of this— living and inanimate, microscopic and cosmic— is governed by mathematical laws with apparently arbitrary constants. And this opens up a question: If the universe is completely governed by these laws, couldn’t a powerful enough computer simulate it exactly? Could our reality actually be an incredibly detailed simulation set in place by a much more advanced civilization? This idea may sound like science fiction, but it has been the subject of serious inquiry. Philosopher Nick Bostrom advanced a compelling argument that we’re likely living in a simulation, and some scientists also think it’s a possibility. These scientists have started thinking about experimental tests to find out whether our universe is a simulation. They are hypothesizing about what the constraints of the simulation might be, and how those constraints could lead to detectable signs in the world. So where might we look for those glitches? One idea is that as a simulation runs, it might accumulate errors over time. To correct for these errors the simulators could adjust the constants in the laws of nature. These shifts could be tiny— for instance, certain constants we’ve measured with accuracies of parts per million have stayed steady for decades, so any drift would have to be on an even smaller scale. But as we gain more precision in our measurements of these constants, we might detect slight changes over time. Another possible place to look comes from the concept that finite computing power, no matter how huge, can’t simulate infinities. If space and time are continuous, then even a tiny piece of the universe has infinite points and becomes impossible to simulate with finite computing power. So a simulation would have to represent space and time in very small pieces. These would be almost incomprehensibly tiny. But we might be able to search for them by using certain subatomic particles as probes. The basic principle is this: the smaller something is, the more sensitive it will be to disruption— think of hitting a pothole on a skateboard versus in a truck. Any unit in space-time would be so small that most things would travel through it without disruption— not just objects large enough to be visible to the naked eye, but also molecules, atoms, and even electrons and most of the other subatomic particles we’ve discovered. If we do discover a tiny unit in space-time or a shifting constant in a natural law, would that prove the universe is a simulation? No— it would only be the first of many steps. There could be other explanations for each of those findings. And a lot more evidence would be needed to establish the simulation hypothesis as a working theory of nature. However many tests we design, we’re limited by some assumptions they all share. Our current understanding of the natural world on the quantum level breaks down at what’s known as the planck scale. If the unit of space-time is on this scale, we wouldn’t be able to look for it with our current scientific understanding. There’s still a wide range of things that are smaller than what’s currently observable but larger than the planck scale to investigate. Similarly, shifts in the constants of natural laws could occur so slowly that they would only be observable over the lifetime of the universe. So they could exist even if we don’t detect them over centuries or millennia of measurements. We're also biased towards thinking that our universe’s simulator, if it exists, makes calculations the same way we do, with similar computational limitations. Really, we have no way of knowing what an alien civilization’s constraints and methods would be— but we have to start somewhere. It may never be possible to prove conclusively that the universe either is, or isn’t, a simulation, but we’ll always be pushing science and technology forward in pursuit of the question: what is the nature of reality?

**P769 2019-09-06 Are we living in a simulation - Zohreh Davoudi**

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翻译人员: Carol Wang 校对人员: Jiasi Hao我们生活在广阔宇宙中的 一个潮湿的小星球上，早在数十亿年前，单细胞生命形式就从与其周围的非生命物质 相同的元素中演变出来，并不断繁衍和发展出 大量的复杂生命形式。无论其有无生命、 微观的还是庞大的，所有这一切都明显受到 任意常量的数学法则的支配。这就提出了下面的问题：如果宇宙完全受这些法则支配的话，那么，功能强大的计算机 难道不能完全模拟它吗？我们的现实世界是否真的是被更先进的文明 所设定出来的精细模拟呢？可能该想法听起来像科幻，但它已成为严肃研究的主题。哲学家尼克·伯斯特罗姆 提出了令人信服的论点，即我们很可能生活在一个模拟中，而一些科学家也认为这是可能的。这些科学家已经开始考虑 进行实验测试，以发现我们的宇宙是否为模拟的。他们假设了模拟的可能约束条件，以及这些约束条件可能 如何在世界上产生可检测的迹象。那么，我们去哪里找寻 这些蛛丝马迹呢？一个想法是，随着模拟的进行，随着时间的推移， 错误可能会被积累。为了纠正这些错误，可调整模拟器 自然法则中的常量。这些变化可能很小 ——例如，我们用百万分之几的精度 所测量的某些常量已经稳定了几十年，因此，任何偏离 都控制在较小范围内。但随着我们对这些常量 测量精度的提高，随着时间推移， 我们可能会发现那些细微变化。从有限计算能力的角度， 另一个可能需要关注的概念是：即无论多大的有限计算能力 都无法模拟无极限的东西。如果空间和时间是连续的，即使宇宙极小的一部分 也具有无限的点组成，无法用有限的计算能力进行模拟。因此，模拟必须以非常小的片段 来表示空间和时间，微小到几乎难以理解。但是，我们或许能够寻找它们，通过使用某些亚原子粒子作为探针。基本原理是：物体越小的话， 对干扰就越敏感 ——试想地面坑洼 对驶过的滑板和卡车的不同影响。时空中的微粒都特别小，以至于多数物体都 不受干扰地通过 ——不仅是肉眼可见的大物体，还有分子、原子，甚至电子，以及我们已发现的其它 多数亚原子粒子也不受干扰。若我们确实在时空中 发现了一个微小单位，或者在自然定律中 发现了一个移动常量，那是否就证明了 宇宙就是一个模拟世界？不 —— 这只是许多步骤中的第一步，其中任意一个发现 可能还有其它解释。而且，作为一个有效运行 的自然理论，建立这个模拟假设需要更多的证据。无论我们设计了多少种测试，都受到了一些假设的共同限制。我们目前对量子水平自然界的理解不适用于普朗克尺度。如果时空单位基于普朗克尺度，那么，我们将无法 按当前的科学理解来寻找它。仍然有大量的比我们目前能观察到的小， 但大于普朗克尺度的东西需要我们去探究。同理，自然定律常量的变化 可能发生得太过缓慢，以至于只有在宇宙的 整个生命周期中才能观察到。因此，即使我们在几个世纪 或几千年的测量中没能发现它们，它们也可能是存在的。如果宇宙模拟器存在的话，我们还偏向于认为 其运算方式与我们相同，即具有类似的计算限制。确实，我们无从知晓外星文明的约束条件和方法，但我们必须从某个地方着手研究。可能最终都永远无法证明宇宙是否为模拟的，但我们将一直推动科技发展去追寻这个问题的答案：现实的本质是什么？

**P770 2019-09-06 Einstein's twin paradox explained - Amber Stuver**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=770)

On their 20th birthday, identical twin astronauts volunteer for an experiment. Terra will remain on Earth, while Stella will board a spaceship. Stella’s ship will travel at 86.6% the speed of light to visit a star that is 10 light-years away, then return to Earth at the same speed. As they prepare to part ways, the twins wonder what will happen when they’re reunited. Since a light year is exactly the distance light can travel in a year, Stella’s journey should take 23 years. But from having studied special relativity, the twins know it’s not that simple. First of all, the faster an object moves through space, the slower it moves through time compared to an unmoving observer. This relationship can be quantified with something called the Lorentz factor, which is defined by this equation. And secondly, the length of a moving object as measured by an observer at rest will contract by the same factor. At 86.6% of the speed of light the Lorentz factor is 2, meaning time will pass twice as slowly aboard the spaceship. Of course, Stella won’t notice time slowing down. That’s because all time-based processes in the ship will slow down as well– clocks and electrical devices; Stella’s biological activities including her rate of aging and her perception of time itself. The only people who could notice time on the moving spaceship passing slower for Stella would be observers in an inertial, or non-accelerating, reference frame– like Terra back on Earth. Thus, Terra concludes that when they meet back on Earth, she’ll be older than Stella. But that’s just one way of looking at things. Because all movement is relative, Stella argues it would be just as valid to say her spaceship will stand still while the rest of the universe, including Terra, moves around her. And in that case, time will pass twice as slowly for Terra, making Stella the older twin in the end. They can’t each be older than the other, so which one of them is right? This apparent contradiction is known as the “Twin Paradox.” But it’s not really a paradox– just an example of how special relativity can be easily misunderstood. To test their theories in real-time, each of the twins agrees to send a burst of light to the other every time a year has passed for them. Unlike other objects, the speed of light is always constant regardless of an observer’s reference frame. A light burst sent from Earth will be measured at the same speed as a light burst sent from the spaceship, regardless of whether it’s on its outbound or return trip. So when one twin observes a burst of light, they’re measuring how long it took the other twin to experience a year passing, plus how long it took for light to travel between them. We can track what’s happening on a graph. The X axis marks distance from Earth, and the Y axis tracks the passage of time. From Terra’s perspective, her path will simply be a vertical line, with distance equal to zero and each tick on the line equivalent to a year as she perceives it. Stella’s path will stretch from the same origin to a point 11.5 years in time and 10 light-years in distance from Terra… before converging again at zero distance and 23 years’ time. At her first one-year mark, Terra will send a pulse of light from Earth towards Stella’s spaceship. Since light takes a year to travel one light-year, its path will be a 45-degree diagonal line. And because Stella is traveling away from it, by the time the light catches up to her, over 7 total years will have passed for Terra, and over 4 for Stella. By the time Stella observes Terra’s second burst, she will already be on her return journey. But now, since she’s moving towards the source of the light, it will take less time to reach her, and she’ll observe the bursts more frequently. This means that Stella observes Terra aging slowly for the first half of her journey, but aging rapidly during the return half. Meanwhile for Stella, it seems as though Terra, the destination star, and the whole universe are moving around her. And because of length contraction, Stella observes the distance between them shrinking by a factor of 2. This means each leg of the trip will only take about six years from Stella’s perspective. When she sends the first signal to Earth, two years will have passed for Terra. Stella will send four more light bursts during her outbound journey, each one from farther away. By the time Terra observes the first pulse from Stella's inbound journey, over 21 years will have passed for her. For the rest of Stella's return home, Terra receives multiple light bursts each year. Thus, Terra observes Stella aging slowly for about 90% of their 23 years apart, and aging rapidly during the last 10%. This asymmetry accounts for why the paradox isn’t really a paradox. Although each twin witnesses time both speeding up and slowing down for the other, Stella sees an even split, while Terra sees Stella aging slowly for most of the time they’re apart. This is consistent with each twin’s measurement of the space voyage, which takes 23 Earth years, but only 11.5 as experienced aboard the ship. When the twins are reunited, Terra will be 43 years old, while Stella will be 31. Where Stella went wrong was her assumption that she and Terra had equal claim to being inertial observers. To be an inertial observer, one has to maintain a constant speed and direction relative to the rest of the universe. Terra was at rest the entire time, so her velocity was a constant zero. But when Stella changed her direction for the return journey, she entered a different reference frame from the one she’d started in. Terra and Stella now both have a better understanding of how spacetime works. And as twins who are eleven years apart in age, they’re a perfect example of special relativity.

**P770 2019-09-06 Einstein's twin paradox explained - Amber Stuver**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=770)

翻译人员: Carol Wang 校对人员: Lipeng Chen一对同卵双胞胎宇航员 20 岁生日时， 自愿参加了一项实验。特拉将留在地球上， 而史黛拉将登上一艘太空船。史黛拉的飞船将去拜访 距我们 10 光年的一颗恒星，飞船速度是光速的 86.6％，然后再以同样速度返回地球。当他们准备分别时，这对双胞胎也想知道， 她们再相聚时会发生什么。1 光年指光在一年中传播的距离，所以史黛拉的旅程应该是 23 年。但是通过研究狭义相对论，她俩知道事情没那么简单。首先，与静止的观察者相比，物体在空间运动的速度越快， 时间就会过得越慢。这种关系可以用洛伦兹因子来量化，这是洛伦兹因子的定义公式。其次，观察者在静止状态下测量的移动物体的长度 将收缩相同的因子。当速度为光速的 86.6％ 时， 洛伦兹因子为 2，意味着飞船上的时间 慢为原来时间的一半。当然，史黛拉觉察不到时间在变慢，因为飞船上所有基于时间的 进程也都会变慢——时钟和电子设备、包括史黛拉衰老速度在内的生理活动、以及她对时间的感知。移动飞船上史黛拉的时间变慢了，唯一能觉察到这一点的人是在惯性或非加速参考系中的观察者,譬如在地球上的特拉。因此，特拉得出结论，当她俩在地球上再次相遇时， 她将比史黛拉年龄大，但这只是看待这件事的一面。因为所有运动都是相对的，史黛拉认为太空船静止不动，而是包括特拉在内的整个宇宙 都围绕她运动的说法同样有效。在这种情况下，特拉的时间 将慢为原来的二分之一，而最后年龄更大的是史黛拉。而她俩不可能都比对方年长， 那么，哪种说法正确呢？这种明显的矛盾 被称为“双生子佯谬”。但这并非一个真正的悖论，只是狭义相对论易被误解的一个例子。为了实时检验他们的理论，两个双胞胎商定，每一年过去的时候 都向对方发出光脉冲。与其他物体不同，无论观察者的参考系如何， 光速始终是恒定的。无论是发出去的光还是收到的光，从地球发出光脉冲的测速与从飞船发出光脉冲的测速相同。因此，当双胞胎中的一人 观察到光脉冲的时候，即可测得另一人的一年的时间加上两点间传播所需的时间。我们可从图表上观察所发生的事情：X 轴表示距地球的距离， Y 轴表示所用的时间。从特拉的角度看，她的轨迹是一条垂直线，距离为零，并且直线上的每个刻度 相当于她所感知的一年。史黛拉的轨迹首先从相同原点出发，延伸到一点，其时间坐标 11.5 年， 距离坐标是特拉的距离 10 光年；然后再汇合到零距离和 23 年的时间点。在特拉的第一年，她将从地球发出光脉冲， 射向史黛拉的飞船。由于光需要一年才能传播一光年，因此其轨迹将是一条 45 度对角线。而且由于史黛拉正驶离光线，等光线追上她的时候，特拉已过了 7 年多， 史黛拉过了 4 年以上。等到史黛拉观察到 特拉的第二次光脉冲时，已是在返程途中。但此时的她正朝着光源前进，光到达她的时间会缩短，而且她会更频繁地观察到光脉冲。这意味着，在旅程的前半段，史黛拉会观察到特拉衰老减缓，而返程时，她则观察到特拉加速衰老。同时，对于史黛拉来说，特拉、目的地和整个宇宙 似乎都在围绕她移动。由于长度的收缩，史黛拉观察到 她俩的间距离缩小了一半。这意味着，从史黛拉的角度来看，每段行程仅需约 6 年的时间。当她向地球发送第一个信号时， 对于特拉来说已经过去了两年。史黛拉在前往恒星的旅程中 将再发出四次光脉冲，一次比一次离地球远。等特拉观察到史黛拉返程中 发出的第一个光脉冲时，时间已过了 21 年多。对于史黛拉返回地球的剩余旅程，特拉每年都会收到多个光脉冲。因此，在分开的 23 年里， 特拉观察到：在 90% 的时间里， 史黛拉减缓衰老， 而在最后的 10％ 时间，她则加速衰老。这种不对称解释了 为何该悖论并非真正的悖论。尽管双胞胎二人都见证了彼此的时间加速和减速，但史黛拉看到的是 时间均等的加速和减速，而特拉在大部分时间里 看到的是史黛拉减缓衰老。这与每个双胞胎所测量的 对太空航行的结果是一致的，该过程需要 23 个地球年， 但飞船上只有 11.5 年。当双胞胎团聚时，特拉 43 岁， 而史黛拉将会是 31 岁。史黛拉出错是因为她的假设错了，即假设她和特拉都是惯性观测者。作为惯性观测者，必须相对于宇宙的其余部分 保持恒定的速度和方向。特拉一直处于静止状态， 因此她的速度恒定为零。但当史黛拉改变方向返程时，她输入的参考系 与开始时的参考系不同。特拉和史黛拉现在 对时空工作原理有了更深了解，而且，作为一对相差 11 岁的双胞胎，她俩是狭义相对论的完美典范。

**P771 2019-09-12 What causes an economic recession - Richard Coffin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=771)

For millennia, the people of Britain had been using bronze to make tools and jewelry, and as a currency for trade. But around 800 BCE, that began to change: the value of bronze declined, causing social upheaval and an economic crisis— what we would call a recession today. What causes recessions? This question has long been the subject of heated debate among economists, and for good reason. A recession can be a mild decline in economic activity in a single country that lasts months, a long-lasting downturn with global ramifications that last years, or anything in between. Complicating matters further, there are countless variables that contribute to an economy’s health, making it difficult to pinpoint specific causes. So it helps to start with the big picture: recessions occur when there is a negative disruption to the balance between supply and demand. There’s a mismatch between how many goods people want to buy, how many products and services producers can offer, and the price of the goods and services sold, which prompts an economic decline. An economy’s relationship between supply and demand is reflected in its inflation rates and interest rates. Inflation happens when goods and services get more expensive. Put another way, the value of money decreases. Still, inflation isn’t necessarily a bad thing. In fact, a low inflation rate is thought to encourage economic activity. But high inflation that isn’t accompanied with high demand can both cause problems for an economy and eventually lead to a recession. Interest rates, meanwhile, reflect the cost of taking on debt for individuals and companies. The rate is typically an annual percentage of a loan that borrowers pay to their creditors until the loan is repaid. Low interest rates mean that companies can afford to borrow more money, which they can use to invest in more projects. High interest rates, meanwhile, increase costs for producers and consumers, slowing economic activity. Fluctuations in inflation and interest rates can give us insight into the health of the economy, but what causes these fluctuations in the first place? The most obvious causes are shocks like natural disaster, war, and geopolitical factors. An earthquake, for example, can destroy the infrastructure needed to produce important commodities such as oil. That forces the supply side of the economy to charge more for products that use oil, discouraging demand and potentially prompting a recession. But some recessions occur in times of economic prosperity— possibly even because of economic prosperity. Some economists believe that business activity from a market’s expansion can occasionally reach an unsustainable level. For example, corporations and consumers may borrow more money with the assumption that economic growth will help them handle the added burden. But if the economy doesn’t grow as quickly as expected, they may end up with more debt than they can manage. To pay it off, they’ll have to redirect funds from other activities, reducing business activity. Psychology can also contribute to a recession. Fear of a recession can become a self-fulfilling prophecy if it causes people to pull back investing and spending. In response, producers might cut operating costs to help weather the expected decline in demand. That can lead to a vicious cycle as cost cuts eventually lower wages, leading to even lower demand. Even policy designed to help prevent recessions can contribute. When times are tough, governments and central banks may print money, increase spending, and lower central bank interest rates. Smaller lenders can in turn lower their interest rates, effectively making debt “cheaper” to boost spending. But these policies are not sustainable and eventually need to be reversed to prevent excessive inflation. That can cause a recession if people have become too reliant on cheap debt and government stimulus. The Bronze recession in Britain eventually ended when the adoption of iron helped revolutionize farming and food production. Modern markets are more complex, making today’s recessions far more difficult to navigate. But each recession provides new data to help anticipate and respond to future recessions more effectively.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=771)

翻译人员: Yen Doran 校对人员: Carol Wang千百年来，英国人民一直用青铜制造工具和珠宝，并用作贸易的货币。但大约在公元前 800 年， 状况开始改变：青铜的价值下降， 导致社会动荡和经济危机——即我们今天所称的经济衰退。是什么导致了经济衰退呢？长期以来，这个问题 一直是经济学家们激烈辩论的话题，并且有充分的理由。衰退可以是一个国家里持续数月的经济活动轻微下降，可以是一个持续几年、 影响全球的长期不景气，或是介于两者之间的情况。更复杂的情况下，有无数变量影响经济健康，造成难以确定具体原因。因此，从大局开始有助于理解：当不利冲击打破供需平衡，就会产生经济衰退。人们想买的商品数量、产品和服务生产商 可以提供的数量、以及商品和服务售价 三者间的不匹配引发了经济衰退。供需之间的经济关系反映在通货膨胀率和利率上。商品和服务越来越贵时， 就会发生通货膨胀。换句话说，钱贬值了。尽管如此，通货膨胀并不一定是坏事。事实上，低通货膨胀率 被认为可促进经济活动。但高通胀若无高需求与之相伴，既可带来经济问题， 又最终导致经济衰退。同时，利率则反映了个人和公司所承担债务的成本。利率，通常是贷款还清前 借款人向债权人所支付的利息与贷款总额的年度百分比。低利率意味着公司有能力借更多的钱，可以用来投资更多项目。同时，高利率也增加了 生产者和消费者的成本，进而放缓经济活动。通货膨胀和利率的波动可让我们洞察经济健康状况，但是首先，什么原因导致这些波动？最明显的原因像自然灾害、 战争这样的冲击，和地缘政治因素。例如，地震，能破坏生产重要商品所需的 基础设施，如石油。这迫使经济供给方对使用 油的产品收取更多费用，进而抑制需求，并可能引发经济衰退。但有些经济衰退 发生在经济繁荣时——甚至可能因为经济繁荣。一些经济学家认为，市场扩张的商业活动 可偶尔达到一个不可持续的水平。例如，在假定经济增长的前提下，公司和消费者可能借更多钱 来帮他们处理增加的负担。但是，如果经济增长不及预期，最终，他们可能 因还不上款而债台高筑。为了还清，他们必须 重新分配活动的资金，减少业务活动。心理状态也是经济衰退的因素，如果人们对经济衰退的恐惧 导致其撤回投资和消费，这种恐惧就成为自我实现的预言。为了应对，生产商可能降低运营成本，来帮助应对预期的需求下降。因为成本削减最终降低了工资， 这样可导致恶性循环，造成需求的再度减少。甚至预防经济衰退的政策， 也能促成经济衰退。困难时期，政府和央行可能会印钞，造成支出增加 和央行利率下降。较小的贷方可反过来降低其利率，有效使贷款“更便宜”以刺激消费。但是这些政策是不可持续的，最终需要回收货币 来防止过度通货膨胀。如果人们变得过于依赖 廉价贷款以及政府激励，这样可能导致经济衰退。当开始采用铁帮助 农业革命和粮食生产时，英国青铜经济衰退最终结束。现代市场更为复杂，使今天的经济衰退 更难以找到正确的方法应对。但每次经济衰退都提供了新数据,更有效地帮助预测 和响应未来的衰退。

**P772 2019-09-16 The ballet that incited a riot - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=772)

We typically think of ballet as harmonious, graceful and polished– hardly features that would trigger a riot. But at the first performance of Igor Stravinsky’s "The Rite of Spring," audience members were so outraged that they drowned out the orchestra. Accounts of the event include people hurling objects at the stage, challenging each other to fights, and getting arrested– all on what started as a sophisticated night at the ballet. First performed in May 1913 at the Théâtre des Champs-Elysées in Paris, "The Rite of Spring" is set in prehistoric times. The narrative follows an ancient Pagan community worshipping the Earth and preparing for the sacrifice of a woman intended to bring about the change of seasons. But the ballet is much more concerned with the violent relationship between humans, nature, and culture than with character or plot. These themes manifest in a truly upsetting production which combines harsh music, jerky dancing, and uncanny staging. It opens with dancers awakening to a solo bassoon, playing in an eerily high register. This gives way to discordant strings, punctured by unexpected pauses while the dancers twitch to the music. These frightening figures enact the ballet’s brutal premise, which set audiences on edge and shattered the conventions of classical music. In these ways and many more, "The Rite of Spring" challenged the orchestral traditions of the 19th century. Composed on the cusp of both the first World War and the Russian revolution, "The Rite of Spring" seethes with urgency. This tension is reflected in various formal experiments, including innovative uses of syncopation, or irregular rhythm; atonality or the lack of a single key, and the presence of multiple time signatures. Alongside these strikingly modern features, Stravinsky spliced in aspects of Russian folk music– a combination that deliberately disrupted the expectations of his sophisticated, urban audience. This wasn’t Stravinsky’s first use of folk music. Born in a small town outside of St. Petersburg in 1882, Stravinsky’s reputation was cemented with the lush ballet "The Firebird." Based on a Russian fairytale, this production was steeped in Stravinsky’s fascination with folk culture. But he plotted a wilder project in "The Rite of Spring," pushing folk and musical boundaries to draw out the rawness of pagan ritual. Stravinsky brought this reverie to life in collaboration with artist Nicholas Roerich. Roerich was obsessed with prehistoric times. He had published essays about human sacrifice and worked on excavations of Slavic tombs in addition to set and costume design. For "The Rite of Spring," he drew from Russian medieval art and peasant garments to create costumes that hung awkwardly on the dancers’ bodies. Roerich set them against vivid backdrops of primeval nature; full of jagged rocks, looming trees and nightmarish colors. Along with its dazzling sets and searing score, the original choreography for "The Rite of Spring" was highly provocative. This was the doing of legendary dancer Vaslav Nijinsky, who developed dances to rethink “the roots of movement itself.” Although Stravinsky later expressed frustration with Nijinsky’s demanding rehearsals and single-minded interpretations of the music, his choreography proved as pioneering as Stravinsky’s composition. He contorted traditional ballet– to both the awe and horror of his audience, many of whom expected the refinement and romance of the genre. The dancing in "The Rite of Spring" is agitated and uneven, with performers cowering, writhing and leaping about as if possessed. Often, the dancers are not one with the music but rather seem to struggle against it. Nijinsky instructed them to turn their toes inwards and land heavily after jumps, often off the beat. For the final, frenzied scene, a woman dances herself to death to loud bangs and jarring strings. The ballet ends abruptly on a harsh, haunting chord. Today, "The Rite of Spring" remains as chilling as its controversial debut, but the shockwaves of the original work continue to resound and inspire. You can hear Stravinsky’s influence in modern jazz’s dueling rhythms, folky classical music, and even film scores for horror movies, which still illicit a riotous audience response.

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翻译人员: Yanyan Hong 校对人员: Jiasi Hao我们一般会认为芭蕾是 和谐、优美和典雅的——不太可能和引发暴乱产生联系。但在伊戈尔·斯特拉文斯基（Igor Stravinsky） 《春之祭》的首场演出中，观众极其愤怒， 吵闹声甚至压过了管弦乐团。对该事件的记述包括： 观众往台上扔东西，互相挑起争执并打作一团， 随后多人被逮捕——一切都开始于 理应雅致的芭蕾舞之夜。1913 年 5 月，《春之祭》在巴黎香榭丽舍剧院 进行了首场演出，整部剧背景设定是在史前时期。故事讲述的是 一个古老的异教徒团体正在膜拜地球， 并且准备献祭一位女性，希望能改变季节的变化。但是这场芭蕾着重表现的是人类、自然与文化之间的暴力联系，而不是角色或是情节。这些主题充斥着令人烦乱的场景，像是刺耳的音乐、 急促的舞步和怪诞的舞台。开幕时，舞者在怪诞的高音域大管独奏中醒来。紧随其后的是极不协调的管弦乐， 穿插着各种出其不意的停顿，同时，舞者随着音乐颤动身体。这些令人毛骨悚然的身影 揭示了芭蕾舞暴力的预设，让观众紧张不安，并打破了古典音乐的传统韵律。除此之外，《春之祭》还通过多种方式挑战了 19 世纪的管弦乐传统。创作于第一次世界大战与俄罗斯革命的关口，《春之祭》点燃了一种急迫感。这种紧张感反映在了多种演奏尝试中，包括出其不意的停顿， 或是不规则的节奏；无调性或是单音缺失，以及使用多种节拍记号。除了这些非常现代的特征之外，斯特拉文斯基还结合了 俄罗斯民间音乐——这种结合有意打消了经验丰富的城市观众 对他的期待。这并不是斯特拉文斯基 首次使用民间音乐。1882 年出生在圣彼得堡外 一个小镇的斯特拉文斯基用华丽的芭蕾舞巨作《火鸟》 奠定了他的名声。这部作品取材于一个俄罗斯童话，内容充分体现了斯特拉文斯基对民俗文化的着迷。但他在《春之祭》中 策划了更狂野的设想，挑战了民俗和音乐的界限， 以呈现异教形式的原始性。通过和艺术家 尼古拉斯·洛里奇（Nicholas Roerich）合作，斯特拉文斯基得以让幻想成真。洛里奇很迷恋 文字记载出现之前的时代，他发表过一些关于活人祭的文章，并参与了斯拉夫墓的发掘工作。此外，他还从事布景和时装设计。在《春之祭》中， 他参考俄国中世纪艺术和农民的服饰，设计出了舞者身上简陋的服饰。洛里奇还将它们 搭配上了原始生动的布景——满是岩石，若隐若现的树木， 和噩梦般的色彩。炫目的布景以及刺耳的配乐让《春之祭》的原版编舞时刻挑战着观众的神经。这是传奇舞者 瓦斯拉夫·尼金斯基 （Vaslav Nijinsky）的杰作，他创作了让人反思 “动作之根本”的舞蹈。虽然斯特拉文斯基随后因尼金斯基对排练要求苛刻，且只对音乐做单一的诠释 而心生不满，但就如同斯特拉文斯基的作曲， 尼金斯基的编舞也极具开创性。他打破了传统的芭蕾——许多期待在作品中 体验优雅和浪漫的观众感觉到的却是敬畏和恐惧。《春之祭》的舞蹈很激烈、无序，表演者像是中了邪一样， 不停蜷缩、扭曲、来回跳跃。通常，舞者们没有与音乐合二为一，反而像是挣扎着摆脱音乐。尼金斯基要求 他们把脚趾转向内测，跳跃之后要重重落地， 而非踩在节拍上。在疯狂的最后一幕，一名女子在震耳欲聋的 管弦乐中独舞至死。这部芭蕾舞剧在刺耳、 恼人的和弦中唐突结束。今天，《春之祭》仍然和当年的首演一样 让人汗毛倒竖，但原作震撼人心的余波 仍然在久久回荡，启迪人心。受到斯特拉文斯基影响的 现代爵士乐中的决斗节奏、很多民间古典音乐， 甚至是恐怖电影的配乐，仍然会在观众席中引发一阵骚动。

**P773 2019-09-16 The myth of the Sampo— an infinite source of fortune and greed - Hann**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=773)

After a savage seafaring skirmish and eight long days of being battered by waves, Väinämöinen— a powerful bard and sage as old as the world itself— washed up on the shores of distant Pohjola. Unlike his home Kalevala, Pohjola was a dark and frozen land, ruled by Louhi, “the gap-tooth hag of the North." The cunning witch nursed Väinämöinen back to health but demanded a reward for returning him home. Not content with mere gold or silver, Louhi wanted what did not yet exist— the Sampo. To be forged from “the tips of white-swan feathers," “the milk of greatest virtue," “a single grain of barley," and “the finest wool of lambskins," this artifact was said to be an endless font of wealth. But Väinämöinen knew that only Seppo Ilmarinen, the Eternal Hammerer who forged the sky-dome itself, could craft such an object. So he convinced Louhi to send him home and fetch the smith. Though the journey was far from easy, the bard finally made it back to Kalevala. But Ilmarinen refused to go to the gloomy North— a land of witches and man-eaters. But keeping true to his word, Väinämöinen tricked Ilmarinen into climbing a giant tree, before summoning a mighty storm to carry the smith all the way to Pohjola. Ilmarinen was well received in the North. Louhi lavished her guest with extravagant hospitality and promised him the hand of her beautiful daughter— if he could craft what she wished. When she finally asked if Ilmarinen was capable of forging the Sampo, the powerful smith declared he could indeed accomplish the task. But try as he might to bend the forge to his will, its fires only produced other artifacts— beautiful in appearance but ill-mannered in nature. An elegant crossbow that thirsted for blood and a gleaming plow that ruined cultivated fields among others. Finally, Ilmarinen summoned the winds themselves to work the bellows, and in three days time he pulled the Sampo, with its lid of many colors from the forge’s flames. On its sides the smith carefully crafted a grain mill, a salt mill, and a money mill. Louhi was so delighted with the object’s limitless productive power that she ran off to lock her treasure inside a mountain. But when Ilmarinen tried to claim his prize, the promised maiden refused to marry him, and the smith had to return home alone. Years passed, and while Pohjola prospered, Ilmarinen and Väinämöinen were without wives or great wealth. Bitter about this injustice, the bard proposed a quest to retrieve the Sampo, and the two sailed north with the help of Lemminkäinen— a beautiful young man with a history of starting trouble. Upon arrival, Väinämöinen requested half the Sampo’s profits as compensation— or they’d take the artifact by force. Outraged at this request, Louhi summoned her forces to fight the heroes. But as her army readied for war, the bard played his magic harp, Kantele, entrancing all who heard it and sending Pohjola into a deep slumber. Unimpeded, the three men took the Sampo and quietly made their escape. Lemminkäinen was ecstatic at their success, and demanded that Väinämöinen sing of their triumph. The bard refused, knowing the dangers of celebrating too early. But after three days of traveling, Lemminkäinen’s excitement overwhelmed him, and he recklessly broke out in song. His awful singing voice woke a nearby crane, whose screeching cries roused the Pohjolan horde. The army made chase. As their warship closed in, Väinämöinen raised a rock to breach their hull. Undeterred, Louhi transformed into a giant eagle, carrying her army on her back as they attacked the heroes’ vessel. She managed to grab the Sampo in her claw, but just as quickly, it dropped into the sea, shattering into pieces and sinking deep beyond her talon’s reach. Buried on the ocean floor, the remnants of this powerful device remain in the realm of Ahti, god of water— where they grind salt for the seas to this very day.

**P773 2019-09-16 The myth of the Sampo— an infinite source of fortune and greed - Hann**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=773)

翻译人员: Carol Wang 校对人员: Lipeng Chen在经历了一次惨烈的航海冲突、在海上漂流了八天后，维纳莫宁，这位与世界 同样古老的强大诗人和智者，被海浪冲上了遥远的波希拉海岸。与他的家乡卡勒瓦拉不同， 波希拉是漆黑的冻土之地，统治者是北部领土的 宽牙缝女巫娄希。狡猾的女巫照料他康复，但送他回家的话，需要付报酬。娄希不要黄金或白银，她想要不存在的三宝磨。要用白天鹅的羽毛梢、 最美德的牛奶、一粒大麦和上好羊羔皮的毛 才能锻造出三宝磨，据说它是无尽财富的源泉 。但维纳默宁知道，只有打造天穹的铁匠、 号称“永恒之锤”的伊尔玛利宁才能造出这样的神器。因此，他说服娄希送他回家， 然后他把铁匠带回来。尽管旅途并不顺利， 但诗人最终回到了卡莱瓦拉，但是，伊尔玛利宁拒绝去北部——那女巫和食人族统治的阴暗之地。但是，为遵守诺言，维纳莫宁骗伊尔玛利宁 爬上了一棵大树，然后召来狂风， 将铁匠吹到了波希拉。伊尔玛利宁在北部大受欢迎，娄希殷勤地款待了他，并承诺，如果能按她的意愿去做，她就把自己的美丽女儿嫁给他。最后，她问伊尔玛利宁 能否造出三宝磨，这位强大的铁匠宣称， 他确实可以完成任务。但是，他尽其所能 按照意愿打造的铸铁，煅烧后的产物却面目全非——外观漂亮，却毫无用处——如造型优雅但嗜血的弩、闪闪发光但毁坏耕地的犁，等等。最后，伊尔玛利宁唤风吹起风箱，三天后，三宝磨制成，盖子的多彩彩色 就是火焰的颜色。铁匠在三宝磨的侧面，精心制作了谷磨、盐磨和钱磨。娄希对神器的无限生产力非常满意，当场带着宝贝逃走， 把宝贝锁进一座山里。当伊尔玛利宁要领取奖赏时， 许诺的少女却拒绝嫁给他，铁匠只好独自返回家园。多年之后，波希拉越来越繁荣，而维纳莫宁和伊尔玛利宁 却既无钱又无妻。维纳莫宁深感命运不公， 发誓要夺回三宝磨，因此，在勒明盖宁的帮助下， 他俩航海北上——帅气年轻的勒明盖宁素来好事。抵达后，维纳莫宁索要 三宝磨的一半利润作为赔偿，否则，就强行带走神器。这项要求激怒了娄希， 她召集军队与英雄们对诀。但她的军队准备应战时， 维纳莫宁弹起魔法竖琴康特勒，迷住了所有听到琴声的人， 并将波希拉送入沉睡中。三人畅通无阻地 带着三宝磨悄悄逃脱。勒明盖宁对成功欣喜若狂，遂让维纳莫宁歌唱他们的胜利。诗人知道过早庆祝太危险， 就拒绝了他的提议。但是经过三天的航行后， 受勒明盖宁的兴奋感染，他鲁莽地打开歌喉。他可怕的歌声惊醒了附近的一只鹤，鹤嘶哑的叫声唤醒了波希拉部落，军队追赶而至。当他们的战舰逼近时， 维纳莫宁举起岩石砸破了船体，娄希毫不畏惧地化身为巨鹰，背起军队去袭击英雄的船，她则设法用爪子抓起了三宝磨，但它即刻就掉入海中，摔成碎片，沉入她爪子够不到的海底。三宝磨葬身海底，这个强大设备的残骸留在水神阿赫第的领地——时至今日还一直为这片海域磨盐。

**P774 2019-09-20 The Prison Break \_ Think Like A Coder, Ep 1**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=774)

Upon emerging from stasis, Ethic is the unfortunate recipient of three surprises. The first: a prison cell. The second: complete amnesia. And the third: a mysterious stranger has gotten stuck squeezing through the bars on her window. His name is Hedge, and he has come to help Ethic save the world. But first they have to break out of jail. Hedge turns his hand into a lockpick and outlines the challenge ahead. Each lock in the prison works in the same unusual way. Inside the keyhole is a red dial that can be rotated to one of 100 positions numbered 1 through 100. The key for a given cell spins the dial to the right position, which, when stopped there, makes it turn green and unlocks the door. It would be out of the question to steal keys from a guard, but Hedge has a better idea. Hedge can carry out Ethic‘s commands. If Ethic tells him to walk 5 steps forward, turn right, then walk another 5 steps, that’s exactly what he’ll do. Hedge needs specific instructions though. If Ethic says “pick the lock” or “try every combination” that would be too vague, but “spin the dial 5 positions forward” would work. Once out of the cell, they will only have a few moments to crack the lock for the outer prison door too before the guards catch them. So what instructions will allow Hedge to efficiently open any door? Pause now to figure it out for yourself. Before we explain the solution, here’s a hint. A key programming concept that can help unlock the door is called a loop. This can be one or more instructions that Hedge will iterate— or repeat— a specified number of times, like “jump up and down 100 times.” Or an instruction that Hedge will repeat until a condition is met, such as “keep jumping up and down until it’s 7 o’clock.” Pause now to figure it out for yourself. The first thing that’s clear is that you need to find a way for Hedge to try every combination until one works. What takes a little more effort is how exactly you do so. One solution would be to instruct Hedge to try every combination in succession. Try 1 and check the light. If it turns green, open the door, and if not, try 2. If that doesn’t work try 3. All the way up to 100. But it would be tedious to lay that out in its entirety. Why write more than 100 lines of code, when you can do the same thing with just 3? This is where a loop comes in. There are a few ways to go about this. The lock has 100 positions, so Ethic could say “Check the dial’s color, then spin the dial forward once, for 100 repetitions. Remember where the dial turns green, then have Hedge set it back to that number.” A loop like this, where you specify the number of times it repeats, is called a “for" loop. But an even more efficient loop would have Hedge spin the dial one position at a time until it turns green and as soon as that happens, have him stop and open the door. That way if the door unlocks on 1, he doesn’t need to cycle through all the rest of the numbers. This is an “until” loop, because it involves doing an action until a condition is met. A similar, alternate approach would be to turn the dial while it’s still red, then stop. That’s called a “while” loop. Back to the adventure. Hedge loops through the combinations, and the cell opens at 41. Ethic and Hedge wait until the perfect moment in the guards’ rotation and make a break for it. Soon, Ethic faces a choice: hide inside a mysterious crystal, or try to crack the outer door and make a run for it. Ethic chooses to run. The second door takes Hedge longer, requiring him to spin all the way to 93. But he gets it open and takes the opportunity to explain why he’s rescued Ethic. The world is in turmoil: robots have taken over, and only Ethic can set things right. In order to do so, they’ll need to collect three powerful artifacts that are being used for nefarious purposes across the land. Only then can Ethic return to the world machine— that giant crystal— to set things right. Ethic may have escaped the prison… but what has she gotten herself into?

**P774 2019-09-20 The Prison Break \_ Think Like A Coder, Ep 1**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=774)

翻译人员: Carol Wang 校对人员: Jiasi Hao[ 像程序员一样思考 ][ 地点：监狱 ][ 第一集 越狱 ]艾斯克刚从休眠中醒来，就不幸遇到了三重意外。第一个意外：牢房，第二个意外：完全失忆，第三个意外：一个神秘的陌生生物 在她牢房窗户的横条间卡住了，他叫海吉， 来帮助艾斯克拯救世界。但是，他们首先要逃出监狱才行。海吉把他的手变成一个开锁器， 并概述了他们将要面临的挑战。监狱中的每一把锁 都是用同一种特别的原理制成的，钥匙孔内部是一个红色拨盘，可以转至数字 1 到 100 的 任意一位置。每个牢房的钥匙 可将拨盘转到正确位置，当钥匙停在该位置时， 锁盘变绿，牢门即打开。从守卫那里偷钥匙是不可能的，但海吉有个更好的主意。海吉能执行艾斯克的命令，如果艾斯克让他先前行 5 步，右转拨盘，接着再前行 5 步，海吉就会完全照办。但海吉需要具体的指示。如果艾斯克说“选锁” 或“尝试每个组合”，指令就太过模糊， 但“拨盘转 5 个位置”就可行。一旦离开牢房， 在守卫抓住他们之前，他们也只有几分钟时间 去打开监狱外门的锁。那么什么指令可以使海吉 高效地打开任何一扇门呢？暂停播放，自行解决谜题。我们解答前，给出如下提示：一个帮助开锁的 关键编程概念叫做“循环”。它可以是一个或多个指令组合，海吉可迭代或重复执行的 指定次数，如“上下跳跃 100 次”。或者是海吉重复执行某指令， 直到满足某个条件即停止，如“上下跳跃直到 7 点钟”。[ 若自行解题，可暂停播放 ]很明显，首先你要为海吉 找到一种方法，尝试每种组合， 直到一个可行为止。需要付出更多努力的是 你如何能精确做到这一点，一种方法是指示海吉 连续尝试每种组合。尝试 1， 并检查指示灯。如果灯变绿色，打开门； 否则尝试 2 。如果 2 不行，尝试 3 …… 一直尝试到 100 。但若将 100 个组合 全部试一遍就太繁琐了，只用 3 行代码能完成同样的事，为何要编写 100 多行的代码呢？“循环”语句应运而生，有几种方法可以实现。锁内有 100 个 孔位，艾斯克可以说：“检查拨盘颜色，然后转 1 次， 重复转动 100 次。记住拨盘变绿的位置，全部试完后， 再让海吉设置回开锁位置”。这种设定循环次数的循环，称为 “for” 循环。但还有一种更高效的循环，让海吉将拨盘一次转一个位置， 直到变成绿色为止，一旦拨盘变绿色， 让他停下，并打开门。采用这种方法的话，如果转到 1 门就开了， 他没必要继续转拨盘了。上面就是一个 “until” 循环，因为它涉及持续执行操作， 直到条件满足为止。一种类似的替代方法是在拨盘仍为红色时转动， 否则就停止。这就是 “while” 循环。现在回到故事中，海吉循环转动拨盘组合， 转到 41 时，牢门开了。艾斯克和海吉 等到守卫轮班的最佳时刻，成功逃出牢房。很快，艾斯克面临选择：是藏到一个神秘的水晶里， 还是尝试打开外门冲出去。艾斯克选择冲出去。第二道门花了更长时间， 海吉一直旋转拨盘直到 93 。但最终他打开了门，并借此机会解释了 为何他要拯救艾斯克。世界正处于动荡之中：机器人已经接管了一切， 只有艾斯克才能使其回到正轨。为实现这个目标，他们需要收集三件强大神器，在地球上它们被用于邪恶目的。只有到了那时， 艾斯克才能回到世界机器——那块巨大的水晶中—— 让世界恢复正常秩序。艾斯克可能已逃离监狱……但是她又陷入了什么困境呢？

**P775 2019-09-23 Why should you read Dante’s “Divine Comedy” - Sheila Marie Orfano**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=775)

“Abandon all hope, ye who enter here… ” Inscribed above the Gate of Hell, these ominous words warn dark tidings for Dante as he begins his descent into inferno. Yet despite the grim tone, this prophecy sets into motion what is perhaps the greatest love story ever told; an epic journey that encompasses both the human and the divine. But for Dante to reach benevolent salvation, he must first find his way through Hell. This landscape of torture is the setting for "Inferno," the first in a three-part narrative poem written by Dante Alighieri in the 14th century. Casting himself as the protagonist, Dante travels deeper and deeper into Hell’s abyss, witnessing obscene punishments distinct to each of its nine realms. Beginning in Limbo, he travels through the circles of Lust, Gluttony, Greed, Wrath, Heresy, Violence, and Fraud, to the horrific ninth circle of Treachery, where sinners are trapped under the watchful eyes of Satan himself. The following two parts, "Purgatorio" and "Paradiso," continue Dante’s journey, as he scales the Mount of Purgatory and ascends the nine celestial spheres of Heaven. Written together over 10 years, these 3 sections comprise the "Divine Comedy"– an allegorical imagining of the soul’s journey towards God. But Dante’s "Divine Comedy" is more than just religious allegory. It’s also a witty, scathing commentary on Italian politics. A soldier and statesman from Florence, Dante was staunchly faithful to God, but often critical of the Roman Catholic Church. He particularly disliked its rampant nepotism and practice of simony, the buying and selling of religious favours such as pardons from sin. Many groups took advantage of these corrupt customs, but few supported them as much as the Guelfi Neri, or Black Guelphs. This was a political and religious faction which sought to expand the pope’s political influence. Dante was a member of the Guelfi Bianchi, or White Guelphs– who believed Florence needed more freedom from Roman influence. As a public representative for the White Guelphs, Dante frequently spoke out against the pope’s power, until the Black Guelphs leveraged their position to exile him from Florence in 1302. But rather than silencing him, this lifelong exile led to Dante’s greatest critique of all. Dishonored and with little hope of return, the author freely aired his grievances with the Church and Italian society. Writing the "Divine Comedy" in Italian, rather than the traditional Latin of the educated elite, Dante ensured the widest possible audience for his biting political commentary. In the "Inferno’s" circle of the Wrathful, Dante eagerly witnesses sinners tear Black Guelph Filippo Argenti limb from limb. In the circle of Fraud, Dante converses with a mysterious sinner burning in the circle’s hottest flames. He learns that this is Pope Nicholas III, who tells Dante that his two successors will take his place when they die— all three guilty of simony and corruption. Despite the bleak and sometimes violent imagery in "Inferno," the "Divine Comedy" is also a love story. Though Dante had an arranged marriage with the daughter of a powerful Florentine family, he had also been unrequitedly in love with another woman since he was nine years old: Beatrice Portinari. Despite allegedly meeting just twice, she became Dante’s lifelong muse, serving as the inspiration and subject for many of his works. In fact, it’s Beatrice who launches his intrepid journey into the pits of Hell and up the terraces of Mount Purgatory. Portrayed as a powerful, heavenly figure, she leads Dante through "Paradiso’s" concentric spheres of Heaven until he is finally face-to-face with God. In the centuries since its publication, the "Divine Comedy’s" themes of love, sin, and redemption have been embraced by numerous artists– from Auguste Rodin and Salvador Dali, to Ezra Pound and Neil Gaiman. And the poet himself received his own belated, earthly redemption in 2008, when the city of Florence finally revoked Dante’s antiquated exile.

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翻译人员: David Tang 校对人员: Wanting Zhong“入此门者，当放弃一切希望……”是刻在地狱之门上方的不祥之辞,对开始堕入地狱的但丁预示着阴凶之讯，尽管气氛骇人，这行谶言却辟启了可谓 史上最伟大的爱情故事，一场人神共存的史诗之旅。若要获得仁慈的救赎，但丁必先穿度地狱。这酷滥的景象便是《地狱篇》的设定。十四世纪，由但丁 · 阿利吉耶里 所作的叙事诗分为三篇，《地狱篇》正为其一。但丁让自己担任主角，他不断深入地狱的严渊，目睹九层地狱中， 每一层独有的暴戾惩罚。他开始行迳层层地狱，从灵薄狱 到贪色、饕餮、贪婪、愤怒、异教、强暴、欺诈，一直到惨怖的第九层：背叛。在那，罪人被囚于撒旦自己的监视下。随后的《炼狱》与《天堂》二篇 继续叙述但丁的历程，他身登炼狱山，飞升九重天。这三部曲历时十年撰著， 一起构成了《神曲》——对灵魂通往上帝之路 刻画了寓言式的幻想。不过但丁的《神曲》 不仅仅是一则宗教寓言，还是对意大利政坛的智讽与苛评。但丁是来自佛罗伦萨的士兵和政客， 他虽然对神十分虔诚，可依然常常批评罗马天主教会。他特别反感教会任人唯亲，并买卖诸如赎罪之类圣职的猖獗行为。这些恶习让许多团体从中渔利，但谁也不比教皇派黑党 更支持这些败俗，这是一个政治和宗教的派别，以扩大教皇的政治影响为目的。但丁是教皇派白党的成员，他相信佛罗伦萨需要 更多自由，而非教会影响。作为白党的公众代表，但丁经常公然反对教皇的权柄，直到 1302 年，黑党势力壮大后，他从佛罗伦萨被驱逐出境。然而终生的放逐未能让他就此沉默，反倒促使他写出最为杰出的批判。包羞忍辱的作者不再企望回迁，他大肆发表自己对 教会和意大利社会的不满。但丁用意大利文书写《神曲》以别于智识阶级所用的拉丁文，这让他的政治苛评 通俗易懂、易于流传。在《地狱篇》的愤怒狱中，但丁迫切地见证罪囚将黑党分子 菲力普 · 阿根提的身体肢解。在欺诈狱中，他同一神秘的罪人交谈， 那人在最灼热的火焰中焚炙，但丁发现此人是教皇尼古拉三世，教皇告诉但丁，他的两位继承者 由于受赇并贩卖圣职死后会接替他在地狱的位子。尽管《地狱篇》的意象 凄凉且时而残暴，《神曲》却还是部爱情故事。即便但丁已和佛罗伦萨 一个权势家族的千金订了婚，他却从九岁时 就单恋着另一名女子：贝阿特丽切 · 波尔蒂纳里。虽据说只相遇过两次， 她却成了但丁终身的婉恋，成为他诸多作品的灵感与主题。也正是贝阿特丽切使他勇敢踏上这趟深入地狱九渊、乘凌炼狱山顶的旅途。她被描绘为一位强大且神圣的人物，引领但丁游历《天堂》的九重天，一直到和上帝面对面。出版后的数世纪，《神曲》围绕爱、罪、救赎的主题受诸多艺术家喜爱，从奥古斯特 · 罗丹、萨尔瓦多 · 达利 到埃兹拉 · 庞德、尼尔 · 盖曼。而在 2008 年，佛罗伦萨 销免了但丁旧时的驱逐令，诗人本人也终于 获得了迟到的尘世救赎。

**P776 2019-09-25 How to 3D print human tissue - Taneka Jones**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=776)

There are currently hundreds of thousands of people on transplant lists, waiting for critical organs like kidneys, hearts, and livers that could save their lives. Unfortunately, there aren’t nearly enough donor organs available to fill that demand. What if instead of waiting, we could create brand-new, customized organs from scratch? That’s the idea behind bioprinting, a branch of regenerative medicine currently under development. We’re not able to print complex organs just yet, but simpler tissues including blood vessels and tubes responsible for nutrient and waste exchange are already in our grasp. Bioprinting is a biological cousin of 3-D printing, a technique that deposits layers of material on top of each other to construct a three-dimensional object one slice at a time. Instead of starting with metal, plastic, or ceramic, a 3-D printer for organs and tissues uses bioink: a printable material that contains living cells. The bulk of many bioinks are water-rich molecules called hydrogels. Mixed into those are millions of living cells as well as various chemicals that encourage cells to communicate and grow. Some bioinks include a single type of cell, while others combine several different kinds to produce more complex structures. Let’s say you want to print a meniscus, which is a piece of cartilage in the knee that keeps the shinbone and thighbone from grinding against each other. It’s made up of cells called chondrocytes, and you’ll need a healthy supply of them for your bioink. These cells can come from donors whose cell lines are replicated in a lab. Or they might originate from a patient’s own tissue to create a personalized meniscus less likely to be rejected by their body. There are several printing techniques, and the most popular is extrusion-based bioprinting. In this, bioink gets loaded into a printing chamber and pushed through a round nozzle attached to a printhead. It emerges from a nozzle that’s rarely wider than 400 microns in diameter, and can produce a continuous filament roughly the thickness of a human fingernail. A computerized image or file guides the placement of the strands, either onto a flat surface or into a liquid bath that’ll help hold the structure in place until it stabilizes. These printers are fast, producing the meniscus in about half an hour, one thin strand at a time. After printing, some bioinks will stiffen immediately; others need UV light or an additional chemical or physical process to stabilize the structure. If the printing process is successful, the cells in the synthetic tissue will begin to behave the same way cells do in real tissue: signaling to each other, exchanging nutrients, and multiplying. We can already print relatively simple structures like this meniscus. Bioprinted bladders have also been successfully implanted, and printed tissue has promoted facial nerve regeneration in rats. Researchers have created lung tissue, skin, and cartilage, as well as miniature, semi-functional versions of kidneys, livers, and hearts. However, replicating the complex biochemical environment of a major organ is a steep challenge. Extrusion-based bioprinting may destroy a significant percentage of cells in the ink if the nozzle is too small, or if the printing pressure is too high. One of the most formidable challenges is how to supply oxygen and nutrients to all the cells in a full-size organ. That’s why the greatest successes so far have been with structures that are flat or hollow— and why researchers are busy developing ways to incorporate blood vessels into bioprinted tissue. There’s tremendous potential to use bioprinting to save lives and advance our understanding of how our organs function in the first place. And the technology opens up a dizzying array of possibilities, such as printing tissues with embedded electronics. Could we one day engineer organs that exceed current human capability, or give ourselves features like unburnable skin? How long might we extend human life by printing and replacing our organs? And exactly who—and what— will have access to this technology and its incredible output?

**P776 2019-09-25 How to 3D print human tissue - Taneka Jones**

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翻译人员: Evelyn Luan 校对人员: Harper Chang目前有数十万人 在器官移植名单上，等待重要器官捐赠， 像是肾、心脏和肝，来拯救他们的生命。很遗憾，器官捐赠供不应求。如果除了等待，我们还有办法从无到有， 创造出全新的、定制的器官呢？这就是生物打印的理念。生物打印是再生医学的分支， 目前处于发展阶段，我们尚未能打印出复杂的器官，但例如血管和负责 交换营养和废物的管道这些较简单的组织已经在我们掌握之中。生物打印和 3D 打印原理相似，将层层的材料堆叠在一起，一次一层，建构出一个三维物体。普通的 3D 打印机 使用金属、塑料或陶瓷，而制作器官和组织的 3D 打印机使用“生物墨水”：一种含有活细胞的 可打印材料。许多生物墨水的主体是 一种富含水的分子，称作水凝胶，水凝胶里混合了上百万个活细胞和各种用来促进细胞交流 和生长的化学物质。有些生物墨水只含单一 一种细胞，有些则结合许多不同种的细胞， 来制造出更复杂的结构。假设你想要打印一个半月板，半月板是膝盖里的一块软骨，用来避免胫骨和股骨互相摩擦。它由软骨细胞组成，你需要有健康的软骨组织供应， 来制作你的生物墨水，这些细胞可能来自捐赠者，他们 的细胞系在实验室里被复制，这些细胞也可能来自 病患自身的组织，这种定制的半月板 可以有效避免发生排斥反应。现在有几种打印技术，其中最常用的是 挤压式生物打印。这项技术将生物墨水 载入打印机，然后将它挤入 打印头上的柱状喷嘴。墨水会从喷嘴挤出，喷嘴的直径 一般不会超过 400 微米，可以挤出连续不断的线丝，厚度和人的指甲差不多。计算机图像或档案会引导线丝布局在平面，或是辅助固定结构的液槽里 直到其稳定。打印机的速度很快， 一次一线的制造出一个半月板，只要半小时。打印完成后， 有些生物墨水会立即变硬；有些则需要紫外线， 或额外的化学或物理加工来稳定结构。如果打印过程顺利的话，人造组织里的细胞会开始表现得 和真实组织里的细胞一样：互相发出信号、 交换养分以及分裂繁殖。我们已经能够打印出 像半月板这样相对简单的结构，也已经成功植入过 生物打印的膀胱，打印出来的组织还成功 促进了老鼠脸部神经再造。研究人员已经创造出 人造肺组织、皮肤及软骨，还有微缩版、半功能性的 肾、肝和心脏。然而，复制主要器官 复杂的生化环境是一项严峻的挑战。挤压式生物打印可能会破坏墨水里很大一部分的细胞， 如果喷头太小或打印压力太高。其中一项最艰巨的挑战，是如何为一个原尺寸的器官里 所有的细胞供给氧气和营养。这就是为什么到目前为止， 最成功的案例都是平坦或空心的结构，这也是为什么 研究人员正积极研发将血管纳入生物打印中的方法。生物打印具有极大的潜能，它可以用来拯救生命，以及提高我们对器官运作的了解。这项科技开启了 一系列的可能性，像是用嵌入式电子产品 打印组织。在未来，我们是否能够设计出 超越现在人类能力的器官，或是赋予人们特殊功能， 例如不可燃的皮肤？打印及更换器官 能延长人类寿命多久？什么人，什么领域有权使用这项科技 和其惊人的成果？

**P777 2019-09-26 Hawking's black hole paradox explained - Fabio Pacucci**

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Scientists work on the boundaries of the unknown, where every new piece of knowledge forms a path into a void of uncertainty. And nothing is more uncertain– or potentially enlightening– than a paradox. Throughout history, paradoxes have threatened to undermine everything we know, and just as often, they’ve reshaped our understanding of the world. Today, one of the biggest paradoxes in the universe threatens to unravel the fields of general relativity and quantum mechanics: the black hole information paradox. To understand this paradox, we first need to define what we mean by "information." Typically, the information we talk about is visible to the naked eye. For example, this kind of information tells us that an apple is red, round, and shiny. But physicists are more concerned with quantum information. This refers to the quantum properties of all the particles that make up that apple, such as their position, velocity and spin. Every object in the universe is composed of particles with unique quantum properties. This idea is evoked most significantly in a vital law of physics: the total amount of quantum information in the Universe must be conserved. Even if you destroy an object beyond recognition, its quantum information is never permanently deleted. And theoretically, knowledge of that information would allow us to recreate the object from its particle components. Conservation of information isn’t just an arbitrary rule, but a mathematical necessity, upon which much of modern science is built. But around black holes, those foundations get shaken. When an apple enters a black hole, it seems as though it leaves the universe, and all its quantum information becomes irretrievably lost. However, this doesn’t immediately break the laws of physics. The information is out of sight, but it might still exist within the black hole’s mysterious void. Alternatively, some theories suggest that information doesn’t even make it inside the black hole at all. Seen from outside, it’s as if the apple’s quantum information is encoded on the surface layer of the black hole, called the event horizon. As the black hole’s mass increases, the surface of the event horizon increases as well. So it’s possible that as a black hole swallows an object, it also grows large enough to conserve the object’s quantum information. But whether information is conserved inside the black hole or on its surface, the laws of physics remain intact– until you account for Hawking Radiation. Discovered by Stephen Hawking in 1974, this phenomenon shows that black holes are gradually evaporating. Over incredibly long periods of time black holes lose mass as they shed particles away from their event horizons. Critically, it seems as though the evaporating particles are unrelated to the information the black hole encodes– suggesting that a black hole and all the quantum information it contains could be completely erased. Does that quantum information truly disappear? If not, where does it go? While the evaporation process would take an incredibly long time, the questions it raises for physics are far more urgent. The destruction of information would force us to rewrite some of our most fundamental scientific paradigms. But fortunately, in science, every paradox is an opportunity for new discoveries. Researchers are investigating a broad range of possible solutions to the Information Paradox. Some have theorized that information actually is encoded in the escaping radiation, in some way we can’t yet understand. Others have suggested the paradox is just a misunderstanding of how general relativity and quantum field theory interact. Respectively, these two theories describe the largest and smallest physical phenomena, and they’re notoriously difficult to combine. Some researchers argue that a solution to this and many other paradoxes will come naturally with a “unified theory of everything.” But perhaps the most mind-bending theory to come from exploring this paradox is the holographic principle. Expanding on the idea that the 2D surface of an event horizon can store quantum information, this principle suggests that the very boundary of the observable universe is also a 2D surface encoded with information about real, 3D objects. If this is true, it’s possible that reality as we know it is just a holographic projection of that information. If proven, any of these theories would open up new questions to explore, while still preserving our current models of the universe. But it’s also possible that those models are wrong! Either way, this paradox has already helped us take another step into the unknown.

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翻译人员: Yizhuo He 校对人员: Jiasi Hao科学家在未知的边缘进行探索，每一个新知识都为 通往未知空间开辟了一条道路。而没有什么能比一个悖论更加具有不确定性和启发性。纵观历史，一个又一个的悖论 已经颠覆了我们的认知，并如同往常一样， 它们重塑了我们对世界的理解。如今，一个宇宙中最有名的悖论扬言要阐释 广义相对论和量子力学：这就是黑洞信息悖论。要理解这个悖论，我们首先需要 给“信息”下一个定义。一般来说，我们所谈论的信息 都是肉眼可见的。比如，苹果是红色的，圆的， 闪闪发亮的这样的信息。但物理学家们更关心量子信息。这指的是组成苹果的 所有粒子的量子属性，比如它们的位置、 速度和自旋。宇宙中的每个物体，都是由具有独特 量子特性的粒子组成的。在一条重要的物理定律中 特别地强调了这个观点：宇宙中量子信息总量 必须是守恒的。即使你把一个物体 摧毁得面目全非，它的量子信息 也不会被永久删除。理论上来说， 掌握这些信息的知识可使我们利用粒子重塑这个物体。信息守恒定理并不只是 一条武断的定理，而是数学上的必然，现代科学 有很大一部分都是建立在此基础上。但在黑洞周围，这些基础理论 似乎就没那么确定了。当一个苹果坠入黑洞时，它似乎离开了宇宙，它所有的量子信息都 无法挽回地丢失了。然而，这并没有 立刻打破物理规律。这些量子信息去了 我们看不见的地方，但有可能就在黑洞的 某个神秘空间里存在着。相反，另外一些理论认为，这些量子信息根本就没有进入黑洞。从外围看， 这个苹果的量子信息像是被转换成了编码附着在黑洞的表面， 我们称之为“事件视界”。随着黑洞质量的增加，视界的表面积也在增加。所以可能在黑洞吞噬物体的同时，它也变得足够大来保存 此物体的量子信息。但是不论信息是在黑洞内部 还是在黑洞表面保持守恒，都还是符合物理定律的——直到你考虑到霍金辐射。霍金辐射在 1974 年 被史蒂芬 · 霍金发现，这个现象表明 黑洞是在逐渐被挥发。在极长的一段时间内，随着黑洞剥离事件视界上的粒子， 它的质量也会减轻。重要的是，似乎挥发的粒子与黑洞所编码的信息没有关联——表明黑洞和其包含的所有量子信息都可能会被彻底抹去。但那些量子信息真的消失了吗？如果没有， 它又去哪儿了呢？尽管这个挥发的过程 要花上极长的一段时间，它所牵扯出的物理问题 却需要被迫切解决。信息的毁灭可能会迫使我们重写 一些我们最基本的科学范型。但幸好，在科学界，每个悖论 都是我们发现新理论的机会。研究者们正在探究一系列解决信息悖论的可行方案。有些研究者提出那些信息其实是 以一种我们还无法理解的形式被编译在逃脱辐射中。另一些研究者提出此悖论不过是对广义相对论与量子场论 相互作用方式的一种误读。这两种理论，分别阐释了最大与最小的物理现象，因此极难被合二为一。一些研究人员论证说 最终自然会有“能阐释万物的理论”能解释此悖论与其他许多悖论。恐怕在探究此悖论的过程中 遇到的最令人费解的理论则是全息原理。此原理是从 “事件视界的二维表面能保存量子信息”的想法中延伸出来的，这表明可观测宇宙的边界其实也是一个 包含了编译着三维物体的二维信息表面。如果这是真的， 那么可能我们所理解的现实也只不过是那些信息的全息投影。一旦被证实，这些理论中的任何一条 都将为我们带来新的值得被探索的问题，当现有的一些关于 宇宙的模型将依旧成立。但也有可能那些模型是错的！不管怎样，此悖论都已带领我们距离未知世界更进一步。

**P778 2019-09-30 The first and last king of Haiti - Marlene Daut**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=778)

The royal couple of Haiti rode into their coronation to thunderous applause. After receiving his ornate crown and scepter, Henry Christophe ascended his throne, towering 20 meters in the air. But little did the cheering onlookers know that the first king of Haiti would also be its last. Enslaved at birth on the island of Grenada, Christophe spent his childhood being moved between multiple Caribbean islands. Just 12 years old in 1779, he accompanied his master to aid the American revolutionaries in the Battle of Savannah. This prolonged siege would be Christophe’s first encounter with violent revolution. There are few surviving written records about Christophe’s life immediately after the war. Over the next decade, we know he worked as a mason and a waiter at a hotel in the French colony of Saint-Domingue, as Haiti was then known. In 1791, when the colony’s slaves rose up in rebellion, Christophe got another opportunity to fight for freedom. Led by Toussaint Louverture, the rebels fought against plantation owners, as well as British and Spanish forces seeking control of the island. Christophe quickly rose through the ranks, proving himself the equal of more experienced generals. By 1793, Louverture had successfully liberated all of Saint-Domingue’s enslaved people, and by 1801 he’d established the island as a semi-autonomous colony. But during this time, Napoleon Bonaparte had assumed power in France, and made it his mission to restore slavery and French authority throughout the empire. French attempts to reinstate slavery met fierce resistance, with General Christophe even burning the capital city to prevent military occupation. Finally, the rebellion and an outbreak of yellow fever forced French soldiers to withdraw— but the fight was not without casualties. Louverture was captured, and left to die in a French prison; a fate that Christophe’s nine-year-old son would share only a few years later. Following the revolution, Christophe and generals Jean-Jacques Dessalines and Alexandre Pétion rose to prominent positions in the new government. In 1804, Dessalines was proclaimed the emperor of independent Haiti. But his desire to hold exclusive power alienated his supporters. Eventually, Dessalines’ rule incited a political conspiracy that ended in his assassination in 1806. The subsequent power struggle led to a Civil War, which split the country in two. By 1807, Christophe was governing as president of the north in Cap-Haïtien, and Pétion was ruling the south from Port-au-Prince. Pétion tried to stay true to the revolution’s democratic roots by modeling his republic after the United States. He even supported anti-colonial revolutionaries in other nations. These policies endeared him to his people, but they slowed trade and economic growth. Christophe, conversely, had more aggressive plans for an independent Haiti. He redistributed land to the people, while retaining state control of agriculture. He also established trade with many foreign nations, including Great Britain and the United States, and pledged non-interference with their foreign policies. He even built a massive Citadel in case the French tried to invade again. To accomplish all of this, Christophe instituted mandatory labor, and to strengthen his authority, he crowned himself king in 1811. During his reign, he lived in an elegant palace called Sans Souci along with his wife and their three remaining children. Christophe’s kingdom oversaw rapid development of trade, industry, culture, and education. He imported renowned European artists to Haiti’s cultural scene, as well as European teachers, in order to establish public education. But while the king was initially popular among his subjects, his labor mandates were an uncomfortable reminder of the slavery Haitians fought to destroy. Over time, his increasingly authoritarian policies lost support, and his opponents to the south gained strength. In October 1820, his reign finally reached its tragic conclusion. Months after a debilitating stroke left him unable to govern, key members of his military defected to southern forces. Betrayed and despondent, the king committed suicide. Today, the traces of Christophe’s complicated history can still be found in the crumbling remains of his palaces, and in Haiti’s legacy as the first nation to permanently abolish slavery.

**P778 2019-09-30 The first and last king of Haiti - Marlene Daut**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=778)

翻译人员: Chong Liu 校对人员: Yanyan Hong海地王室夫妇 在雷鸣般的掌声中加冕。在接受了华丽的王冠和权杖之后，亨利 · 克利斯朵夫（Henry Christophe) 登上了 20 米高的宝座。但夹道欢呼的民众绝不会料到，海地第一位的国王， 也将会是最后一位。出生在格林纳达岛的 克利斯朵夫生而为奴，他的童年是在多个 加勒比岛屿之间度过的。1779 年，年仅 12 岁的他，跟随他的主人在萨凡纳战役中帮助美国革命者。这场旷日持久的围攻 将是克利斯朵夫第一次遇到暴力革命。关于克利斯朵夫战后的生活，现存的书面记录很少。在接下来的十年里，我们知道他在法国殖民地圣多明克，也就是现在我们说的海地 的一家酒店做石匠和服务员。1791 年，当殖民地的奴隶起义时，克利斯朵夫又得到了 一次争取自由的机会。在图森 · 卢维杜尔（Toussaint Louverture）的领导下，叛乱分子与种植园主 以及寻求控制该岛的英国和西班牙军队作战。克利斯朵夫很快就在队伍中晋升，证明自己与更有经验的将军不相上下。直到 1793 年，卢维杜尔成功解放了 圣多明戈所有的奴隶，到 1801 年，他把圣多明戈岛 建成了半自治殖民地。但在这段时间里， 拿破仑 · 波拿巴在法国掌权，他的任务是恢复整个帝国的奴隶制和法国的权威。法国恢复奴隶制的努力 遭到了激烈的抵抗，克利斯朵夫将军甚至烧毁了首都以防止军事占领。最后，叛乱和黄热病爆发迫使法国士兵撤退， 但战斗并非没有伤亡。卢维杜尔被俘，在法国监狱里死去;几年后，克利斯朵夫 9 岁的儿子 也面临同样的命运。革命之后，克利斯朵夫和将军 让雅克 · 德萨林以及亚历山大 · 佩蒂翁在新政府中担任要职。1804年，德萨林被宣布为 海地独立的皇帝。但是他想独揽大权的欲望 疏远了他的支持者。最终，德萨林的统治 引发了一场政治阴谋，最终导致他在 1806 年被暗杀。随后的权力斗争导致了内战， 把国家一分为二。到 1807 年，克利斯朵夫 在海地角担任北方的总统，而佩蒂翁在太子港统治南方。佩蒂翁试图以美国为榜样忠于革命的民主根源。他甚至支持其他国家的反殖民革命。这些政策赢得了他的人民的喜爱，但却减缓了贸易和经济增长。相反，克利斯朵夫 对海地独立有更激进的计划。他重新分配土地给人民， 同时保留国家对农业的控制。他还与包括英国和美国在内的许多国家建立了贸易关系，并保证不干涉这些国家的外交政策。他甚至建造了一个巨大的城堡， 以防法国人再次入侵。为了完成这一切， 克利斯朵夫设立了强制劳动制度，为了加强自己的权威， 他在 1811 年自立为王。在他统治期间，他和他的妻子 以及他们剩下的三个孩子住在一个名为圣苏西宫 （Sans Souci ）的优雅宫殿里。克利斯朵夫的王国 见证了贸易、工业、文化和教育的快速发展。为了建立公共教育，他把著名的欧洲艺术家 和欧洲教师引进海地的文化舞台。虽然国王最初在他的臣民中很受欢迎，但他的劳工法令 令人不安地让人想起了海地人为摧毁奴隶制而进行的斗争。随着时间的推移， 他越来越专制的政策失去了人心，他的南方宿敌日渐得势。1820 年 10 月， 他的统治终以悲剧收场。在中风后数月，国王憔悴无力执政，军队的主将纷纷叛逃到南方军队。国王最后众叛亲离，落寞自杀。时至今日，在克利斯朵夫宫殿 摇摇欲坠的废墟中，在作为第一个永久废除 奴隶制的国家的海地遗迹中，仍能找到克利斯朵夫复杂历史的痕迹。

**P779 2019-10-04 The Greek myth of Talos, the first robot - Adrienne Mayor**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=779)

Hephaestus, god of technology, was hard at work on his most ingenious invention yet. He was creating a new defense system for King Minos, who wanted fewer intruders on his island kingdom of Crete. But mortal guards and ordinary weapons wouldn’t suffice, so the visionary god devised an indomitable new defender. In the fires of his forge, Hephaestus cast his invention in the shape of a giant man. Made of gleaming bronze; endowed with superhuman strength, and powered by ichor, the life fluid of the gods, this automaton was unlike anything Hephaestus had forged before. The god named his creation Talos: the first robot. Three times a day, the bronze guardian marched around the island's perimeter searching for interlopers. When he identified ships approaching the coast, he hurled massive boulders into their path. If any survivors made it ashore, he would heat his metal body red-hot and crush victims to his chest. Talos was intended to fulfill his duties day after day, with no variation. But despite his robotic behavior, he possessed an internal life his victims could scarcely imagine. And soon, the behemoth would encounter a ship of invaders that would test his mettle. The bedraggled crew of Jason, Medea, and the Argonauts were returning from their hard-won quest to retrieve the Golden Fleece. Their adventure had taken many dark turns, and the weary sailors were desperate to rest in a safe harbor. They’d heard tales of Crete’s invulnerable bronze colossus, and made for a sheltered cove. But before they could even drop anchor, Talos spotted them. While the Argonauts cowered at the approach of the awesome automaton, the sorceress Medea spotted a glinting bolt on the robot’s ankle— and devised a clever gambit. Medea offered Talos a bargain: she claimed that she could make Talos immortal in exchange for removing the bolt. Medea's promise resonated deep within his core. Unaware of his own mechanical nature, and human enough to long for eternal life, Talos agreed. While Medea muttered incantations, Jason removed the bolt. As Medea suspected, the bolt was a weak point in Hephaestus’ design. The ichor flowed out like molten lead, draining Talos of his power source. The robot collapsed with a thunderous crash, and the Argonauts were free to travel home. This story, first recorded in roughly 700 BCE, raises some familiar anxieties about artificial intelligence— and even provides an ancient blueprint for science fiction. But according to historians, ancient robots were more than just myths. By the 4th century BCE, Greek engineers began making actual automatons including robotic servants and flying models of birds. None of these creations were as famous as Talos, who appeared on Greek coins, vase paintings, public frescoes, and in theatrical performances. Even 2,500 years ago, Greeks had already begun to investigate the uncertain line between human and machine. And like many modern myths about artificial intelligence, Talos’ tale is as much about his robotic heart as it is about his robotic brain. Illustrating the demise of Talos on a vase of the fifth century BCE, one painter captured the dying automaton’s despair with a tear rolling down his bronze cheek.

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翻译人员: Carol Wang 校对人员: Jiasi Hao匠神赫淮斯托斯一直在努力完成 他迄今为止最巧妙的发明。他正在为国王米诺斯 打造一个新的防御系统，国王不希望入侵者 踏上他的克里特岛国。但是凡人哨兵和普通武器 根本做不到这一点，因此，这位有远见的神 设计了一个无敌的新捍卫者。在锻造之火中，赫菲斯托斯将他的发明 铸造成一个巨人模样。巨人由闪闪发光的青铜制成， 并拥有超人的力量，并由众神的生命流体“灵液” 提供动力，他是与赫菲斯托斯以前锻造的 任何东西都不一样的自动机器。匠神将他的作品命名为塔罗斯， 史上的第一个机器人。青铜守护者一日之内巡岛三圈，寻找闯入者。当他看到船只驶向海岸时，就向他们的船扔巨石。如果有幸存者上岸，他就加热金属身体，然后， 把受害者放到炽热胸前压死。塔罗斯本打算日复一日地、 雷打不动地履行职责，但是，尽管他的动作像机器，但那些受害者无法想象 他也拥有内心活动。不久之后，这个庞然大物就遇到 考验他勇气的一艘入侵船，船上是衣衫褴褛的伊阿宋、 美狄亚和阿尔戈船英雄们，他们险胜夺取金羊毛， 正在返航途中。他们航程中经历了许多险情，疲倦的船员们迫切希望 在安全的港口休息。他们听说过克里特岛的 无敌青铜巨人，就驶向一个庇护海湾。但还没等他们抛锚， 塔洛斯就发现了他们。看到青铜机器人来了， 阿尔戈船英雄们吓作一团，女巫美狄亚发现机器人的脚踝上 有一个闪闪发光的螺栓——就想出来一个聪明的主意。美狄亚向塔罗斯提出做一笔交易：她声称可以使他不朽，条件是把他脚上的螺栓拧下来。塔罗斯不知道自己的机械天性，内心的人性化让他渴望永生不死，因此，美狄亚的承诺 在他内心深处引起了共鸣，所以，他同意了这笔交易。当美狄亚喃喃地念咒语时， 伊阿宋拧下了塔罗斯的螺栓。正如美狄亚所怀疑的那样， 螺栓是赫菲斯托斯设计的弱点。灵液像熔化的铅一样流出来， 塔罗斯的动力来源消耗殆尽，机器人轰然倒塌，阿尔戈船的英雄们可以回家了。这个故事最早记录于 公元前 700 年左右，引起了人们对人工智能的 一些类似的忧虑——甚至为科幻小说 提供了一个古老的蓝图。但是根据历史学家的考察， 古代机器人不仅仅是神话。到公元前四世纪，希腊工程师已开始制造 真正的的自动机器，包括机器仆人和鸟类飞行模型。这些作品中不像塔罗斯那样著名，塔罗斯出现在希腊硬币上、花瓶画、公共壁画和戏剧表演中。甚至在 2500 年前，希腊人就已经开始研究人机之间的不确定界限。就像许多关于人工智能的 现代神话一样，塔罗斯的故事既涉及他的机器人心脏， 也涉及他的机器人大脑。在公元前五世纪的一个花瓶上，一位画家用青铜颊上滚落的一滴泪，描绘了濒死机器人的绝望。

**P780 2019-10-07 Claws vs. nails - Matthew Borths**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=780)

Consider the claw. Frequently found on four-limbed animals around the world, it’s one of nature’s most versatile tools. Bears use claws for digging as well as defense. An eagle’s needle-like talons can pierce the skulls of their prey. And lions can retract their massive claws for easy movement, before flicking them out to hunt. Even the ancestors of primates used to wield these impressive appendages, until their claws evolved into nails. So what in our evolutionary past led to this manicured adaptation, and what can nails do that their sharper cousins can’t? When nails first appeared in the fossil record around 55.8 million years ago, claws had already been present for over 260 million years in the ancestors of mammals and reptiles. But despite the gulf of time between their emergence, these adaptations are both part of the same evolutionary story. Both nails and claws are made of keratin— a tough, fibrous protein also found in horns, scales, hooves and hair. This protein is produced by a wedge of tissue called the keratin matrix. Rich in blood vessels and nutrients, this protein factory produces an endless stream of keratin, which is tightly packed into cells called keratinocytes. These high-density cells give nails and claws their trademark toughness. Since nails evolved from claws, both adaptations produce keratinocytes in the same way. The cells grow out from the matrix, emerging from the skin where they die and harden into a water-resistant sheath. The primary difference between the two keratin coverings is really just their shape, which depends on the shape of the bone at the end of the animal’s digits. In claws, the bed of keratinocytes conforms to a narrow finger bone, wrapping around the end of the digit and radiating outwards to form a cone-shaped structure. Animals with nails, on the other hand, have much broader digits, and keratinocytes only cover the top surface of their wide bones. It’s possible that nails have simply persisted as a side effect of primates evolving wider, more dexterous fingers. But given what we know about the habitats of our primate ancestors, it’s more likely that nails came with their own powerful advantages. High in the forest canopy where these primates lived, wide finger bones and expansive finger pads were ideal for gripping narrow branches. And nails improved that grip even further. By providing a rigid surface to press against, primates could splay out their pads to create even more contact with the trees. Additionally, nails improved the sensitivity of their digits by providing an extra surface to detect changes in pressure while climbing. This combination of sensitivity and dexterity gave our ancestors the precise motor control needed to snatch up insects, pinch berries and seeds, and keep a firm grip on slim branches. The evolution of nails and the evolution of opposable thumbs and toes are closely linked. And when our ancestors moved down from the trees, this flexible grasp enabled them to create and wield complex tools. Even if it was possible for wide fingers to sport claws, their sharp points would’ve likely interfered with these primates’ regular tasks. Claws are ideal for piercing, puncturing, and hooking, but their points make grabbing difficult, and potentially dangerous. However, both claws and nails are used in some unexpected ways. Manatees use nails to grasp their food, and researchers think elephant toenails may sense vibrations in the ground to help them hear. Meanwhile, some primates, like the aye-ayes of Madagascar, have re-acquired claws. They use these extra-long appendages to tap branches and trunks, while listening for hollow sections with their bat-like ears. When they hear an opening, they burrow into the tree and skewer grubs with their needle-like middle finger. We’ve only scratched the surface of all the incredible ways nails and claws are used throughout the animal kingdom. But as for which of these adaptations is better? That’s an answer we may never nail down.

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翻译人员: Carol Wang 校对人员: Jiasi Hao今天我们来说说爪子。世界上的很多动物长着爪子，它是自然界中用途最广的工具之一。熊使用爪子进行挖掘和防御，鹰的针状爪子可刺穿猎物的头骨，狮子能收回爪子以方便活动，狩猎时再把爪子伸出。甚至灵长类动物的祖先 也曾使用这些令人印象深刻的附肢，直到它们的爪子演变成指甲。那么，在我们过去的进化中， 是什么造成整齐指甲的适应性进化，哪些事指甲能做到， 而比它锋利的爪子却不行？指甲首次出现于 大约 5580 万年前的化石中，而哺乳动物和爬行动物的祖先长着爪子的记录已逾 2.6 亿年。尽管它们的出现时间相差很多，但是，这些适应性 是同一进化过程的一部分。指甲和爪子都由角蛋白组成——角蛋白是一种坚韧的纤维蛋白， 也存在于角、鳞片、蹄和头发中。称为“角蛋白基质”的组织层 负责生产这种蛋白质，该蛋白工厂组织富含血管和营养，生产出源源不断的角蛋白流，紧紧塞满了角质细胞。正是这些高密度细胞， 赋予了指甲和爪子坚韧特性。因指甲由爪子进化而来，所以，两种适应方式 都以相同方式产生角质细胞。细胞从基质中长出来，露出皮肤即死亡， 然后硬化成防水鞘。两种角蛋白覆盖物的主要区别实际上只是形状不同而已，取决于动物手指（脚趾） 末端的骨骼形状。长爪子的动物，是因为角质细胞 顺着狭窄指骨形成基底，进而环绕手指末端，并向外辐射而形成锥形结构。另一方面，长指甲的动物 其手指（脚趾）要宽得多，角质细胞仅覆盖其宽骨的顶表面。灵长类动物进化出更宽、 更灵巧的手指后，指甲只是意外的收获。但是，鉴于我们 对灵长类祖先栖息地的了解，指甲可能更有强大优势。灵长类动物栖息于林冠高处，宽手指骨和宽阔的指垫非常适合抓紧细小树枝，指甲更增强了握持力。通过可以压靠的硬性表面（指甲），灵长类动物可张开指垫， 增加与树木的接触面积。此外，它们在攀爬时， 额外表面（指甲）能感知压力变化，从而提高了手指的敏感性。灵敏性和灵巧性的结合为我们的祖先提供了 精确的运动控制能力，可捉昆虫、捏住浆果和种子， 并牢牢抓住纤细的树枝。指甲的进化，与可对捏的拇指进化 和脚趾的进化紧密相关。当我们的祖先 从树上搬迁到陆地生活时，这种灵活的抓握能力 使它们能制造和使用复杂工具。即使宽手指也可以掌控爪子，但尖锐的爪尖可能会干扰这些灵长类动物的日常工作。爪子适合穿透、刺破和钩住东西，但爪尖使得抓取困难， 并且有潜在危险。但是，爪子和指甲都有某些 意想不到的使用方式。海牛用指甲抓住食物，研究人员认为，大象的脚趾甲 或许能感知地面的震动，以帮助它们听见远处声音。同时，一些灵长类动物， 例如马达加斯加指猴，又重新获得了爪子。它们用这些超长附肢 敲打树枝和树干的同时，用蝙蝠状耳朵倾听， 以寻找空心部位。当它们听到有空响时， 就用爪子挖开并探入树中，然后用针状中指把幼虫串起来。关于动物界令人不可思议的 指甲和爪子的使用方式，我们本次只做了表面了解，但至于哪一种适应进化更好，我们可能永远也无法得出答案。

**P781 2019-10-08 The Resistance \_ Think Like A Coder, Ep 2**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=781)

After breaking Ethic out of prison, Hedge flies them both towards a frontier settlement in the shadow of the Bradbarrier, the great wall that encircles the nation. All the settlers there will soon gather for the monthly feeding. The people of the wall spend their days gathering up works of art and literature, from all across the land. On feeding day, the furnace-bots arrive, ravenous. If they eat, the lights stay on, and the food gets delivered. If they starve, the people do too. Hedge’s fuel supply runs out just as he and Ethic reach the outskirts of town, and they come in for a crash landing. Luckily, everyone is too busy preparing for the feeding to notice. Today’s feeding is where Ethic can find the leader of an underground resistance movement. This person knows the location of the first of three powerful artifacts. The problem is, Hedge and Ethic don’t know the resistance leader’s name or appearance. But Hedge has gathered the following information: The leader has green eyes. If the leader has red hair, their name has at least one consecutive double letter. If the leader wear glasses, their name has exactly 2 vowels. Otherwise, their name has exactly 3 vowels. There is exactly one person for whom these are all true. As a fugitive, Ethic can’t sneak into the crowd without drawing attention to herself. But she can give instructions to Hedge. And one tool she has is what programmers call a conditional. That’s a statement of the form “If A, then B.” Flowcharts are great illustrations of how those work. This conditional translates to: if A is true, carry out instruction B. There are also conditionals that account for different possibilities. This says, “If A is true, perform instruction B. Otherwise, carry out instruction C.” So what instructions does she give Hedge so he can find the resistance leader? Pause now to figure it out for yourself. With a problem like this, it can help to simplify first. What if Hedge just has to examine this one person? What information does he need to collect about her? He might ask, “Does she have green eyes?” What other questions should Hedge ask to find the resistance leader, and how can he track those answers? Pause now to figure it out for yourself. It may seem intuitive how you’d approach this problem as a human. But Hedge isn’t a human, and so the challenge comes from needing to give him systematic instructions that will work in any scenario. Hedge needs to examine the settlers, one at a time, until he discovers the right person. In other words, like with the lock on the prison cell, this is a loop that repeats the same instructions. Only this time the loop will involve a series of questions in the form of conditionals, and will end as soon as Hedge finds his target. But first, you’ll want to organize your information. Each person has a set of characteristics: Eye color, hair color, glasses, and name. Does this person have green eyes? If so, mark a check next to “eye color." If not, mark an X there. If they have red hair, does their name contain a double letter? If so, mark a check next to “hair color.” If they don’t have a double letter, mark an X next to “hair color.” Anyone with red hair and no double letter can’t be the resistance leader. But notice that if they have blue hair, Hedge will skip this question and go on to the next one. For the last question, we can say, “If they wear glasses, does their name have exactly 2 vowels? If they don’t have glasses, does their name have exactly 3 vowels?” There will be people in the crowd with glasses and 1 vowel, or no glasses and 2 vowels. But they’re not who we’re looking for, so they’ll get X’s. The resistance leader must be someone with either check marks or blanks next to every question. Blanks are ok, because if someone has blue hair, the rule about red hair doesn’t apply to them. You could have Hedge ask every question about every person, and then choose the person with only checks and blanks. But there’s a way to save yourself lots of time: as soon as Hedge marks an X, have him move on to the next person. You don’t need to know the answer to every question; just one X means they’re not the target of your search. Hedge buzzes through the crowd, and within minutes finds Adila, the resistance leader, and brings her back to Ethic. Adila agrees to help them steal the first artifact— the node of power— but under one condition: that Ethic and Hedge jump-start the revolution by reprogramming the furnace-bots that terrorize the town. And right on cue, the robots descend.

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翻译人员: Carol Wang 校对人员: Yanyan Hong[ 像程序员一样思考 ][ 地点：监狱、BRADBARRIER ][ 第二集 反抗 ]海吉从狱中救出艾斯克之后，就带着她飞往长城脚下的 一个边境定居点，布莱德霸长城绕国土而建。那里的人们很快就要聚集 参加每月的喂食活动。长城脚下的人花了大量时间从全国收集艺术和文学作品。喂食那天炉膛机器人抵达，饥饿如狼。如果机器人吃东西，炉膛灯才会亮， 给人的食物就会被送出来。如果它们挨饿，人们就没吃的。他俩抵达城郊时， 海吉的燃料刚好用尽，他们只好紧急着陆。幸运的是，所有人忙于准备喂食， 没有人注意到他俩。在今天的喂食现场，艾斯克能找到在暗中的反抗领袖，此人知道三个强大物件中 第一个的位置。问题是，海吉和艾斯克不知道抵抗领袖的名字或长相。但海吉搜集到领袖的相关信息：他的眼睛是绿色的；如果他长着红头发， 名字至少两个连续字母相同；如果戴眼镜的话， 名字中则有且仅有 2 个元音；否则，名字中会有 3 个元音；只有 1 人 符合以上条件。艾斯克作为逃犯，难以潜入人群而不引人注意，但她可以给海吉下达指令。她有个程序员称为条件语句的工具，使用形式是：“If A， then B”。流程图可很好展现其工作原理，这个条件语句可翻译为：如果 A 真，则执行 B 指令。条件语句也可描述不同的可能，如这句：“如果 A 是真的， 则执行 B 指令；否则，执行 C 指令。”艾斯克给海吉下达什么指令， 才能让它找到抵抗领袖呢？[ 提示倒计时 3 ][ 提示倒计时 2 ][ 提示倒计时 1 ]碰到类似问题， 先简化会帮助解答。要是海吉必须先检查这个人呢？他需要收集关于她的哪些信息？他可能会问：“她眼睛是绿色吗？”海吉要找到抵抗领袖， 还应该问其它什么问题？以及如何追踪这些答案呢？[ 若想自行解题，可按暂停 ][ 答案公布倒计时 3 ][ 答案公布倒计时 2 ][ 答案公布倒计时 1 ]作为人类，你可能觉得 处理这个问题很直观，但是，海吉不是人类，因此，你面临的挑战是 需要给它系统化指令，这些指令能处理任何情况。海吉需挨个查看住在那里的人，直到找到符合条件的人。换句话说，就像解开牢房锁一样，这是一个重复相同指令的循环。只是这一次的循环指令是一系列问题的条件语句形式，一旦海吉找到目标， 会立即结束循环。但是首先，你需要整理信息。每个人都有一组特征： 眼睛和头发颜色、眼镜和名字。这人的眼睛是绿色吗？如果是，请在“眼睛颜色”旁打勾； 否则，请在此处标记 X 。如果他们是红色头发， 名字里有两个连续字母相同吗？如果是，请在“头发颜色”旁打勾；否则，在“头发颜色”旁标 X 。红头发但名字里没有双字母的人， 都不可能是抵抗运动领袖。但是请注意，如果是蓝头发，海吉将跳过此问题， 继续查看下一个人。最后一个问题，我们可以这样问：“如果他们戴眼镜， 名字中有且仅有 2 个元音吗？如果没戴眼镜， 名字是否有且仅有 3 个元音？”人群中戴眼镜 和名字有 1 个元音的人，或没戴眼镜 和名字有 2 个元音的人，但他们不是我们的目标， 所以，把他们标记为 X 。抵抗运动领袖一定是 每个问题旁打勾的人或问题旁空白 并有待进一步检验的人。空白是可能的，因为如果某人是蓝头发， 那么就与红色头发的规则相左。你可以让海吉询问每人所有问题，然后仅选择打勾和空白的人。但有一种方法可以节省大量时间：一旦海吉对此人标 X 后， 立即让它转到下一个人。你无需知道每个问题的答案，一个 X 就说明他们不是目标。海吉在人群中飞来飞去，几分钟内就找到了 抵抗运动领袖阿迪拉，并将她带回艾斯克处。她愿意帮忙偷第一件物品—— 权力的节点——但有一个条件：艾斯克和海吉要对镇压小镇的 炉膛机器人重新编程，来发动这场革命。话音刚落，炉膛机器人就到了。

**P782 2019-10-14 Are the illuminati real - Chip Berlet**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=782)

The year was 1776. In Bavaria, new ideals of rationalism, religious freedom, and universal human rights competed with the Catholic church’s heavy influence over public affairs. Across the Atlantic, a new nation staked its claim for independence on the basis of these ideas. But back in Bavaria, law professor Adam Weishaupt’s attempts to teach secular philosophy continued to be frustrated. Weishaupt decided to spread his ideas through a secret society that would shine a light on the shortcomings of the Church’s ideology. He called his secret society the Illuminati. Weishaupt modelled aspects of his secret society off a group called the Freemasons. Originally an elite stoneworkers’ guild in the late Middle Ages, the Freemasons had gone from passing down the craft of masonry to more generally promoting ideals of knowledge and reason. Over time, they had grown into a semi-secret, exclusive order that included many wealthy and influential individuals, with elaborate, secret initiation rituals. Weishaupt created his parallel society while also joining the Freemasons and recruiting from their ranks. He adopted the code name Spartacus for himself, after the famed leader of the Roman slave revolt. Early members became the Illuminati’s ruling council, or Areopagus. One of these members, Baron Adolph Knigge, was also a freemason, and became an influential recruiter. With Knigge’s help, the Illuminati expanded their numbers, gained influence within several Masonic chapters, and incorporated Masonic rituals. By 1784, there were over 600 members, including influential scholars and politicians. As the Illuminati gained members, the American Revolution also gained momentum. Thomas Jefferson would later cite Weishaupt as an inspiration. European monarchs and clergy were fearful of similar revolts on their home soil. Meanwhile, the existence of the Illuminati had become an open secret. Both the Illuminati and the Freemasons drew exclusively from society’s wealthy elite, which meant they were constantly rubbing shoulders with members of the religious and political establishment. Many in the government and church believed that both groups were determined to undermine the people’s religious faith. But these groups didn’t necessarily oppose religion— they just believed it should be kept separate from governance. Still, the suspicious Bavarian government started keeping records of alleged members of the Illuminati. Just as Illuminati members begun to secure important positions in local governments and universities, a 1784 decree by Duke Karl Theodor of Bavaria banned all secret societies. While a public ban on something ostensibly secret might seem difficult to enforce, in this case it worked. Only nine years after its founding, the group dissolved, their records were seized, and Weishaupt forced into exile. The Illuminati would become more notorious in their afterlife than they had ever been in their brief existence. A decade later, in the aftermath of the French Revolution, conservative authors claimed the Illuminati had survived their banishment and orchestrated the overthrow of the monarchy. In the United States, preacher Jedidiah Morse promoted similar ideas of an Illuminati conspiracy against the government. But though the idea of a secret group orchestrating political upheaval is still alive and well today, there is no evidence that the Illuminati survived, reformed, or went underground. Their brief tenure is well-documented in Bavarian government records, the still-active Freemasons’s records, and particularly the overlap between these two sources, without a whisper since. In the spirit of rationalism the Illuminati embraced, one must conclude they no longer exist. But the ideas that spurred Weishaupt to found the illuminati still spread, becoming the basis for many Western governments today. These ideas didn’t start or end with the Illuminati— instead, it was one community that represented a wave of change that was already underway when it was founded and continued long after it ended.

**P782 2019-10-14 Are the illuminati real - Chip Berlet**

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翻译人员: Carol Wang 校对人员: Jiasi Hao在 1776 年的巴伐利亚，理性主义、宗教自由 和世界人权的新理想与天主教会对公共事务的 巨大影响相抗衡。在大西洋彼岸，一个新国家（美国） 基于此发布了独立宣言。而在巴伐利亚，法学教授亚当 · 魏萨普（Adam Weishaupt）尝试讲授世俗哲学，但仍然挫折连连。魏萨普决定通过一个秘密社团 来传播他的思想，这将让教会的 意识形态缺点显露无疑，他称该秘密团体称为光明会。魏萨普模仿共济会的模式， 组建了其秘密社团。共济会原是中世纪晚期的 一个精英石匠工会，已经从传承石工技术发展到更普遍地 推广知识和理性理想。随着时间的流逝， 发展为半公开的排他性组织，其中包括许多富有和有影响力的人，具有精心设计的秘密入会仪式。魏萨普在加入共济会的同时， 创建了自己的并行社团，并从他们的队伍中招募成员。他使用了在罗马奴隶起义中著名领袖斯巴达克斯（Spartacus） 作为自己的代号。早期成员组成了光明会的 统治委员会（Areopagus）。共济会成员巴伦 · 阿道夫 · 科尼格（Baron Adolph Knigge）男爵是光明会成员之一，他成为了有影响力的招募者。在科尼格的帮助下， 光明会迅速壮大，在共济会的几个分会中赢得了声誉，并纳入了共济会的仪式。到 1784 年，已有 600 多名成员，其中包括有影响力的学者和政客。随着光明会的不断壮大，美国革命也获得了发展，托马斯 · 杰斐逊（Thomas Jefferson） 后来用魏萨普激励自己。欧洲统治者和神职人员 担心自己家乡发生类似起义，同时，光明会的存在 已成为公开的秘密。光明会和共济会成员都来自社会富裕精英阶层，这也意味着，他们一直与宗教 和政治组织成员有往来。政府和教会的许多人认为，这两个团体决心破坏 人民的宗教信仰。但这些团体并不一定反对宗教——他们只是认为宗教应该与政府分开。尽管如此，多疑的巴伐利亚政府开始保留 所谓的光明会成员的记录。伴随着光明会成员开始在地方政府 和大学中担任重要职位，巴伐利亚公爵卡尔 · 西奥多 （Duke Karl Theodor of Bavaria）于 1784 年颁布了法令，禁止所有的秘密团体存在。尽管公开禁止表面秘密的东西 似乎很难得以执行，但在这种情况下，却奏效了。成立仅九年后，该组织解散，他们的记录被没收，魏夏普被迫流亡。光明会解散之后，比起其短暂存在时期， 名声更加臭名昭著。十年后，在法国大革命之后，保守派作家声称 光明会幸免于难，并策划推翻了君主制。在美国，传教士吉迪亚 · 摩尔斯（Jedidiah Morse） 提出了类似想法，认为光明会阴谋反对政府。但是，尽管今天依然有人认为秘密组织策划了政治动荡，但没有证据表明光明会得以幸存，改头换面或转入地下。他们短暂的存在完好记录于 巴伐利亚政府的档案中、依然活跃的共济会记录里，尤其在这两项资源的交叠部分中，此后再没有任何音讯。基于光明会推崇的理性主义精神，只能断定他们已不复存在。但促使魏萨普 创立光明会的思想仍在传播，成为当今许多西方政府的基础。这些想法没有 随着光明会而兴衰——相反，光明会是代表变革浪潮的 一个社会团体。在其创立之时， 变革浪潮也已形成，并且在其解散很久后， 它还一直继续存在。

**P783 2019-10-14 How close are we to uploading our minds - Michael S.A. Graziano**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=783)

Imagine a future where nobody dies— instead, our minds are uploaded to a digital world. They might live on in a realistic, simulated environment with avatar bodies, and could still call in and contribute to the biological world. Mind uploading has powerful appeal— but what would it actually take to scan a person’s brain and upload their mind? The main challenges are scanning a brain in enough detail to capture the mind and perfectly recreating that detail artificially. But first, we have to know what to scan. The human brain contains about 86 billion neurons, connected by at least a hundred trillion synapses. The pattern of connectivity among the brain’s neurons, that is, all of the neurons and all their connections to each other, is called the connectome. We haven’t yet mapped the connectome, and there’s also a lot more to neural signaling. There are hundreds, possibly thousands of different kinds of connections, or synapses. Each functions in a slightly different way. Some work faster, some slower. Some grow or shrink rapidly in the process of learning; some are more stable over time. And beyond the trillions of precise, 1-to-1 connections between neurons, some neurons also spray out neurotransmitters that affect many other neurons at once. All of these different kinds of interactions would need to be mapped in order to copy a person’s mind. There are also a lot of influences on neural signaling that are poorly understood or undiscovered. To name just one example, patterns of activity between neurons are likely influenced by a type of cell called glia. Glia surround neurons and, according to some scientists, may even outnumber them by as many as ten to one. Glia were once thought to be purely for structural support, and their functions are still poorly understood, but at least some of them can generate their own signals that influence information processing. Our understanding of the brain isn’t good enough to determine what we’d need to scan in order to replicate the mind, but assuming our knowledge does advance to that point, how would we scan it? Currently, we can accurately scan a living human brain with resolutions of about half a millimeter using our best non-invasive scanning method, MRI. To detect a synapse, we’ll need to scan at a resolution of about a micron— a thousandth of a millimeter. To distinguish the kind of synapse and precisely how strong each synapse is, we’ll need even better resolution. MRI depends on powerful magnetic fields. Scanning at the resolution required to determine the details of individual synapses would requires a field strength high enough to cook a person’s tissues. So this kind of leap in resolution would require fundamentally new scanning technology. It would be more feasible to scan a dead brain using an electron microscope, but even that technology is nowhere near good enough– and requires killing the subject first. Assuming we eventually understand the brain well enough to know what to scan and develop the technology to safely scan at that resolution, the next challenge would be to recreate that information digitally. The main obstacles to doing so are computing power and storage space, both of which are improving every year. We’re actually much closer to attaining this technological capacity than we are to understanding or scanning our own minds. Artificial neural networks already run our internet search engines, digital assistants, self-driving cars, Wall Street trading algorithms, and smart phones. Nobody has yet built an artificial network with 86 billion neurons, but as computing technology improves, it may be possible to keep track of such massive data sets. At every step in the scanning and uploading process, we’d have to be certain we were capturing all the necessary information accurately— or there’s no telling what ruined version of a mind might emerge. While mind uploading is theoretically possible, we’re likely hundreds of years away from the technology and scientific understanding that would make it a reality. And that reality would come with ethical and philosophical considerations: who would have access to mind uploading? What rights would be accorded to uploaded minds? How could this technology be abused? Even if we can eventually upload our minds, whether we should remains an open question.

**P783 2019-10-14 How close are we to uploading our minds - Michael S.A. Graziano**

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翻译人员: Jiasi Hao 校对人员: Gabriella Hu想象一个无人死亡的未来——相反，我们的心灵 被上传到数字世界。它们可能依靠数字化身 生存在一个逼真的模拟环境中，并且它们仍旧可以被召唤， 为现实世界做贡献。心灵上传具有强大的吸引力——但是这究竟需要怎样的准备， 才能扫描人类大脑并上传心灵呢？主要的挑战是对大脑 进行足够详细的扫描来捕捉心灵，并且完美地人工重现那些细节。但首先，我们需要知道扫描什么。人脑包含约 860 亿个神经元，它们之间 至少由 100 万亿个突触相连。大脑神经元间的连通性模式，即所有神经元 和它们之间的所有连接，称为连接组。我们尚未能绘制连接组图谱，神经信号传递还涉及很多其它东西。总共有成百，可能至上千种 不同类型的连接，或突触。每种连接的工作方式都略有不同。有些速度快些，有的则较慢。有些在学习过程中会 快速增长或收缩，有的则一直比较稳定。除了神经元间上万亿的 一对一连接外，一些神经元也会喷射出 能同时影响许多其他神经元的神经递质。所有的这些不同的相互作用将需要被映射记录， 以用来复制一个人的心灵。对神经信号的影响有很多，人们对此了解颇少，或未曾发现。就举一个例子，神经元间的活动模式有可能就受到一种 叫神经胶质的细胞影响。神经胶质包围着神经元， 根据一些科学家，神经胶质和神经元的数量比 甚至可达 10 比 1。神经胶质一度被认为是 单纯以提供结构支撑的存在，我们对它们的作用依旧了解甚少，但至少部分神经胶质 可以产生它们自己的信号来影响信息处理。我们对大脑的理解 还远不足以决定为了达到复制心灵的目的 我们需要扫描哪些东西，但假使我们的知识 已经可以解答这个问题，那我们该如何扫描它呢？当前，我们能够精确地 扫描活体大脑，使用我们最好的 非入侵性核磁共振成像（MRI），其分辨率约为半毫米。为探测突触，我们将需要 以微米的分辨率进行扫描——千分之一毫米。为区分突触种类 和每个突触的精确强度，我们将需要更高的分辨率。MRI 依靠于强大的磁场。为确定每个突触的细节，扫描需要在一定的分辨率下进行，这将要求场强要高到能 烹饪人体组织。因此这般分辨率的飞跃，将从根本上 需要一个全新扫描技术。而采用电子显微镜扫描死亡的大脑 将会比较可行，但是这项技术 甚至还远不够成熟——它也首先要求杀死大脑。假设我们最终对大脑的了解足够多 到我们知道扫描什么，也成功开发了能够在要求分辨率下 安全扫描的技术，下一个挑战将会是 数字重现那些信息。主要障碍是计算机能力和存储空间，这两个方面的技术每年都在进步。实际上，相较我们对 自己大脑的理解或扫描我们更接近拥有这样的技术能力。人工神经网络已经在运行着 我们互联网搜索引擎、数字助理、自动驾驶汽车、 华尔街交易算法，以及智能手机。目前尚未有人使用 860 亿神经元 建造人工网络，但是随着计算机技术的进步，跟踪如此海量的数据集 或许是有可能的。扫描和上传过程的每一步，我们将必须确认 所有必要的信息都被准确捕捉——或不会说 “被破坏了的心灵可能会出现”。尽管心灵上传理论上是可能的，但我们距离能让这真实发生的技术和科学理解，可能还相差几百年的时间。倘若它真实发生， 随之而来的是伦理和哲学的思考：谁将获得心灵上传的权限？上传心灵的人将获得怎样的权利？这项技术可能会如何被滥用？尽管我们可以最终上传心灵，但是否应该这么做， 仍然是一个悬而未决的问题。

**P784 2019-10-14 The Maya myth of the morning star**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=784)

Chak Ek’ rose from the underworld to the surface of the eastern sea and on into the heavens. His brother K’in Ahaw followed. Though Chak Ek’ had risen first, K’in Ahaw outshone him, and the resentful Chak Ek’ descended back to the underworld to plot against his brother. In Mayan mythology, Chak Ek’ represents Venus and K’in Ahaw represents the sun. Known as both the morning and the evening star, Venus moves through the sky, sometimes visible before sunrise, sometimes after sunset, and occasionally not at all. The ancient Maya identified this roughly 584 day cycle more than a thousand years ago and it still accurately predicts when and where Venus will appear in the sky around the world. Five of these cycles make up almost exactly eight years, and the Maya also recognized this larger cycle. They assigned Chak Ek’ five different forms, one for each cycle of Venus, that were repeated every eight years. Within the 584 day cycle, Venus is visible in the evening sky for 250 days, then disappears for 8 days before reappearing as the Morning Star. The ancient Maya ascribed particular significance to this point in this cycle: the first time Venus appears before sunrise after being invisible. On this day, Chak Ek’ rose again from the underworld, wielding a spearthrower and darts. To bring discord to the world, he decided to attack his brother and his brother’s allies. His first target was K’awiil, god of sustenance and lightning. Rising in the late rainy season, Chak Ek’ aimed his spear and struck K’awiil, causing damage to the food and a period of chaos in the social order until K’awiil was reborn. 584 days after attacking K’awiil, Chak Ek’ turned his attention back to his brother, the Sun. Each night, the Sun took the form of jaguar and journeyed through the underworld. Chak Ek’ speared the jaguar sun as it rose at dawn towards the end of the dry season. The Sun was wounded, plunging the world into a period of chaos and warfare. Chak Ek’s third victim was the god of maize, who provided sustenance for all humankind. Chak Ek’ speared him at the time of the harvest. He was buried in the underworld, and maize—the staple of life— was no longer available to Earth’s inhabitants. But the maize god emerged after three months in the place of new beginnings– the eastern cave known as Seven Water Place– bringing food once again to earth. When the turtle Ak Na'ak rose in the sky to mark the summer solstice, Chak Ek’ claimed his fourth victim. With the death of this good omen, the Sun, the food supply, and the people were buried within the earth, and the forces of chaos reigned. But out of the chaos rose a new order established by Hun Ajaw, one of the hero twins known to all for having vanquished the lords of the underworld. A new race of humans was created, made from maize. This state of balance was not to last, however. Chak Ek’s fifth and final victim was a mysterious stranger from the west, and his death in the heart of the dry season shook the order established by Hun Ajaw. The gods, the lords, and the maize were buried in the underworld. But this victory for Chak Ek’ would also prove temporary. The two brothers, Venus and the Sun, were caught in an endless cycle as they battled for supremacy, re-enacting the same five struggles, while the world alternated between order and chaos with the rising of the Morning Star.

**P784 2019-10-14 The Maya myth of the morning star**

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翻译人员: Jessie Zhang 校对人员: Yanyan Hong查克 · 埃克（Chak Ek’） 从地下世界上升到东海海面，越过人间，直上天堂。他的兄弟金 · 亚（K’in Ahaw）紧随其后。查克 · 埃克的光芒 被金 · 亚后来居上，心怀怨恨的查克 · 埃克 回到地下世界密谋对付他的兄弟。在玛雅神话中，查克 · 埃克 代表金星，金 · 亚代表太阳。金星既是晨星，也是晚星，它在天空中运行， 有时在日出前出现，有时在日落后出现， 有时根本不出现。一千多年前，古玛雅人就发现了这个大约 584 天的周期，它至今仍能准确预测金星出现在世界各地天空中的时间和地点。五个这种周期几乎正好构成八年，玛雅人也识别出了这个更大的周期。他们赋予查克 · 埃克五个不同的形态，每个形态代表金星的一个周期， 这些形态每八年循环一次。在 584 天的周期内， 金星有 250 天出现在夜空，然后消失 8 天， 再以晨星身份出现。古玛雅人尤其在意周期的这一刻：金星自消失一段时间后， 在日出前重现的瞬间。在这一天，查克 · 埃克 再次从地下世界升起，挥舞着长矛和飞镖。为了扰乱世界，他决定攻击他的兄弟及其盟友。他的第一个目标是食物 和闪电之神科伊尔（K’awiil）。查克 · 埃克在雨季末升起， 将他的矛瞄准科伊尔然后刺向了他，破坏了食物并造成一段时间的 社会秩序混乱，直到科伊尔获得重生。在袭击科伊尔 584 天后，查克 · 埃克将矛头重新 指向他的兄弟，太阳。每天晚上，太阳以美洲虎的形象穿越地下世界。在旱季快结束的时候， 当美洲虎太阳在黎明升起时， 查克 · 埃克用长矛刺向它。太阳受伤了， 使世界陷入混乱和战争。查克 · 埃克的第三个受害者，是为全人类提供食物的玉米神。查克 · 埃克在收割季节用长矛刺了他。他被埋葬在地下世界， 而玉米——生命的主食，再也不能被地球上的居民享用到了。但是三个月后，玉米神出现在 被称为七水之地的东方洞穴，这一新开始兴起的地点， 再次将食物带到地球上。当海龟阿克 · 纳阿克 (Ak Na'ak） 升上天空宣布夏至时，查克 · 埃克把他变成第四个受害者。随着这个好兆头的死亡， 太阳、食物和人们都被埋在地下， 混乱的力量统治着大地。但是在混乱中却出现了由洪 · 阿乔（Hun Ajaw） 建立的新秩序，他是因击败了地下世界领主 而变得赫赫有名的一对英雄孪生兄弟中的一位。一个新的人类种族被用玉米创造了出来。然而，这种平衡状态并没有持续下去。查克 · 埃克的第五个 也是最后一个受害者是一个来自西方的神秘陌生人，他在旱季正当时的死，动摇了洪 · 阿乔建立的秩序。众神、领主和玉米被埋在地下世界。但事实证明，查克 · 埃克的 胜利也是暂时的。金星和太阳这两兄弟 在争夺霸权的过程中陷入了一个无尽的循环，在晨星升起，世界在有序 与混乱之间交替之时，重复上演着相同的五场争斗。

**P785 2019-10-23 The Taino myth of the cursed creator - Bill Keegan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=785)

Before the world of humans began, there was the world of the gods, made of fields, plains and gardens. Four brothers wandered this celestial realm. They had no family other than each other— they didn’t even know who their parents were. One of the brothers, Deminan, looked different from the others. His skin was covered in painful scabs, and he wondered why he alone had been marked with this affliction. One day, while the supreme spirit Yaya was out in his gardens, Deminan and his brothers snuck into Yaya’s house. After feasting and exploring, they spotted a giant gourd hanging in the corner. But as they tried to look inside the gourd, they dropped it. The gourd broke apart, releasing a deluge that swept the brothers away, separating them from the celestial lands forever. The waters from the gourd formed a new world. This realm was covered in seas, which didn’t exist in the gods’ world. The waters were full of fish and other creatures, and dotted with islands and caves. This world of seas was also cut off completely from the celestial realm, and the brothers wandered aimlessly, even more lost than they had been before. One day, three of the brothers stumbled upon a house. In the house lived an elder named Bayamanacao, and he invited them in. When Deminan caught up slightly later, he followed them into the house. Bayamanacao told the brothers he was their grandfather and gave them a gift of special cassava bread. He revealed their family lineage to them: their mother had been the Earth Mother Goddess Itibi Cahubaba and had died when they were born. The brothers were grateful for his hospitality and insight into their past. But then Bayamanacao turned on Deminan, blowing tobacco spittle from his nose onto Deminan’s back. The spot where the spittle landed immediately began to swell and sting. Soon Deminan was delirious and his back was so swollen his brothers feared he would die. Not knowing what else to do, they cut open the welt. A turtle emerged from the wound and swam away, alternating easily between sea and land as she went. When Deminan recovered from his delirium, he finally understood what the curse of his disease meant: he was a caracaracol, able to communicate with the gods. He was the link between the celestial realm and the earthly realm. Deminan was the first in a long lineage of caracaracols. The world of seas he and his brothers had created when they dropped the gourd became the world of humans, where the caracaracols who followed Deminan maintained the delicate balance between people and gods. But their unique power came at a price: Deminan and all the caracaracols who followed him continued to suffer from the illness that had first marked Deminan as special. Represented in Taino carvings and figurines with a swollen back and emaciated arms, the caracaracol is both cursed and blessed to be a conduit between worlds.

**P785 2019-10-23 The Taino myth of the cursed creator - Bill Keegan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=785)

翻译人员: Carol Wang 校对人员: Jiasi Hao在有人类世界之前，是神的世界， 那里有田野、平原和花园，有兄弟四人在天界中闲逛，他们除了彼此， 没有任何家人——甚至不知道自己父母是谁。德米南与其他三兄弟长得不一样，他的皮肤上布满疮痂，疼痛无比，他不明白为何只有自己 要遭受这种痛苦。一天，至上的神祇亚雅去花园了，德米安和他的兄弟们 趁机溜进了亚雅的房子，他们大吃一顿，并在屋里乱看， 发现角落里挂着一个巨大葫芦。但当他们想看看葫芦里有什么时， 不小心把葫芦碰掉，摔到了地上，葫芦摔成碎片，流出涛涛洪水， 席卷了四兄弟，把他们冲走了，他们四人从此与天界永远分离。葫芦中的水形成了一个新世界，它被不存在于天界的海洋所覆盖，水域里满是鱼类和其它生物，并散布着岛屿和洞穴。这个海洋世界与天界也完全隔绝，兄弟四人漫无目的地游荡，比以前更无所事事。一天，三兄弟偶然发现了一个房子，主人是位长者，叫巴亚玛那宼， 他邀请兄弟三人进屋去；德米南稍后赶到， 也跟着进了屋。巴亚玛那宼告诉兄弟四人， 自己就是他们的祖父，并把特殊的木薯面包 作为礼物送给他们，还透露了兄弟四人的家庭血统：他们的母亲曾是地球母亲 伊蒂比 · 卡胡巴巴女神，他们刚出生，她就去世了。兄弟们对他的热情款待 和告知家世背景无比感激。但是随后，巴亚玛那宼转向德米南，从鼻子里把烟草唾沫 吐到德米南背上，被唾沫沾到的地方 立即开始肿胀和刺痛，很快，德米南就神志不清，他的背肿得特别厉害， 兄弟们担心他会因此死去。三兄弟不知所措，于是， 他们切开了他背部肿胀的地方，伤口中竟然冒出来一只乌龟，游走了，它灵活地在水中游、陆上爬，随心变换。当德米南醒过来时，他终于明白 为何自己患有被诅咒的怪病：他是能够与众神交流的 卡拉卡拉科尔，他是天界与尘世之间的纽带。德米南是卡拉卡拉科尔大家族的鼻祖，他和兄弟们摔破葫芦 所创造的海洋世界创造出人类的世界，住着德米南的后代—— 卡拉卡拉科尔们，他们维护着人与神之间的微妙平衡。但他们独特的力量是有代价的：德米南和后来追随他的克拉克拉科尔，继续遭受 最初标记德米南与众不同的怪病折磨。在泰诺雕刻和小雕像中，被刻画为背部肿胀、手臂细瘦的 卡拉卡洛科尔，作为神界与尘世的桥梁， 他是被诅咒也是被祝福的存在。

**P786 2019-10-28 Why haven’t we cured arthritis - Kaitlyn Sadtler and Heather J. Faust**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=786)

While regaling you with daring stories from her youth, it might be hard to believe your grandmother used to be a trapeze artist. However, the bad backs, elbow pain, and creaky knees so common in older people is more than just “old age." In fact, the source of this stiffness plagues many young people as well. The culprit is arthritis: a condition that causes inflammation and pain in the joints of over 90 million people in the U.S. alone. But are stiff, creaky joints really inevitable? What makes arthritis so pervasive, and why haven’t we found a cure for this widespread condition? The first hurdle is that arthritis is actually a spectrum of over 100 different arthritic conditions. All these conditions share symptoms of joint pain and inflammation, but the origin and severity of those symptoms vary widely. Even the most common type, osteoarthritis, is trickier to prevent than one might think. It’s a general misconception that arthritis is confined to old age. The origins of osteoarthritis can often be traced to a patient’s early life, from any seemingly ordinary joint injury. Following impact, immune cells rush in to help clean and repair the damaged site and begin pumping out enzymes, including matrix metalloproteinases and aggrecanases. These enzymes clear out the damaged tissue and contribute to inflammation. But while this rapid swelling helps protect the joint during recovery, inadequately healed tissue can cause these immune cells to overstay their welcome. The continuing flood of enzymes starts to degrade the cartilage, weakening the joint and leading to arthritis later on. Not all forms of arthritis can simply be traced to an old sports injury. Take rheumatoid arthritis, which affects 1.3 million U.S. adults. This condition is actually an autoimmune disease in which autoantibodies target natively produced proteins, some of which are secreted by cartilage cells. We still don’t know what causes this behavior, but the result is that the body treats joint tissue like a foreign invader. Immune cells infiltrate the joint despite there being no tissue damage to repair. This response leads to chronic inflammation, which destroys bone and cartilage. Yet another condition, spondyloarthritis, has similarities to both of the conditions we’ve covered. Patients experience continuous inflammation in the joints and at the sites where ligaments and tendons attach to bones, even without any initial injury. This leads to the flood of enzymes and degradation seen in osteoarthritis, but is driven by different inflammatory proteins called cytokines. As the enzymes eat away at cartilage, the body attempts to stabilize smaller joints by fusing them together. This process sometimes leads to outgrowths called bone spurs, which also cause intense stiffness and joint pain. With so many factors causing arthritis, our current treatments are tailored to tackle specific symptoms rather than underlying causes. These range from promising MACI techniques, which harvest cells from small pieces of cartilage to grow replacement tissue. To a technique called microfracture, where surgeons create small holes in the bone, allowing bone marrow stem cells to leak out and form new cartilage. As a last resort, people with withered cartilage can even undergo full joint replacements. But outside these drastic measures, the underlying drivers of autoimmune arthritis still present a unique treatment challenge. Scientists are making progress with therapies that block TNF-alpha, one of the primary proteins causing inflammation in rheumatoid arthritis. But even this approach only treats the symptoms of the condition, not the cause. In the meantime, some of our best defenses against arthritis are lifestyle choices: maintaining a healthy weight to take pressure off joints, low-impact exercises like yoga or cycling, and avoiding smoking. These arthritis-fighting behaviors can help us lead longer lives as we continue to research cures and treatments for the huge diversity of arthritic conditions.

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翻译人员: Carol Wang 校对人员: Jiasi Hao当奶奶讲起年轻时的大胆经历时，你可能很难相信 她曾是一位飞人艺术家。然而，老年人常见的背痛、肘痛 和膝盖吱吱作响的毛病不仅仅只是“老年病”，事实上，这种僵硬的根源 也困扰着许多年轻人。其罪魁祸首就是关节炎：仅在美国，超过九千万人遭受其导致的关节发炎和疼痛。僵硬而老旧的关节毛病 真的无法避免吗？什么原因使关节炎如此普遍，为什么我们还没找到 这种常见病的治愈方法呢？第一个难题是，关节炎其实是 100 多种不同关节病的总称，它们都有关节疼痛和发炎的症状，但是这些症状的起源 和严重程度差异很大。即使要避免最常见的骨关节炎，也比人们想象的难得多。人们普遍误以为关节炎只是老年病，骨关节炎的病根，通常可追溯到患者早些年看似普通的关节损伤。关节遭受冲击后，免疫细胞涌入 以帮助清理和修复受损部位，并释放包括基质金属蛋白酶和聚集蛋白聚糖酶在内的酶。这些酶清除受损组织， 并引起发炎症状。但是，尽管这种迅速的肿胀 有助于在恢复过程中保护关节，但是，愈合不充分的组织 可能会导致免疫细胞滞留。持续的酶代谢使软骨退化、削弱关节， 并后来发展为关节炎。并非所有形式的关节炎 都能简单追溯到旧运动损伤，以类风湿关节炎为例， 这种疾病影响到 130 万美国成年人，这种情况实际是自身免疫性疾病，自身抗体靶向正常产生的蛋白质，有些蛋白质是软骨细胞分泌的。我们仍然不知道导致这种行为的原因，但结果是，人体错把关节组织 当成外来入侵者一样对待。免疫细胞涌入关节， 尽管没有组织损伤需要修复。这种反应导致慢性炎症，破坏骨骼和软骨。另一种疾病脊椎关节炎，与我们刚才提到的两种情况类似。即使初期没有任何伤害的情况下，患者的关节、韧带 以及肌腱附着的骨骼部位也会持续发炎，也出现骨关节炎中 产生大量酶和削弱关节的现象，但由不同的炎症蛋白引起， 这种蛋白称为细胞因子。随着酶不断吞噬软骨，人体试图将较小关节 衔接起来以保持稳定。这一过程有时会导致骨刺的生长，也会引起严重僵硬和关节痛。有许多导致关节炎的因素，我们目前的治疗方法 只是专门针对特定症状，而非潜在的病因。这些包括有前景的 MACI 技术 （自体软骨细胞移植技术），该技术可从软骨切片中 提取细胞以培养移植组织，还有一种微骨折的技术，在这种技术中， 外科医生会在骨骼上打小孔，从而使骨髓干细胞流出 并生成新的软骨。作为最后的选择，软骨萎缩的人 甚至可以进行全关节置换。但除了这些激进的治疗措施外，自身免疫性关节炎的潜在病因仍然提出了独特的治疗挑战。科学家在阻断 TNF-α 疗法上 正取得研究进展，TNF-α 是导致类风湿关节炎 发炎的主要蛋白质之一。但是，即使这种方法 也只能治疗症状，而非病因。同时，对关节炎的最佳防治方法 是生活方式的选择：保持健康的体重以减轻关节压力，选择低影响的运动 如瑜伽或骑自行车，并避免吸烟。面对种类繁多的关节炎病，在我们继续研究治愈方法 和治疗方案的同时，这些抗关节炎行为 可以帮助我们延长寿命。

**P787 2019-10-29 Game theory challenge - Can you predict human behavior - Lucas Husted**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=787)

A few months ago we posed a challenge to our community. We asked everyone: given a range of integers from 0 to 100, guess the whole number closest to 2/3 of the average of all numbers guessed. So if the average of all guesses is 60, the correct guess will be 40. What number do you think was the correct guess at 2/3 of the average? Let’s see if we can try and reason our way to the answer. This game is played under conditions known to game theorists as common knowledge. Not only does every player have the same information — they also know that everyone else does, and that everyone else knows that everyone else does, and so on, infinitely. Now, the highest possible average would occur if every person guessed 100. In that case, 2/3 of the average would be 66.66. Since everyone can figure this out, it wouldn’t make sense to guess anything higher than 67. If everyone playing comes to this same conclusion, no one will guess higher than 67. Now 67 is the new highest possible average, so no reasonable guess should be higher than ⅔ of that, which is 44. This logic can be extended further and further. With each step, the highest possible logical answer keeps getting smaller. So it would seem sensible to guess the lowest number possible. And indeed, if everyone chose zero, the game would reach what’s known as a Nash Equilibrium. This is a state where every player has chosen the best possible strategy for themselves given everyone else playing, and no individual player can benefit by choosing differently. But, that’s not what happens in the real world. People, as it turns out, either aren’t perfectly rational, or don’t expect each other to be perfectly rational. Or, perhaps, it’s some combination of the two. When this game is played in real-world settings, the average tends to be somewhere between 20 and 35. Danish newspaper Politiken ran the game with over 19,000 readers participating, resulting in an average of roughly 22, making the correct answer 14. For our audience, the average was 31.3. So if you guessed 21 as 2/3 of the average, well done. Economic game theorists have a way of modeling this interplay between rationality and practicality called k-level reasoning. K stands for the number of times a cycle of reasoning is repeated. A person playing at k-level 0 would approach our game naively, guessing a number at random without thinking about the other players. At k-level 1, a player would assume everyone else was playing at level 0, resulting in an average of 50, and thus guess 33. At k-level 2, they’d assume that everyone else was playing at level 1, leading them to guess 22. It would take 12 k-levels to reach 0. The evidence suggests that most people stop at 1 or 2 k-levels. And that’s useful to know, because k-level thinking comes into play in high-stakes situations. For example, stock traders evaluate stocks not only based on earnings reports, but also on the value that others place on those numbers. And during penalty kicks in soccer, both the shooter and the goalie decide whether to go right or left based on what they think the other person is thinking. Goalies often memorize the patterns of their opponents ahead of time, but penalty shooters know that and can plan accordingly. In each case, participants must weigh their own understanding of the best course of action against how well they think other participants understand the situation. But 1 or 2 k-levels is by no means a hard and fast rule— simply being conscious of this tendency can make people adjust their expectations. For instance, what would happen if people played the 2/3 game after understanding the difference between the most logical approach and the most common? Submit your own guess at what 2/3 of the new average will be by using the form below, and we’ll find out.

**P787 2019-10-29 Game theory challenge - Can you predict human behavior - Lucas Husted**

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翻译人员: Jiasi Hao 校对人员: 潘 可儿几个月前，我们在自己的社群上 发起了一个挑战。我们问每个人： 从给定 0 到 100 的整数范围内，猜测一个最接近 所有猜测数字平均数 2/3 的整数。即倘若所有猜测数的平均是 60， 那么正确的猜测将会是 40。你认为哪个数字会是 平均数 2/3 的正确猜测呢？让我们看看是否可以尝试并推理出 我们猜测答案的方法。这个博弈是在一先决条件下进行的， 该条件被博弈理论家称为常识。不仅每一个参与者 都有一样的信息储备——他们也知道其他人都一样，并且其他人也都知道 再其他人也如此，如此无限循环。现在，如果每个人都猜 100， 那最大的可能平均数将会出现。在那个情况下，平均数的 2/3 将会是 66.66。既然每个人可以明白这个道理，那就没有理由去猜比 67 大的整数。如果每个人都在博弈中 得出同样的结论，没人会猜比 67 大的整数。现在 67 是最大的可能平均数，所以合理的猜测 就不应该比 67 的 2/3 大，即 44。这个逻辑可以不断地被拓展，随着每一步，符合逻辑的 最大可能猜测数会不断变小。因此猜测最小的可能数字 看似非常明智。确实，如果每个人都选择 0，这个博弈将会达到“纳什均衡”。在这一情况中，每个玩家在都为自己 选择了最优可能策略，并且没有单独的玩家 可以通过不同选择受益。但是这在现实世界不会发生。事实证明， 人们要么不是完全理智的，要么不会预期别人能做到完全理智，再或者可能是这两种情况的组合。当这个博弈在真实世界中发生时，平均数接近于 20 至 35 之间的某个整数。丹麦 Poolitiken 报纸曾开展这个博弈， 有超过 1.9 万读者参与。其平均数结果约为 22， 使得最终正确答案为 14。而我们的观众参与者， 平均数为 31.3。所以如果你的猜测数为 21， 那你猜得漂亮！经济博弈理论家有一个 模拟理性和实践相互作用方法，称为“ k 级推理”。其中 k 代表 一个推理周期的重复次数。一个 k 级为 0 的人 会非常天真地参与我们的博弈，他不会考虑别人的选择 而只是任意地猜一个数字。一个 k 级为 1 的人 会假设别人都在 0 级博弈，进而平均数为 50， 因此猜测数为 33。一个 k 级为 2 的人 会假设其他人都在 1 级博弈，导致他们最终猜测数为 22。这将要求 12 的 k 级 来达到猜测数为 0。事实证明大部分人 处于 1 或 2 的 k 级。而知道这一点很有用，因为 k 级思维 在高风险情况下时常出现。例如，股票交易员 不仅基于收益报告来评估股票，也基于其他人 在那些数字上摆放的价值。在球赛的点球环节中，射门人和守门员 都凭借他们对彼此想法的预判来决定向右或向左跑。守门员时常提前 记住他们对手的习惯模式，但罚球射手知道此事， 并依此做出相应计划。每个情况下，参与者必须衡量自身对最优行为的理解，来对抗他们认为 其他参与者对情况的了解深度。但是 1 或 2 的 k 级推理 绝不是硬性且速成的规定——仅是人们对这种博弈趋势的意识 使人们调整他们的预期。例如，当大家都了解了最符合逻辑的 与最普遍方法之间的区别，再来玩这个 2/3 的博弈游戏，结果又会如何？将你的新平均数 2/3 的猜测整数 填到以下表格并提交，我们再来看看。

**P788 2019-10-29 Why do humans have a third eyelid - Dorsa Amir**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=788)

You know that little pink thing nestled in the corner of your eye? It’s actually the remnant of a third eyelid. Known as the “plica semilunaris,” it’s much more prominent in birds and a few mammals, and functions like a windshield wiper to keep dust and debris out of their eyes. But in humans, it doesn’t work. It’s vestigial, meaning it no longer serves its original purpose. There are several other vestigial structures like the plica semilunaris in the human body. Most of these became vestigial long before homo sapiens existed, quietly riding along from one of our ancestor species to the next. But why have they stuck around for so long? To answer this question, it helps to understand natural selection. Natural selection simply means that traits which help an organism survive and reproduce in a given environment are more likely to make it to the next generation. As the environment changes, traits that were once useful can become harmful. Those traits are often selected against, meaning they gradually disappear from the population. But if a trait isn’t actively harmful, it might not get selected against, and stick around even though it isn’t useful. Take the tailbone. Evolutionary biologists think that as the climate got drier and grasslands popped up, our tail-bearing ancestors left the trees and started walking on land. The tails that had helped them in the trees began to disrupt their ability to walk on land. So individuals with mutations that reduced the length of their tails became more successful at life on land, surviving long enough to pass their short tails on to the next generation. The change was likely gradual over millions of years until, about 20 million years ago, our ancestors’ external tails disappeared altogether. Today, we know human embryos have tails that dissolve as the embryo develops. But the stubby tailbone sticks around, probably because it doesn’t cause any harm— in fact, it serves a more minor function as the anchor point for certain other muscles. Up to 85% of people have a vestigial muscle called the “palmaris longus.” To see if you do, put your hand down on a flat surface and touch your pinkie to your thumb. If you see a little band pop up in the middle of your wrist, that’s the tendon that attaches to this now-defunct muscle. In this case, the fact that not everyone has it has helped us trace its function. Vestigial traits can persist when there’s no incentive to lose them— but since there’s also no incentive to keep them, random mutations will sometimes still eliminate them from part of the population. Looking at our primate relatives, we can see that the palmaris longus is sometimes absent in those that spend more time on the land, but always present in those that spend more time in trees. So we think it used to help us swing from branch to branch, and became unnecessary when we moved down to land. The appendix, meanwhile, may once have been part of the intestinal system our ancestors used for digesting plant materials. As their diets changed, those parts of the intestinal system began to shrink. Unlike other vestigial structures, though, the appendix isn’t always harmless— it can become dangerously inflamed. For most of human history, a burst appendix could be a death sentence. So why did it stick around? It’s possible that it was very slowly on its way out, or that mutations simply hadn’t arisen to make it smaller. Or maybe it has other benefits— for example, it might still be a reservoir of bacteria that helps us break down food. But the fact is, we’re not really sure why the appendix persists. Evolution is an imperfect process. Human beings are the result of millions of years of trial, error, and random chance— and we’re full of evolutionary relics to remind us of that.

**P788 2019-10-29 Why do humans have a third eyelid - Dorsa Amir**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=788)

校对人员: Jiasi Hao你知道缩在你眼角中粉色小东西吗？这实际上是第三层眼皮的残余，被称为“半月皱襞”。在鸟类和一些哺乳动物中更明显，功能就像挡风玻璃上的雨刷器， 防止灰尘和小碎片进入眼睛。而对于人类，它却没有什么用。它退化了， 意味着起不到原有作用了。像半月皱襞一样， 还有其它一些退化结构的残余存在于人体中。多数在智人存在之前就已经退化了，安静地随着我们祖先一步步进化。但为什么半月皱襞能存在如此之久？为了回答这个问题， 理解自然选择会有所帮助。自然选择意味着有助于一种生物体存在的， 并在给定环境中能够复制的特征更可能会传递给下一代。当环境改变时， 曾经有用的特征可能会变得有害。这些特征经常会被选择性淘汰，意味着从种群中逐渐消失。但如果某一特征没有实际坏处， 则可能不会被淘汰，即使没用也会保留下来。想想尾锥。进化生物学家认为，随着气候的干燥，草原的出现，我们长有尾巴的祖先离开树林， 并开始在地面上行走。在树林中辅助他们的尾巴影响了它们在地上的行走能力。因突变而具有缩短尾巴长度的个体在地面生活中变得更成功，它们的生存时间足够长， 得以将短尾巴的特征传给下一代。在上百万年的时间中， 变化是渐进的，直到大约 2000 万年前，我们祖先的外部尾巴完全消失了。今天，我们知道人类胚胎仍然长有尾巴，它会随着胚胎发育，逐渐消失。但短短的尾锥保留了下来，可能因为没有什么坏处——实际上，尾椎对固定某些肌肉 仅有一点点什么作用。超过 85% 的人都具有 一种退化残余称为“掌长肌”的肌肉。看看你是否也有，把你的手放在一个平面上， 用小指触摸大拇指。如果看到手腕中部突起一小条肌肉，这就是连接到这条退化肌肉上的肌腱。这种情况下， 不是每个人都有这条肌肉的事实能够帮助我们跟踪其功能。退化的残余特征即使倘若没有理由消失， 便可能会保留下来——但由于也没有什么理由保留它们，随机的突变，有时也会促使其从部分种群中消失。看看我们的灵长目亲戚，我们可以看到， 那些更多时间于地面生活的物种，有的掌长肌消失了，但在更多时间于树上生活的物种中， 它通常得以保留。所以我们认为掌长肌能帮助 我们在树枝间摇荡，当我们搬到地面上生活时， 它就变得不那么必要了。同时，阑尾可能曾经是我们的祖先用于消化植物的内部系统器官之一。当它们的日常饮食改变时， 那些内部系统的开始部分萎缩。然而不像其他退化的残余结构， 阑尾并不总是无害的——它可能会因发炎而变得危险。在人类大部分历史中， 急性阑尾炎可能是致命的。而它为什么会保留下来？可能其消失过程非常缓慢，或者只是使它变小的突变还没有出现，再或者可能还有其他的好处——例如，阑尾可能是一个容器， 容纳细菌来帮助分解食物。但实际上，我们并不确定阑尾为什么存在。进化是一个不完美的过程。人类是上百万年 试验、错误、随机的产物——有好多的进化残余提醒着我们这一点。

**P790 2019-11-12 The myth of Loki and the master builder - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=790)

Asgard, a realm of wonders, was where the Norse Gods made their home. There Odin’s great hall of Valhalla towered above the mountains and Bifrost, the rainbow bridge, anchored itself. But though their domain was magnificent, it stood undefended from the giants and trolls of Jotunheim, who despised the gods and sought to destroy them. One day when Thor, strongest of the gods, was off fighting these foes, a stranger appeared, riding a powerful gray horse. The visitor made the gods an astonishing offer. He would build them the greatest wall they’d ever seen, higher than any giant could climb and stronger than any troll could break. All he asked in return was the beautiful goddess Freya’s hand in marriage— along with the sun and moon from the sky. The gods balked at this request and were ready to send him away. But the trickster Loki concocted a devious plan. He told the gods they should accept the stranger’s offer, but set such strict conditions that he would fail to complete the wall in time. That way, they would lose nothing, while getting most of the wall built for free. Freya didn’t like this idea at all, but Odin and the other gods were convinced and came to an agreement with the builder. He would only have one winter to complete the wall. If any part was unfinished by the first day of summer, he would receive no payment. And he could have no help from any other people. The gods sealed the deal with solemn oaths and swore the mason would come to no harm in Asgard. In the morning, the stranger began to dig the foundations at an astonishing speed, and at nightfall he set off towards the mountains to obtain the building stones. But it was only the next morning, when they saw him returning, that the gods began to worry. As agreed, no other people were helping the mason. But his horse Svadilfari was hauling a load of stones so massive it left trenches in the ground behind them. Winter came and went. The stranger kept building, Svadilfari kept hauling, and neither snow nor rain could slow their progress. With only three days left until summer, the wall stood high and impenetrable, with only the gate left to be built. Horrified, the gods realized that not only would they lose their fertility goddess forever, but without the sun and moon the world would be plunged into eternal darkness. They wondered why they’d made such a foolish wager— and then remembered Loki and his terrible advice. Suddenly, Loki didn’t feel so clever. All of his fellow gods threatened him with an unimaginably painful death if he didn’t find some way to prevent the builder from getting his payment. So Loki promised to take care of the situation, and dashed away. Outside, night had fallen, and the builder prepared to set off to retrieve the final load of stones. But just as he called Svadilfari to him, a mare appeared in the field. She was so beautiful that Svadilfari ignored his master and broke free of his reins. The mason tried to catch him, but the mare ran deep into the woods and Svadilfari followed. The stranger was furious. He knew that the gods were behind this and confronted them: no longer as a mild-mannered mason, but in his true form as a terrifying mountain giant. This was a big mistake. Thor had just returned to Asgard, and now that the gods knew a giant was in their midst, they disregarded their oaths. The only payment the builder would receive— and the last thing he would ever see— was the swing of Thor’s mighty hammer Mjolnir. As they set the final stones into the wall, the gods celebrated their victory. Loki was not among them, however. Several months would pass before he finally returned, followed by a beautiful gray foal with eight legs. The foal would grow into a magnificent steed named Sleipnir and become Odin’s mount, a horse that could outrun the wind itself. But exactly where he had come from was something Loki preferred not to discuss.

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翻译人员: Xiaowei Dong 校对人员: Harper Chang阿斯加德，一片奇妙的疆域， 北欧众神的土地。在那，奥丁的英灵殿俯瞰群山，彩虹桥横亘其间。尽管这片地域宏伟无比，却不设防御，时常受到 约顿汉姆巨人的袭击，缘由是他们痛恨并想要摧毁众神。有天，最强的神索尔 与对手激战正酣，一个骑壮硕灰马的外乡人突然出现，并提出了一个惊人的提议。他会为众神建造一座 史无前例的城墙，高到让巨人们难以企及， 坚实到没有巨人能击碎。他要求的报酬是 与美丽的女神芙蕾雅结婚——连同天空中的日与月。众神犹疑了， 还是打算将他送走。但最狡猾的洛基， 费尽心机想出了一个歪点子。他建议众神接受外乡人的提议，但要给他设置 不可能完成的时限。这样他们不会有任何损失， 还能白挣大半堵墙。芙蕾雅完全不支持这个想法，但奥丁和其他神都被说服了，并与石匠达成协议。规定他只有一个冬天的时间造墙，如果在夏天开始的第一天， 有任何未完部分，他就得不到报酬。并且他不能向任何人寻求帮助。众神用神圣的誓言 封印了这项协议，并让石匠发誓绝不伤害阿斯加德。清早，石匠开始用 惊人的速度刨地基，夜幕降临时，就去群山间寻找石材，一直到第二天早上他才回来。众神们开始有些紧张。按照约定， 没有任何人在帮石匠。但他的马，斯瓦迪尔法利， 却能拉动成吨的石材，多到土地上， 都被拉出了沟渠。一整个冬天，石匠不停地造， 斯瓦迪尔法利不停地拉，日夜兼程，雨雪无阻。夏天到来三天前，城墙几近完成， 高高耸立，坚不可摧，只剩下一扇门还没完成。慌乱的众神意识到 他们不仅会永远失去他们的生育女神，还会失去日月， 让天地堕入无尽黑暗。他们思来想去，当初是 如何达成这样一个愚蠢的约定——这才想起是洛基提的坏主意。突然之间， 洛基不再自视聪明了。众神威胁要将他折磨致死，除非他找到办法避免石匠获得报酬。洛基只好连连答应， 然后马上去办事了。殿外，夜幕降临，石匠出发去拿最后一批石材。但正当他呼唤斯瓦迪尔法利的时候， 一匹漂亮的母马突然出现。斯瓦迪尔法利被美色迷惑， 无视了主人的呼唤，挣脱了缰绳。石匠想要抓住斯瓦迪尔法利，但母马跑进了树丛， 斯瓦迪尔法利也随之而去。外乡人震怒。他知道众神在操纵这一切， 便前去对峙：他卸下好脾气石匠的伪装，现出他的真实面目—— 一个可怕的山巨人。这可是一个天大的错误。索尔正好回到阿斯加德，由于巨人在众神间现出原形，众神违背了誓言。巨人收到的唯一报酬，也是最后看到的东西，将是索尔的巨锤，姆乔尔尼尔。众神把最后一块砖砌上城墙后， 开始庆祝他们的胜利。洛基却并不在其中。几个月后，洛基终于回来了，身后是一匹漂亮的八脚灰马驹。小马驹之后会长成一匹骏马， 斯莱布尼尔，并成为奥丁的坐骑， 跑得比风还快。但至于他是从何而来的， 洛基从不愿过多赘述。

**P791 2019-11-13 The history of the world according to corn - Chris A. Kniesly**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=791)

Corn currently accounts for more than one tenth of our global crop production. The United States alone has enough cornfields to cover Germany. But while other crops we grow come in a range of varieties, over 99% of cultivated corn is the exact same type: Yellow Dent #2. This means that humans grow more Yellow Dent #2 than any other plant on the planet. So how did this single variety of this single plant become the biggest success story in agricultural history? Nearly 9,000 years ago, corn, also called maize, was first domesticated from teosinte, a grass native to Mesoamerica. Teosinte’s rock-hard seeds were barely edible, but its fibrous husk could be turned into a versatile material. Over the next 4,700 years, farmers bred the plant into a staple crop, with larger cobs and edible kernels. As maize spread throughout the Americas, it took on an important role, with multiple indigenous societies revering a “Corn Mother” as the goddess who created agriculture. When Europeans first arrived in America, they shunned the strange plant. Many even believed it was the source of physical and cultural differences between them and the Mesoamericans. However, their attempts to cultivate European crops in American soil quickly failed, and the settlers were forced to expand their diet. Finding the crop to their taste, maize soon crossed the Atlantic, where its ability to grow in diverse climates made it a popular grain in many European countries. But the newly established United States was still the corn capital of the world. In the early 1800’s, different regions across the country produced strains of varying size and taste. In the 1850’s, however, these unique varieties proved difficult for train operators to package, and for traders to sell. Trade boards in rail hubs like Chicago encouraged corn farmers to breed one standardized crop. This dream would finally be realized at 1893’s World’s Fair, where James Reid’s yellow dent corn won the Blue Ribbon. Over the next 50 years, yellow dent corn swept the nation. Following the technological developments of World War II, mechanized harvesters became widely available. This meant a batch of corn that previously took a full day to harvest by hand could now be collected in just 5 minutes. Another wartime technology, the chemical explosive ammonium nitrate, also found new life on the farm. With this new synthetic fertilizer, farmers could plant dense fields of corn year after year, without the need to rotate their crops and restore nitrogen to the soil. While these advances made corn an attractive crop to American farmers, US agricultural policy limited the amount farmers could grow to ensure high sale prices. But in 1972, President Richard Nixon removed these limitations while negotiating massive grain sales to the Soviet Union. With this new trade deal and WWII technology, corn production exploded into a global phenomenon. These mountains of maize inspired numerous corn concoctions. Cornstarch could be used as a thickening agent for everything from gasoline to glue or processed into a low-cost sweetener known as High-Fructose Corn Syrup. Maize quickly became one of the cheapest animal feeds worldwide. This allowed for inexpensive meat production, which in turn increased the demand for meat and corn feed. Today, humans eat only 40% of all cultivated corn, while the remaining 60% supports consumer good industries worldwide. Yet the spread of this wonder-crop has come at a price. Global water sources are polluted by excess ammonium nitrate from cornfields. Corn accounts for a large portion of agriculture-related carbon emissions, partly due to the increased meat production it enables. The use of high fructose corn syrup may be a contributor to diabetes and obesity. And the rise of monoculture farming has left our food supply dangerously vulnerable to pests and pathogens— a single virus could infect the world’s supply of this ubiquitous crop. Corn has gone from a bushy grass to an essential element of the world’s industries. But only time will tell if it has led us into a maze of unsustainability.

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翻译人员: Carol Wang 校对人员: Jiasi Hao玉米目前占全球农作物 产量的 1/10 以上，仅美国的种植面积 就足以覆盖整个德国。但是，尽管我们种植的 其他作物品种繁多，但超过 99% 的耕种玉米 都是一个品种：黄马牙 2 号玉米。也就是说，人类种植的 黄马牙 2 号玉米比地球上任何其它植物都多。那么，这类植物的单一品种如何成为农业史上最成功案例呢？约 9000 年前，玉米首次从中美洲的原生草 玉蜀黍驯化而来。玉蜀黍的坚硬种子 几乎无法食用，但它的纤维状皮 可做成用途广泛的材料。在接下来的 4700 年中， 农民将这种植物培育成主食，玉米穗轴更大，且谷粒可食。随着玉米传遍整个美洲， 它发挥了重要作用，被多个土著部落誉为“玉米母亲”，即创造农业的女神。当欧洲人第一次抵达美国时， 他们避开了这种奇怪的植物。许多人甚至认为，这是其与中美洲人之间 物质和文化差异的根源。他们尝试在美国土地上 种植欧洲农作物，但很快就失败了，这些定居者被迫扩大饮食范围。他们发现玉米符合自己的口味后， 玉米很快就抵达大西洋彼岸。玉米适应各种气候的生长的能力使其成为受许多欧洲国家欢迎的谷物。但是，新成立的美国 仍然是世界玉米之都。在 19 世纪初期，全国不同地区生产出 大小和口味各异的玉米。然而，在 19 世纪 50 年代，对火车运营商来说， 很难对这些独特品种进行包装，对商人来说，也很难出售。芝加哥等铁路枢纽贸易委员会鼓励玉米种植者 种植一种标准化作物。这一梦想最终在 1893 年的 世界博览会上得以实现，詹姆斯 · 里德（James Reid）的黄马牙玉米 在会上赢得了蓝丝带奖。在接下来的 50 年中， 黄马牙玉米席卷整个美国。随着二战期间的技术发展，机械收割机开始广泛普及。这意味着以前人工一天所收获的玉米，现在只需 5 分钟就收获完毕。另一种战时技术化学炸药硝酸铵，在农场也找到了新用途。有了这种新的合成肥料，农民就可以年复一年地 在地里密集种植玉米，无需轮作种植以恢复土壤中的氮。尽管这些进步使玉米 成为美国农民喜欢种植的作物，但为确保玉米高售价，美国农业政策 限制了农民种植玉米数量。但是在 1972 年，理查德 · 尼克松总统 （Richard Nixon）取消了这些限制，同时谈判向苏联出售大量谷物。通过这项新的贸易协议 和二战期间的技术，玉米产量猛增成为全球现象。大量的玉米催生了无数玉米制品。玉米淀粉可用作增稠剂， 从汽油到胶水都有使用，也可以加工成低成本的甜味剂， 称为高果糖浆。玉米迅速成为全球 最便宜的动物饲料之一，这使得肉类生产成本降低，进而增加了对肉类 和玉米饲料的需求。如今，人类食用的玉米 仅占所有种植量的 40％，而其余 60％ 支持全球消费品行业。然而，这种神奇作物的传播 也付出了相应代价。玉米田中过量的硝酸铵 污染了全球水源，与农业有关的碳排放中， 玉米占了很大比例，部分原因是，它增加了肉类产量。高果糖浆的使用， 可能是糖尿病和肥胖症的病因。单一农作物种植模式的兴起，使我们的食品供应极易 受到病虫害和病原体的侵害——单一病毒可能会感染这种 无处不在的农作物的全球供应。玉米已由丛生禾草成为世界工业的重要组成部分，但是，只有时间才能证明， 它是否令我们陷入了不可持续的迷宫。

**P792 2019-11-15 The Furnace Bots \_ Think Like A Coder, Ep 3**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=792)

Ethic and her robot Hedge agree to help the resistance leader, Adila, sabotage the art-incinerating furnace-bots. In exchange, Adila promises to lead them to the first object of Ethic’s quest, an artifact called the Node of Power. Years ago, there was just one furnace-bot. It had a 0 inside its furnace and an unknown, randomly generated serial number. Over time, the original self-replicated to produce more identical furnace-bots. Each child inherited the original’s unknown serial number within its furnace, and had a random, unique serial number of its own inscribed on its shell. The second generation of furnace- bots also self-replicated in the same way, always passing their own serial numbers to their offspring’s furnaces. This continued on for many generations. Today, each furnace-bot receives its orders from its parent. So if Ethic can find the original 0 bot and somehow change its instructions, she could take over the entire army, all at once. Adila has the perfect solution: a data crystal that she’s been carrying for years, waiting for the right moment to activate it. It contains a program designed to gain control of a bot and give it new instructions. But if it’s uploaded to any furnace- bot other than the original, the 0 bot will override the instructions and destroy the data crystal in the process. The feeding is just a few minutes away, and there’s only one chance to get this right. Fortunately, Hedge’s ability to store data can help. In programming, a piece of information gets stored in something called a variable. Variables are basically containers that hold onto numbers, words, or other values. How does Ethic program Hedge to find the original 0 bot as quickly as possible? Pause now to figure it out for yourself. Here’s a hint. Programs can be written to have as many variables as you need, but you can solve this problem with just one. Hedge can use it to store a serial number and replace it with a new one as often as he needs. Pause now to figure it out for yourself. A key insight here is that Hedge doesn’t need to map out the entire set of relationships to find the original furnace-bot. If, for example, he gets lucky and picks the original one right away, he’ll be done. But if he starts with any other bot, he can still find a path that leads straight back to the 0-bot by following a simple set of instructions. To help craft them, let’s first simplify the problem. Let’s say there were only three furnace-bots; a parent and two children, but you don’t know which is which. You could have Hedge pick one at random and look inside its furnace. Now, you know the family tree looks like this. If the number inside the furnace is a 0, you’ve found the parent. If not, then no matter which child you chose, it must have the parent’s serial number in its furnace. So in this scenario, you’re guaranteed to find the parent in one or two moves. In actuality, there are many furnace-bots, and you don’t know how many generations there are nor what the family tree looks like. But you don’t need to, because Hedge can just keep repeating the same sequence of actions until he gets to the original. How? With a loop. Hedge can pick any bot at random, look inside its furnace, and store that serial number as a variable. Then he’ll begin the following loop that will repeat until the stored variable equals 0, the furnace number of the original bot: 1. Find the bot whose shell serial number matches the stored number. 2. Look inside its furnace. 3. Store that new number, overwriting the old one. Once the loop ends, we’ll know that Hedge has found the 0 bot, so he should upload the control program. So here’s what happens: Hedge only takes 5 repetitions to find the original: robot 733 has the 0 in its furnace. In a blink of a mechanical eye, the program spreads through the entire army, and Adila takes control. She has the furnace-bots give off theatrical bouts of flame to hide the fact that they’re now secretly safe-guarding all of that artistic output. Now that Ethic’s delivered the furnace-bots, Adila honors her end of the deal. She leads Ethic and Hedge to the location of the first artifact, the Node of Power. There, one thing is immediately clear: they’ll have to steal it.

**P792 2019-11-15 The Furnace Bots \_ Think Like A Coder, Ep 3**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=792)

翻译人员: Sicheng Lu 校对人员: Jiasi Hao[ 像程序员一样思考 ][ 地点：BRADBARRIER ][ 第三集 炉膛机器人 ][ 音乐 ]艾斯克和她的机器人海吉 同意帮助反对运动的领袖，埃迪拉，密谋破坏 焚毁艺术品的炉膛机器人。作为交换，埃迪拉保证会带领他们 前往艾斯克要寻找的第一个物品——一个名为“能量晶石”的神器。几年之前，只有一个炉膛机器人，在它的炉膛里有一个数字 0 ，和另一个未知的、任意生成的编码。随着时间的推移，原始的机器人自我复制， 制造了更多一样的炉膛机器人。每一个子机器人的熔炉内 都继承了初始机器人未知的编码，并且有一个属于自己的 独一无二的任意编码刻于其外壳。第二代炉膛机器人 也通过同样的方法自我复制，永远将属于自己的编码 传承给自己子机器人的熔炉。就这样传承了很多代。如今，每一个炉膛机器人 都从自己的母机器人那接收指令。所以，如果艾斯克可以找到 初始零号机器人并改变它的指令，她就可以一次性掌控 整个机器人军队。埃迪拉有个完美的解决办法：一个她带在身上很多年的数据水晶正等待着合适的时机被激活。水晶内包含一个程序，这个程序能操控一个机器人 并且给它新指令。但是如果它被上传到 任何除 0 之外的炉膛机器人上，零号机器人就会覆盖这个指令，同时摧毁数据水晶。离喂食开始只有几分钟，成功的机会只有一次。幸运的是，海吉存储数据的能力 可以派上用场。在编程的时候，信息被储存在 一个称为变量的东西里。变量就是保存数字、单词 和其他量数的容器。艾斯克要如何为海吉编写程序， 让它最快地找到零号机器人呢？[ 可暂停播放自行解题 ]提示如下：程序可以被编写成 包含任意数量的变量，但你只需要用一个变量 就能解决这个问题。海吉可以用这个变量储存一个编码，然后随时用新的编码将其替换。[ 可暂停播放自行解题 ]一个重要的切入点是海吉不需要画出整张关系图 来寻找原始机器人。假设，如果它幸运地 一下就选中了原始零号机器人，它的任务就完成了。但如果他从其他任何一个机器人开始，通过执行一组简单的指令，它仍然能找到 一条直通零号机器人的途径。为生成这个指令， 首先我们需要简化这个问题。假设只有三个炉膛机器人： 一个母机器人和两个子机器人，但你不知道谁是谁，你可以让海吉 任意选择一个检查它的熔炉。现在，你知道系谱图长这个样子：如果熔炉内的编码是 0 ， 那么你找到了母机器人。如果不是， 那么不论你选择哪一个，它的熔炉内必定都有母机器人的编码。所以在这种情况下， 你必定会在两步之内找到母机器人。现实情况中，有无数的炉膛机器人，而且你也不知道现在有多少代机器人，也不知道系谱图的样子。但其实你不需要知道，因为海吉可以 一直重复执行相同的动作直到它找到初始的零号机器人。如何办到？使用循环指令。海吉可以选择任意一个机器人， 检查它的熔炉，并且将其的编码作为变量储存。然后它将执行以下循环指令 直到储存变量等于 0 ，即，初始机器人的编码：1、找到外壳上的编码 等于储存编码的机器人。2、检查它的熔炉。3、储存这个新的编码，覆盖旧的编码。一旦这个循环指令结束， 我们就知道海吉找到了零号机器人，随后它就应该立刻上传控制程序。情况是这样的：海吉只用 5 个循环就找到了初始机器人；733 号机器人的熔炉内有编码 0 。一眨眼的时间，程序散播到整个机器人军团， 埃迪拉因此获得了控制权。她让炉膛机器人假装放出火焰来掩饰它们其实在暗中保护所有的文艺作品的事实。现在，艾斯克交出了炉膛机器人，埃迪拉也信守承诺，她带领艾斯克和海吉 去了第一件神器——“能量晶石”的存放地。在那，他们立即了解到一件事：他们得将它偷出来。

**P793 2019-11-18 Can you outsmart this logical fallacy - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=793)

Meet Lucy. She was a math major in college, and aced all her courses in probability and statistics. Which do you think is more likely: that Lucy is a portrait artist, or that Lucy is a portrait artist who also plays poker? In studies of similar questions, up to 80 percent of participants chose the equivalent of the second statement: that Lucy is a portrait artist who also plays poker. After all, nothing we know about Lucy suggests an affinity for art, but statistics and probability are useful in poker. And yet, this is the wrong answer. Look at the options again. How do we know the first statement is more likely to be true? Because it’s a less specific version of the second statement. Saying that Lucy is a portrait artist doesn’t make any claims about what else she might or might not do. But even though it’s far easier to imagine her playing poker than making art based on the background information, the second statement is only true if she does both of these things. However counterintuitive it seems to imagine Lucy as an artist, the second scenario adds another condition on top of that, making it less likely. For any possible set of events, the likelihood of A occurring will always be greater than the likelihood of A and B both occurring. If we took a random sample of a million people who majored in math, the subset who are portrait artists might be relatively small. But it will necessarily be bigger than the subset who are portrait artists and play poker. Anyone who belongs to the second group will also belong to the first– but not vice versa. The more conditions there are, the less likely an event becomes. So why do statements with more conditions sometimes seem more believable? This is a phenomenon known as the conjunction fallacy. When we’re asked to make quick decisions, we tend to look for shortcuts. In this case, we look for what seems plausible rather than what is statistically most probable. On its own, Lucy being an artist doesn’t match the expectations formed by the preceding information. The additional detail about her playing poker gives us a narrative that resonates with our intuitions— it makes it seem more plausible. And we choose the option that seems more representative of the overall picture, regardless of its actual probability. This effect has been observed across multiple studies, including ones with participants who understood statistics well– from students betting on sequences of dice rolls, to foreign policy experts predicting the likelihood of a diplomatic crisis. The conjunction fallacy isn’t just a problem in hypothetical situations. Conspiracy theories and false news stories often rely on a version of the conjunction fallacy to seem credible– the more resonant details are added to an outlandish story, the more plausible it begins to seem. But ultimately, the likelihood a story is true can never be greater than the probability that its least likely component is true.

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翻译人员: Jiasi Hao 校对人员: Wei Zhang认识一下露西。她在大学主修数学，并且在所有的概率与统计课程中 获得了高分。你觉得哪一个情况可能性更高： 露西是一个肖像画家，或露西不仅是一个肖像画家， 同时也是扑克玩家？在一个提出相似问题的研究中， 高达 80% 的参与者选择了与第二个陈述等价的情况：即露西是一个肖像画家， 而且也是一个扑克玩家。毕竟，我们所知的露西 和艺术没有什么联系，但在扑克中， 概率与统计却很有用。不过，这是一个错误的猜测。再次看一下两个选择的陈述。我们是如何知道第一个陈述 更可能是真的呢？因为相比第二个陈述， 它是细节较少的版本。说露西是一个肖像画家不代表她可能做，或可能不做 其它事情。基于背景信息， 尽管想象露西玩扑克比想象她从事艺术工作简单得多，但只有在她同时做这两件事时 第二个陈述才可为真。不论想象露西是一个艺术家 看起来有多违背直觉，第二个情景中额外增加的一个条件 使其可能性变低。对于任何可能的事件集， 事件 A 可能发生的概率总是比事件 A 和事件 B 同时发生的概率高。如果我们随机抽取 100 万个数学专业的人，其中是肖像画家的子集 可能相对较小。但是这必定会大于同时拥有肖像画家和扑克玩家 双重身份的子集。任何属于第二个子集的人， 也同时属于第一个子集。反之，却并非如此。条件越多， 一个事件发生的可能性越低。所以，为什么包含更多条件的陈述 有时更加令人信服？这是一个称为 “合取谬误”的现象。当我们被要求快速地做出选择， 我们通常偏向于选择捷径。在这种情况下， 我们会选择看似更具可行性的选项，而非从统计意义上讲 最有可能的选项。就其本身而言， 露西是艺术家这一事件并不符合信息处理所生成的预期。额外的一个关于她玩扑克的细节提供了与我们直觉相吻合的叙述——这细节使之看似更加可信。于是，不论选项的实际概率，我们选择了看似 更加具有整体代表性的选项。在许多研究中， 都观察到了这一现象，包括那些熟知统计知识的 研究参与者——从学生们对骰子掷出顺序的赌注，到外交政策专家 对外交危机可能性的预测。合取谬误不是一个 仅存在于假设情况下的问题。阴谋论和虚假新闻通常仗着一个合取谬误的版本， 使之看似看信——在一个奇特故事中加入 越是与我们直觉相互呼应的细节，会使这个故事看起来更加真实。但最终，一个故事为真的可能性永远不会超过 事实真相最小的可能性。

**P794 2019-11-18 History's 'worst' nun - Theresa A. Yugar**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=794)

Juana Ramírez de Asbaje sat before a panel of prestigious theologians, jurists, and mathematicians. The viceroy of New Spain had invited them to test the young woman’s knowledge by posing the most difficult questions they could muster. But Juana successfully answered every challenge, from complicated equations to philosophical queries. Observers would later liken the scene to “a royal galleon fending off a few canoes.” The woman who faced this interrogation was born in the mid-17th century. At that time, Mexico had been a Spanish colony for over a century, leading to a complex and stratified class system. Juana’s maternal grandparents were born in Spain, making them members of Mexico’s most esteemed class. But Juana was born out of wedlock, and her father – a Spanish military captain – left her mother, Doña Isabel, to raise Juana and her sisters alone. Fortunately, her grandfather’s moderate means ensured the family a comfortable existence. And Doña Isabel set a strong example for her daughters, successfully managing one of her father’s two estates, despite her illiteracy and the misogyny of the time. It was perhaps this precedent that inspired Juana’s lifelong confidence. At age three, she secretly followed her older sister to school. When she later learned that higher education was open only to men, she begged her mother to let her attend in disguise. Her request denied, Juana found solace in her grandfather’s private library. By early adolescence, she’d mastered philosophical debate, Latin, and the Aztec language Nahuatl. Juana’s precocious intellect attracted attention from the royal court in Mexico City, and when she was sixteen, the viceroy and his wife took her in as their lady-in-waiting. Here, her plays and poems alternately dazzled and outraged the court. Her provocative poem Foolish Men infamously criticized sexist double standards, decrying how men corrupt women while blaming them for immorality. Despite its controversy, her work still inspired adoration, and numerous proposals. But Juana was more interested in knowledge than marriage. And in the patriarchal society of the time, there was only one place she could find it. The Church, while still under the zealous influence of the Spanish Inquisition, would allow Juana to retain her independence and respectability while remaining unmarried. At age 20, she entered the Hieronymite Convent of Santa Paula and took on her new name: Sor Juana Inés de la Cruz. For years, Sor Juana was considered a prized treasure of the church. She wrote dramas, comedies, and treatises on philosophy and mathematics, in addition to religious music and poetry. She accrued a massive library, and was visited by many prominent scholars. While serving as the convent’s treasurer and archivist, she also protected the livelihoods of her niece and sisters from men who tried to exploit them. But her outspokenness ultimately brought her into conflict with her benefactors. In 1690, a bishop published Sor Juana’s private critique of a respected sermon. In the publication, he admonished Sor Juana to devote herself to prayer rather than debate. She replied that God would not have given women intellect if he did not want them to use it. The exchange caught the attention of the conservative Archbishop of Mexico. Slowly, Sor Juana was stripped of her prestige, forced to sell her books and give up writing. Furious at this censorship, but unwilling to leave the church, she bitterly renewed her vows. In her last act of defiance, she signed them “I, the worst of all,” in her own blood. Deprived of scholarship, Sor Juana threw herself into charity work, and in 1695, she died of an illness she contracted while nursing her sisters. Today, Sor Juana has been recognized as the first feminist in the Americas. She’s the subject of countless documentaries, novels, and operas, and appears on Mexico’s 200-peso banknote. In the words of Nobel laureate Octavio Paz: “It is not enough to say that Sor Juana’s work is a product of history; we must add that history is also a product of her work.”

**P794 2019-11-18 History's 'worst' nun - Theresa A. Yugar**

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翻译人员: Chen Pince 校对人员: Yizhuo He胡安娜 · 拉米雷斯 · 德 · 阿斯巴耶 坐在著名的神学家、法学家和数学家小组面前。新西班牙总督邀请他们提出 能想到的最困难的问题来测试这名年轻女子的知识。但是胡安娜成功地回应了所有挑战，从复杂的方程到哲学疑问。见证者们后来将现场比作“一艘皇家帆船 挡住了几只独木舟。”面对询问的这个女人 出生于 17 世纪中叶。当时，墨西哥成为西班牙殖民地 已有一个多世纪，形成了一个复杂而分层的阶级制度。胡安娜的外祖父母出生于西班牙，这使他们成为了墨西哥 最受尊敬的阶级成员。但胡安娜是一个私生女，她的父亲—— 一位西班牙军事上尉——离开了她的母亲多妮娅 · 伊莎贝尔， 使她不得不独自抚养胡安娜和她的姐妹们。幸运的是，祖父的和蔼态度使家庭得以和睦。多妮娅 · 伊莎贝尔为她的女儿们 树立了一个强有力的榜样，尽管她目不识丁，而且身处 那个对女性偏见盛行的时代，她依然成功地管理着 父亲的两个庄园之一。也许正是母亲的例子 塑造了胡安娜终生的自信。三岁时，她偷偷地跟着姐姐去上学。在她得知高等教育只对男性开放时，她恳求母亲让她假扮成 男性的模样去上学。在她的请求被拒绝后，胡安娜在祖父的 私人图书馆中找到了慰藉。刚进入青春期时， 她就已经掌握了哲学辩论、拉丁语和阿兹特克的纳瓦特尔语。胡安娜年纪轻轻 就展现出过人的聪慧，引起了墨西哥城皇家法院的注意，在她十六岁时，总督和他的妻子邀她入宫 成为侍从女官。在那儿，她的戏剧与诗歌令人叹服， 但同时又惹怒了法院。《愚蠢的男人》这首颇具挑衅意味的诗，由于批判了对于性别的双重标准， 使社会陷入了惶恐和恼怒，这首诗谴责了男性如何在亵渎妇女 的同时还谴责她们的不道德行为。尽管存在争议，她的作品 依然使她令众多男子倾慕，并引来了无数的求婚者。但是胡安娜对知识的 兴趣远胜于婚姻。在当时的父权制社会中，她只能在一个地方找到它。教会，虽然处于西班牙 宗教裁判所的狂热影响下，但将允许胡安娜在未婚的情况下免受于他人的控制并得到尊重。20 岁时，她进入圣保拉圣像修道院，并改名为： 修女胡安娜 · 伊内斯 · 德 · 拉克鲁兹。多年以来，胡安娜被认为是 教会的宝贵财富。除宗教音乐和诗歌之外， 她还撰写了戏剧、喜剧和关于哲学和数学的论著。日积月累所构筑的藏书库，引来了许多著名学者参观。在掌管修道院的财务 和保管档案的同时，她还维持侄女和姐妹的生计，使其免受来自男性的剥削。但她直言不讳的性格 最终导致了她与赞助人的冲突。1690 年，一位主教发表了修女胡安娜 对受人尊敬的布道的私人批判。出版物中，他告诫胡安娜修女 应致力于祈祷而不是辩论。她回答说， 若上帝不希望女性使用智慧，就不会将之赋予女性。此次谈话引起了 墨西哥保守派大主教的注意。慢慢地， 修女胡安娜被剥夺了威望，被迫卖掉她的书，放弃了写作。她对这种审查制度感到愤怒， 但不愿意离开教会，她痛苦地重述着自己的誓言。在她最后的反抗行为中，她用自己的鲜血签下了 “我，最糟糕的人。”失去了学者身份，修女胡安娜 全身心地投入到慈善事业中，1695 年，她在照顾姐妹时 因感染疾病而死亡。如今，修女胡安娜已被公认为 美洲第一位女权主义者，她是无数纪录片、 小说和歌剧的主题，并被印在了墨西哥 200 比索的钞票上。用诺贝尔奖获得者 奥克塔维奥 · 帕斯的话说：“修女胡安娜的作品 不该仅被视为历史的产物；我们必须补充说 历史也是她作品的产物。”

**P795 2019-11-18 How does laser eye surgery work - Dan Reinstein**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=795)

In 1948, Spanish ophthalmologist Jose Ignacio Barraquer Moner was fed up with glasses. He wanted a solution for blurry vision that fixed the eye itself, without relying on external aids. But the surgery he eventually devised was not for the faint of heart. Barraquer began by slicing off the front of a patient’s cornea and dunking it in liquid nitrogen. Using a miniature lathe, he ground the frozen cornea into the precise shape necessary to focus the patient’s vision. Then he thawed the disc, and sewed it back on. Barraquer called this procedure keratomileusis, from the Greek words for “carving” and “cornea.” And though it might sound grisly, his technique produced reliable results. So how did Barraquer’s surgery work? Keratomileusis corrects what are called refractive errors: imperfections in the way the eye focuses incoming light. Ideally, the cornea and lens work together to focus light on the surface of the retina, but several kinds of refractive errors can impair this delicate system. In people with myopia, or short-sightedness, a steep cornea focuses light just short of the retina. Those with hyperopia, or far-sightedness, have the opposite problem: light is focused too far beyond the retina. And in people with astigmatism, the cornea has two different curvatures which focus light at two distances and produce blurry vision. Even those with perfect vision will eventually suffer from presbyopia, or “aging eyes.” As the proteins in the lens age, they slowly increase its size. By an adult’s mid-40’s, the lens is too large to easily change shape and shift focus. Glasses and contact lenses bend light to compensate for these refractive errors. But, as Barraquer’s procedure shows, we can also alter the shape of the cornea itself; moving the focal point backwards, forwards, or pulling a divided image together. And thankfully, modern eye surgeons can sculpt the cornea with far less invasive tools. In corrective laser eye surgery, surgeons rely on excimer lasers. These tools are accurate enough to etch words into a human hair. To safely accomplish these ultra-fine incisions, they use a technique called photoablation. This allows the laser to essentially evaporate organic tissue without overheating surrounding eye tissue. So how does laser eye surgery actually work? The first step is to separate a thin layer from the front of the cornea. This can be done with either a flat, wide blade, or a femto-second laser that produces millions of tiny plasma bubbles to create a plane beneath the corneal surface. Surgeons then lift the flap to expose the inside of the cornea. Guided by the refractive error and the shape of the cornea, the excimer laser robotically sculpts the exposed corneal bed into the correct shape. This process usually takes less than 30 seconds for each eye. Finally, the flap is closed, and its edges reseal themselves in just a few hours. Because the lasering is done on the eyeball itself, it’s described as “in situ,” or “on site.” Its complete name is “laser in-situ keratomileusis” – but you probably know it as LASIK. Essentially, this technique carves a patient’s contact lens prescription onto their cornea. Like any surgical procedure, LASIK comes with certain risks. Some patients experience slightly blurred vision that can’t be corrected by glasses. But the technique is currently about as likely to damage your eyes as wearing daily disposable contact lenses for one year. Today, a technique called SMILE enables surgeons to sculpt the cornea through even smaller incisions – further reducing recovery time. And lasers aren’t just correcting the three types of refractive errors – this technology can also restore aging eyes. In a technique called Laser Blended Vision, surgeons adjust one eye to be slightly better at distance vision and the other to be better at close range vision. The difference between the two eyes is small enough that most patients can merge their vision, allowing both eyes to work together at all distances. Advances in laser technology continue to make vision correction surgery more effective and accessible. One day soon, Barraquer’s vision of a world without glasses may finally come true.

**P795 2019-11-18 How does laser eye surgery work - Dan Reinstein**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=795)

翻译人员: Yuxin Zhang 校对人员: Gabriella Hu1948 年， 西班牙眼科医生何塞 · 伊格纳西奥 · 巴拉奎尔 · 莫纳 （Jose Ignacio Barraquer Moner）受够了戴眼镜。他想要找到修复眼睛本身的方法 来解决视力模糊的问题，而无需依靠外部帮助。但他最终设计的手术方案 并不适合胆小的人。巴拉奎尔通过切下患者前侧眼角膜，并将其泡在氮液中。通过使用微型车床， 他将冰冻的眼角膜磨成能够让病人 视力聚焦的精准形状。接着，他把这个圆盘 解冻后再缝合回去。巴拉奎尔把这种手术称为： 角膜磨镶术，源自希腊语中的 “雕刻” 和 “角膜”。这虽然听起来很可怕， 但他的技术却十分可靠。那么，巴拉奎尔的手术 是如何操作的呢？角膜磨镶术矫正了所谓的屈光不正，即眼睛无法将射入的光线 完美地进行对焦。理想情况下，角膜和晶状体共同作用将光线聚焦再视网膜表面上，但是几种屈光不正 会破坏这个精巧的系统。在近视的人群中，较陡的角膜使得聚焦的光线 刚好无法抵达到视网膜。远视的人则有刚好相反的问题：光线聚焦在远超过视网膜的地方。而患有散光的人， 角膜有两个不同的曲率使光线有两个不同的聚焦点， 造成视力模糊。即使视力完美的人， 最终眼睛也会老化，即 “老花眼”。随着晶状体中的蛋白质老化， 它们会慢慢变大。成年人到了四十岁左右， 晶状体由于太大而不易改变形状和转移焦点。眼镜和隐形眼镜会改变光线方向 以补偿这种屈光不正。但是，如同巴拉奎尔的手术所表明我们也可以改变角膜本身的形状，将焦点向前或向后移动，或让分离的图像重叠回到一起。幸好，现代眼科手术可以使用创口更小的工具雕刻角膜。在激光矫正眼科手术中， 外科医生依靠准分子激光器。这些工具精准到 可以在人类的头发上刻字。为了安全地完成这些超精细切割，他们使用一种叫做光消融的技术。基本上，这种技术 使用激光让有机组织蒸发，而不会让周围眼组织过热。那么，激光眼科手术 到底是怎么运行的呢？第一步是将角膜前侧 分离出薄薄的一层。这既可以使用平宽的刀片，也可以使用飞秒激光。它可以产生数 百万个微小的等离子气泡，在角膜表面下形成一个平面。接着，外科医生会将角膜瓣掀开， 露出角膜内部。根据屈光偏差和角膜形状准分子激光会自动将暴露的角膜床雕刻成正确的形状。这一过程对于每只眼睛 通常只需要不到 30 秒。最后，将角膜瓣放回原位，只需几小时，它的边缘会自然地愈合。因为激光手术是在眼球上进行，这在手术中被称为“原位”的，全称为“准分子激光原位角膜磨镶术”，但大家熟知的可能是“LASIK”。基本上， 这项技术是将患者的隐形眼镜处方直接刻到其角膜上。和其他任何外科手术一样，LASIK 手术也伴随着风险。有些患者会出现轻微的视线模糊，且无法通过佩戴眼镜矫正。但这项技术目前对于眼睛的伤害如同佩戴一年的日抛型隐形眼。如今，外科医生通过一项名为 SMILE 的技术来雕刻角膜，通过更小的切口，进一步缩短了恢复的时间。激光手术不仅可以 矫正三类屈光不正，这项技术还可以修复老花眼。有一种叫做激光混合视觉的技术，外科医生微调一只眼睛， 使其远距视线更好，然后微调另一只眼睛， 使其近距离视线更好。两个眼睛之间的区别足够小到使大部分患者可以合并视线，让两只眼睛可以一起看不同的距离。激光手术的持续进步，使得视力矫正手术更加高效和便利。巴拉奎尔的愿景： 一个没有眼镜的的世界，在不久的将来，或许将会实现。

**P796 2019-11-21 Is marijuana bad for your brain - Anees Bahji**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=796)

In 1970, marijuana was classified as a schedule 1 drug in the United States: the strictest designation possible, meaning it was completely illegal and had no recognized medical uses. For decades, this view persisted and set back research on the drug's mechanisms and effects. Today, marijuana’s therapeutic benefits are widely acknowledged, and some nations have legalized medical use or are moving in that direction. But a growing recognition for marijuana’s medical value doesn’t answer the question: is recreational marijuana use bad for your brain? Marijuana acts on the body’s cannabinoid system, which has receptors all over the brain and body. Molecules native to the body, called endocannabinoids, also act on these receptors. We don’t totally understand the cannabinoid system, but it has one feature that provides a big clue to its function. Most neurotransmitters travel from one neuron to the next through a synapse to propagate a message. But endocannabinoids travel in the opposite direction. When a message passes from the one neuron to the next, the receiving neuron releases endocannabinoids. Those endocannabinoids travel backward to influence the sending neuron— essentially giving it feedback from the receiving neuron. This leads scientists to believe that the endocannabinoid system serves primarily to modulate other kinds of signals— amplifying some and diminishing others. Feedback from endocannabinoids slows down rates of neural signaling. That doesn’t necessarily mean it slows down behavior or perception, though. For example, slowing down a signal that inhibits smell could actually make smells more intense. Marijuana contains two main active compounds, tetrahydrocannabinol or THC, and cannabidiol, or CBD. THC is thought to be primarily responsible for marijuana’s psychoactive effects on behavior, cognition, and perception, while CBD is responsible for the non-psychoactive effects. Like endocannabinoids, THC slows down signaling by binding to cannabinoid receptors. But it binds to receptors all over this sprawling, diffuse system at once, whereas endocannabinoids are released in a specific place in response to a specific stimulus. This widespread activity coupled with the fact that the cannabinoid system indirectly affects many other systems, means that each person’s particular brain chemistry, genetics, and previous life experience largely determine how they experience the drug. That’s true much more so with marijuana than with other drugs that produce their effects through one or a few specific pathways. So the harmful effects, if any, vary considerably from person to person. And while we don’t know how exactly how marijuana produces specific harmful effects, there are clear risk factors that can increase peoples’ likelihood of experiencing them. The clearest risk factor is age. In people younger than 25, cannabinoid receptors are more concentrated in the white matter than in people over 25. The white matter is involved in communication, learning, memory, and emotions. Frequent marijuana use can disrupt the development of white matter tracts, and also affect the brain’s ability to grow new connections. This may damage long-term learning ability and problem solving. For now, it’s unclear how severe this damage can be or whether it’s reversible. And even among young people, the risk is higher the younger someone is— much higher for a 15 year old than a 22 year old, for instance. Marijuana can also cause hallucinations or paranoid delusions. Known as marijuana-induced psychosis, these symptoms usually subside when a person stops using marijuana. But in rare cases, psychosis doesn’t subside, instead unmasking a persistent psychotic disorder. A family history of psychotic disorders, like schizophrenia, is the clearest, though not the only, risk factor for this effect. Marijuana-induced psychosis is also more common among young adults, though it’s worth noting that psychotic disorders usually surface in this age range anyway. What’s unclear in these cases is whether the psychotic disorder would have appeared without marijuana use— whether marijuana use triggers it early, is a catalyst for a tipping point that wouldn’t have been crossed otherwise, or whether the reaction to marijuana is merely an indication of an underlying disorder. In all likelihood, marijuana’s role varies from person to person. At any age, as with many other drugs, the brain and body become less sensitive to marijuana after repeated uses, meaning it takes more to achieve the same effects. Fortunately, unlike many other drugs, there’s no risk of fatal overdose from marijuana, and even heavy use doesn’t lead to debilitating or life-threatening withdrawal symptoms if use stops. There are more subtle forms of marijuana withdrawal, though, including sleep disturbances, irritability, and depressed mood, which pass within a few weeks of stopping use. So is marijuana bad for your brain? It depends who you are. But while some risk factors are easy to identify, others aren’t well understood— which means there’s still some possibility of experiencing negative effects, even if you don’t have any of the known risk factors.

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翻译人员: Stella Peng 校对人员: Meng Ren1970 年，大麻在美国 被归为一级管制药物：即最严格的管理类型，意味着它完全非法， 且毫无医疗用途。这种观点一直持续了几十年，阻碍了对大麻机制和效用的研究。如今，大麻的治疗功效 得到了广泛的认可，而且一些国家已经 或正在使大麻的医用合法化。但大麻的医疗价值被认可 并不能解答一个问题：使用娱乐性大麻是否对大脑有害？大麻作用于人体的内源性大麻素系统，这一系统的受体遍布大脑和人体。人体自然生产的内源性大麻素分子，同样也作用于那些受体。我们还没有完全了解 内源性大麻素系统，但它的一个特性为我们了解 其功能提供了很重要的线索。大多数神经递质 从一个神经元移动到下一个，通过突触传递消息。而内源性大麻素往相反的方向移动。当消息从一个神经元传递到下一个，接收神经元释放出内源性大麻素。这些内源性大麻素 往回移动至发送神经元，给予其接收神经元的反馈。这一机制使得科学家们认为内源性大麻素系统 主要负责调控其他种类的信号，即放大信号或缩小信号。内源性大麻素的反馈 使得神经元信号传递速度减慢，但这并不意味着 行为或感知速度的减慢。例如，减慢抑制嗅觉的信号反而使得闻到的气味更加强烈。大麻含有两种主要的活性化合物：四氢大麻酚（THC） 和大麻二酚（CBD）。THC 被认为主要负责 产生大麻的精神影响，包括行为、认知以及感知。而 CBD 负责产生非精神类影响。和内源性大麻素类似,THC 通过与大麻素受体结合 来减缓信号的传递。不同的是，它会立即与遍布全身的 大麻素系统中的所有受体结合，而内源性大麻素仅在特定部位产生，对特定的刺激作出反应。这种大范围的影响， 以及内源性大麻素系统对很多其他系统的间接影响，意味着每个人独有的脑化学、遗传学 以及之前的生活经历，在很大程度上 决定了他们对这种药物的体验。相较于其他只通过一种 或几种特定的途径产生作用的药物，大麻更是如此。因此，不良影响，如果存在的话， 非常因人而异。虽然我们不了解大麻究竟 怎样产生特定的不良影响，但我们可以明确一些 会增加不良影响概率的风险因子。最显而易见的风险因子是年龄。对于小于 25 岁的人， 大麻素受体更集中于脑白质中。脑白质参与人的交流、 学习、记忆以及情感。经常使用大麻 会扰乱脑白质神经束的发育，并且会影响大脑形成新连接的能力。由此可能会破环长期的学习能力 以及解决问题的能力。目前，尚不清楚这一损害的 严重程度以及是否可逆。甚至对于年轻人来说， 越年轻则风险越高。例如，15 岁的人会比 22 岁的人风险高很多。大麻还会引起幻觉或妄想症，统称为大麻引起的精神病。这些症状通常会 随着大麻的停用而消退。但在极少数情况下， 这些症状不会消退，意味着一种持续性的精神病。精神病家族病史，例如精神分裂，是产生这一效应 最为明显的危险因子之一。大麻引起的精神病 也在年轻人中更为常见。尽管值得注意的是，无论如何，精神病通常都会在这个年龄段出现。无法明确的是，若不使用大麻，精神病是否仍旧会产生？大麻是否会促使其提前发生？它是一个促使病症 越过临界点的催化剂吗？或者对大麻的反应只是 一个潜在疾病的象征？大麻的作用很可能因人而异。在任何年龄，如同使用其他很多药物，大脑和身体会随着大麻的重复使用 而对其敏感性降低，这意味着需要使用更多药量 以达到相同效果。幸运的是，不像其他很多药物，大麻没有过量致命的风险，甚至大量使用也不会导致虚弱乏力，停止使用也不会产生 威胁生命的戒断症状。不过，戒断大麻有着更微妙的症状，例如睡眠障碍，烦躁不安和情绪低落，它们都会在停用几周内消失。所以大麻对大脑有害吗？这取决于你是谁。但尽管一些危险因子很容易被确认，我们对其他危险因子还不了解。这意味着即使你不具有 任何已知的危险因子，仍有可能存在负面影响。

**P797 2019-11-22 Why doesn’t the Leaning Tower of Pisa fall over - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=797)

In 1990, the Italian government enlisted top engineers to stabilize Pisa’s famous Leaning Tower. There’d been many attempts to right the tower during its 800 year history, but this team’s computer models revealed the urgency of their situation. They projected the tower would topple if it reached an angle of 5.44 degrees— and it was currently leaning at 5.5. No one knew how the tower was still standing, but the crisis was clear: they had to solve a problem that stumped centuries of engineers, and they needed to do it fast. To understand their situation, it’s helpful to understand why the tower tilted in the first place. In the 12th century, the wealthy maritime republic of Pisa set about turning its cathedral square into a magnificent landmark. Workers embellished and enlarged the existing church, and added a massive domed baptistry to the plaza. In 1173, construction began on a free-standing campanile, or bell tower. The engineers and architects of the time were masters of their craft. But for all their engineering knowledge, they knew far less about the ground they stood on. Pisa’s name comes from a Greek word for “marshy land," which perfectly describes the clay, mud, and wet sand below the city’s surface. Ancient Romans counteracted similar conditions with massive stone pillars called piles which rest on Earth’s stable bedrock. However, the tower’s architects believed a three-meter foundation would suffice for their relatively short structure. Unfortunately for them, less than five years later, the tower’s southern side was already underground. Such a shifting foundation would normally have been a fatal flaw. If workers added more weight, the pressure from upper stories would sink the structure and fatally increase the lean. But construction halted at the fourth story for nearly a century as Pisa descended into prolonged warfare. This long pause allowed the soil to settle, and when construction began again in 1272, the foundation was on slightly more stable footing. Under the direction of architect Giovanni di Simone, workers compensated for the tower’s minor tilt by making the next few floors taller on the southern side. But the weight of the extra masonry made that side sink even deeper. By the time they completed the seventh floor and bell chamber, the angle of the tilt was 1.6 degrees. For centuries, engineers tried numerous strategies to address the lean. In 1838, they dug a walkway around the base to examine the sunken foundation. But removing the supporting sand only worsened the tilt. In 1935, the Italian Corps of Engineers injected mortar to strengthen the base. However, the mortar wasn’t evenly distributed throughout the foundation, resulting in another sudden drop. All these failed attempts, along with the ever-sinking foundation, moved the tower closer to its tipping point. And without definitive knowledge of the soil composition, engineers couldn’t pinpoint the tower’s fatal angle or devise a way to stop its fall. In the years following WWII, researchers developed tests to identify those missing variables. And in the 1970’s, engineers calculated the curved tower’s center of gravity. With this data and new computing technology, engineers could model how stiff the soil was, the tower’s trajectory, and the exact amount of excavation needed for the tower to remain standing. In 1992, the team drilled diagonal tunnels to remove 38 cubic meters of soil from under the tower’s north end. Then, they temporarily counterbalanced the structure with 600 tons of lead ingots before anchoring the base with steel cables. More than six centuries after its construction, the tower was finally straightened… to a tilt of about four degrees. No one wanted the tower to fall, but they also didn’t want to lose the landmark’s most famous feature. Today the tower stands at 55– or 56– meters tall, and it should remain stable for at least 300 years as a monument to the beauty of imperfection.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=797)

翻译人员: 彬琳 张 校对人员: Tingting Zhao1990 年，意大利政府招募了 一批顶尖工程师来维护著名的比萨斜塔。在过去的八百年中 有过许多次修正斜塔的尝试，但计算机模型向这只团队 揭示了他们面临的严峻考验。他们预测这座塔将在 倾斜角度超过 5.44 度的时候倒塌——现在它的倾斜角度是 5.5。没有人知道为什么斜搭仍旧屹立， 但危机就摆在眼前：他们需要解决这个困扰了 无数代工程师的问题，并且是迅速解决。为了更好的理解他们的处境，让我们先来了解比萨塔倾斜的原因。在 12 世纪，富有的比萨海上共和国着手将主教座堂广场 变成它宏伟的地标建筑。工人们扩大并装饰了原有的教堂，并在广场上加盖了带穹顶的洗礼堂。1173 年，独立式钟楼的修建也开始了。参与建造的工程师与建筑师 都是那个时代的大师，然而相对工程知识，他们对脚下的这片土地知之甚少。“比萨”一词起源于 古希腊词汇“沼泽之地”，恰好完美描述了藏在这座城市 地表之下的黏土、淤泥和湿砂岩。相似的条件下， 古罗马人将大理石柱立在地表岩床上以增加建筑的稳定性。然而，塔的建筑设计师认为三米的地基足以支撑这个相对较矮的建筑。不幸的是，不到五年，塔的南侧已经陷入地下。通常情况下地基的倾移 将成为致命的缺陷。如果继续增加重量，来自上层的压力将使建筑下沉，从而导致更严重的倾斜。由于比萨陷入长久的战争时期，工程在第四层停滞了将近一个世纪。在这期间，土壤沉降等到 1272 年工程再次开始时，地基的基脚变得相对稳定。在建筑师乔瓦尼 · 迪 · 西蒙尼 （Giovanni di Simone）的指导下，接下来几层的建造中钟楼南侧略高于北侧， 以此来修正塔的微小倾斜。然而额外的砖石结构加速了塔楼南侧的下沉。等到第七层及钟室竣工时，塔已经倾斜了 1.6 度。数个世纪以来，工程师们 无数次尝试修正它。1838 年，为了探究下沉的地基， 他们围绕地基挖掘出一条走道，然而挖走支撑的沙土 导致了更严重的倾斜。1935 年，为了加固塔基， 意大利工程军向基底灌注砂浆，然而砂浆灌注不均匀引发了又一次下沉。所有失败的尝试， 伴随沉降的地基使得倒塌一触即发。由于缺乏对土壤构成的认知，人们无法计算出塔何时会倒也无法阻止它发生。第二次世界大战结束后，学者们尝试确定这些缺失的变量。20 世纪 80 年代， 工程师们计算出塔的重心曲线，再加上新的计算机技术，土质硬度，塔的轨迹以及精确的挖掘量才得以确定。1992 年，施工队挖出倾斜的隧道，从北端的塔基挖走 38 立方米的土壤。随后，他们用 600 吨铅锭 来过渡性的平衡塔身，最后用钢索来固定地基。在竣工的六个世纪之后，塔的倾斜角终于被修正到 4 度左右。没有人希望它倒塌，但他们也不想失去 这个地标建筑最出名的特征。如今，塔高约 55 到 56 米，作为缺陷之美的里程碑，它将至少屹立 300 年。

**P798 2019-11-25 How does chemotherapy work - Hyunsoo Joshua No**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=798)

During World War I, one of the horrors of trench warfare was a poisonous yellow cloud called mustard gas. For those unlucky enough to be exposed, it made the air impossible to breathe, burned their eyes, and caused huge blisters on exposed skin. Scientists tried desperately to develop an antidote to this vicious weapon of war. In the process they discovered the gas was irrevocably damaging the bone marrow of affected soldiers— halting its ability to make blood cells. Despite these awful effects, it gave scientists an idea. Cancer cells share a characteristic with bone marrow: both replicate rapidly. So could one of the atrocities of war become a champion in the fight against cancer? Researchers in the 1930s investigated this idea by injecting compounds derived from mustard gas into the veins of cancer patients. It took time and trial and error to find treatments that did more good than harm, but by the end of World War II, they discovered what became known as the first chemotherapy drugs. Today, there are more than 100. Chemotherapy drugs are delivered through pills and injections and use "cytotoxic agents," which means compounds that are toxic to living cells. Essentially, these medicines cause some level of harm to all cells in the body— even healthy ones. But they reserve their most powerful effects for rapidly-dividing cells, which is precisely the hallmark of cancer. Take, for example, those first chemotherapy drugs, which are still used today and are called alkylating agents. They’re injected into the bloodstream, which delivers them to cells all over the body. Once inside, when the cell exposes its DNA in order to copy it, they damage the building blocks of DNA’s double helix structure, which can lead to cell death unless the damage is repaired. Because cancer cells multiply rapidly, they take in a high concentration of alkylating agents, and their DNA is frequently exposed and rarely repaired. So they die off more often than most other cells, which have time to fix damaged DNA and don’t accumulate the same concentrations of alkylating agents. Another form of chemotherapy involves compounds called microtubule stabilizers. Cells have small tubes that assemble to help with cell division and DNA replication, then break back down. When microtubule stabilizers get inside a cell, they keep those tiny tubes from disassembling. That prevents the cell from completing its replication, leading to its death. These are just two examples of the six classes of chemotherapy drugs we use to treat cancer today. But despite its huge benefits, chemotherapy has one big disadvantage: it affects other healthy cells in the body that naturally have to renew rapidly. Hair follicles, the cells of the mouth, the gastrointestinal lining, the reproductive system, and bone marrow are hit nearly as hard as cancer. Similar to cancer cells, the rapid production of these normal cells means that they’re reaching for resources more frequently— and are therefore more exposed to the effects of chemo drugs. That leads to several common side effects of chemotherapy, including hair loss, fatigue, infertility, nausea, and vomiting. Doctors commonly prescribe options to help manage these side-effects, such as strong anti-nausea medications. For hair loss, devices called cold caps can help lower the temperature around the head and constrict blood vessels, limiting the amount of chemotherapy drugs that reach hair follicles. And once a course of chemo treatment is over, the healthy tissues that’ve been badly affected by the drug will recover and begin to renew as usual. In 2018 alone, over 17 million people world-wide received a cancer diagnosis. But chemotherapy and other treatments have changed the outlook for so many. Just take the fact that up to 95% of individuals with testicular cancer survive it, thanks to advances in treatment. Even in people with acute myeloid leukemia— an aggressive blood cancer— chemotherapy puts an estimated 60% of patients under 60 into remission following their first phase of treatment. Researchers are still developing more precise interventions that only target the intended cancer cells. That’ll help improve survival rates while leaving healthy tissues with reduced harm, making one of the best tools we have in the fight against cancer even better.

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翻译人员: Meng Ren 校对人员: 潘 可儿一战时期，有一种 黄色的有毒气体，堪称堑壕战里，最恐怖的梦魇， 它就是“芥子毒气”。一旦不幸中招，你将会无法呼吸， 双眼灼伤，暴露的皮肤上长出巨大的水泡。科学家们穷尽精力，想要研制出 能对抗这残暴武器的解毒剂。在这个过程中，他们发现气体 对伤员的骨髓造成了永久性损伤，使它无法继续产生血细胞。这一糟糕的结果反而 赋予了科学家们灵感。癌细胞和骨髓细胞有一个共同点： 它们都能快速自我复制那么，我们能否将战争的暴行变为对抗癌症的武器呢？1930 年代的研究学者 对这个想法进行了验证。他们从芥子气中提取出复合物，再注入癌症病人的静脉里。通过长时间反复的试验，他们发现 这种方法利大于弊。而在第二次世界大战末期，人们终于发现了 世界上第一种化疗药物。如今，市面上的化疗药物 高达上百种。患者可以选择口服或者注射，这是一种“细胞毒剂”， 即对活细胞有毒的化合物。虽然，这些药物在一定程度上 会损伤身体里的所有细胞，包括健康的。但当面对快速分裂的细胞时， 打击效果最佳，而那正好是癌细胞的标志。举个例子，烷化剂是 我们发现的第一种并且至今仍在使用的 化疗药物。这是一种注射型药物，被输送到所有细胞内。当 DNA 进行自我复制时它将破坏 DNA 的双螺旋结构，从而杀死细胞， 除非损伤被修复。而正因为癌细胞的繁殖速度快，吸引烷化剂大量涌入，DNA 在暴露过程中被迅速破坏， 很难自我修复。所以癌细胞的死亡速度 远远高于其他细胞，后者有足够时间 自我修复受损的 DNA，而不会累积过量的烷化剂。第二种化疗药物 含有一种“微管稳定剂”。细胞内的微管聚集后能 协助细胞分裂、DNA 复制，然后微管散开， 完成细胞复制。微管稳定剂进入细胞后，它们能阻止已经 聚集的微管散开，从而截断细胞的复制过程， 导致细胞死亡。除了上述两种， 还有另外四种化疗药物被用于现代癌症临床治疗。尽管化疗有着巨大的好处， 但它有一个明显的缺点：正常情况下迅速代谢的细胞 也面临着化疗的巨大杀伤力。毛囊、口腔细胞、 胃肠黏膜、生殖系统、甚至骨髓， 统统都遭受了无差别攻击。这些正常细胞 和癌细胞一样繁殖迅速，也就意味着 它们将消耗更多的营养，与血管内的化疗药物的 反应也更加频繁。从而导致化疗的各项副作用，包括脱发、疲劳、不孕不育、 恶心、呕吐等。通常，为了缓解不适， 医生会给患者开一些药比如强效的止吐药。有一种冷却帽， 专门用于防止脱发。它能降低头皮温度， 收缩血管，减少化疗药物与毛囊的接触。当一个疗程的化疗结束后，之前受损严重的皮肤组织 将恢复健康，重新开始正常的新陈代谢。仅在 2018 年，全世界就有超过 1700 万人被确诊癌症。幸好，化疗以及其他治疗手段 为我们带来了希望的曙光。超过 95% 的睾丸癌患者重获健康，而这多亏了医学的进步。即使像急性髓系白血病 这种严重的血癌，在接受第一个阶段的化疗后， 约 60% 六十岁以下的患者的病情得到了缓解。学者们还在继续研究更准确的，只针对癌细胞的干预方式，以期在提高存活率的同时，减轻对健康组织的伤害，以改进我们拥有的 最好的抗癌工具之一。

**P799 2019-12-04 Hacking bacteria to fight cancer - Tal Danino**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=799)

In 1884, a patient’s luck seemed to go from bad to worse. This patient had a rapidly growing cancer in his neck, and then came down with an unrelated bacterial skin infection. But soon, something unexpected happened: as he recovered from the infection, the cancer also began to recede. When a physician named William Coley tracked the patient down 7 years later, no visible signs of the cancer remained. Coley believed something remarkable was happening: that the bacterial infection had stimulated the patient’s immune system to fight off the cancer. Coley’s fortunate discovery led him to pioneer the intentional injection of bacteria to successfully treat cancer. Over a century later, synthetic biologists have found an even better way to use these once unlikely allies— by programming them to safely deliver drugs directly to tumors. Cancer occurs when normal functions of cells are altered, causing them to rapidly multiply and form growths called tumors. Treatments like radiation, chemotherapy, and immunotherapy attempt to kill malignant cells, but can affect the entire body and disrupt healthy tissues in the process. However, some bacteria like E. coli have the unique advantage of being able to selectively grow inside tumors. In fact, the core of a tumor forms an ideal environment where they can safely multiply, hidden from immune cells. Instead of causing infection, bacteria can be reprogrammed to carry cancer-fighting drugs, acting as Trojan Horses that target the tumor from within. This idea of programming bacteria to sense and respond in novel ways is a major focus of a field called Synthetic Biology. But how can bacteria be programmed? The key lies in manipulating their DNA. By inserting particular genetic sequences into bacteria, they can be instructed to synthesize different molecules, including those that disrupt cancer growth. They can also be made to behave in very specific ways with the help of biological circuits. These program different behaviors depending on the presence, absence, or combination of certain factors. For example, tumors have low oxygen and pH levels and over-produce specific molecules. Synthetic biologists can program bacteria to sense those conditions, and by doing so, respond to tumors while avoiding healthy tissue. One type of biological circuit, known as a synchronized lysis circuit, or SLC, allows bacteria to not only deliver medicine, but to do so on a set schedule. First, to avoid harming healthy tissue, production of anti-cancer drugs begins as bacteria grow, which only happens within the tumor itself. Next, after they’ve produced the drugs, a kill-switch causes the bacteria to burst when they reach a critical population threshold. This both releases the medicine and decreases the bacteria’s population. However, a certain percentage of the bacteria remain alive to replenish the colony. Eventually their numbers grow large enough to trigger the kill switch again, and the cycle continues. This circuit can be fine-tuned to deliver drugs on whatever periodic schedule is best to fight the cancer. This approach has proven promising in scientific trials using mice. Not only were scientists able to successfully eliminate lymphoma tumors injected with bacteria, but the injection also stimulated the immune system, priming immune cells to identify and attack untreated lymphomas elsewhere in the mouse. Unlike many other therapies, bacteria don’t target a specific type of cancer, but rather the general characteristics shared by all solid tumors. Nor are programmable bacteria limited to simply fighting cancer. Instead, they can serve as sophisticated sensors that monitor sites of future disease. Safe probiotic bacteria could perhaps lie dormant within our guts, where they’d detect, prevent, and treat disorders before they have the chance to cause symptoms. Advances in technology have created excitement around a future of personalized medicine driven by mechanical nanobots. But thanks to billions of years of evolution we may already have a starting point in the unexpectedly biological form of bacteria. Add synthetic biology to the mix, and who knows what might soon be possible.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=799)

翻译人员: Yue WANG 校对人员: Jiasi Hao1884 年，一位癌症患者的病情每况愈下。他颈部的恶性肿瘤快速增大，随之而来的，是非肿瘤所致的 细菌性皮肤感染。但很快，令人意外的情况出现了：随着此人皮肤感染的痊愈， 他的恶性肿瘤亦开始消退。一位名叫威廉 · 科利的医生（William Coley） 在 7 年后找到这名患者，他没有发现任何 癌症（恶性肿瘤）遗存的迹象。科利于是相信 有一件举世瞩目的事情要发生：细菌感染能够刺激患者的免疫系统以对抗癌症。这项发现使科利成为癌症疗法的先驱，即，有意向患者体内注射细菌， 以成功治疗癌症。一个世纪之后， 合成生物学家发现了更好的治疗手段。他们利用了看似不可能的盟友——通过人为编程细菌的帮助， 使药物安全并直接地送至肿瘤处。当细胞正常功能被改变时， 癌症就会发生。癌变细胞之后开始 快速繁殖、成长，最终形成肿瘤。诸如放疗、化疗以及免疫疗法会击杀癌细胞， 但对整个身体也有副作用，而且会在治疗过程中 无差别地破坏健康的组织。然而，一些细菌，例如大肠杆菌具有特定的优势， 它们可以选择性地在肿瘤内生长。实际上，肿瘤的内部核心 为细菌提供了理想的生长环境，供细菌安全地繁殖， 躲避免疫细胞的攻击。这样的细菌不但不会引发炎症还可被重编程， 使其自身携带抗癌药物犹如特洛伊木马， 从肿瘤内部展开攻击。此类通过基因编程细菌活细胞 作为治疗手段的新颖方式是目前合成生物学中 一个备受关注的领域。那细菌是如何被编程的呢？关键就在于对它们 DNA 的操控。在细菌活细胞的 DNA 中 插入特别的基因序列，并指导其合成不同的分子。其中包括一些 会干扰癌细胞的生长的分子。在生物电路的帮助下，细菌还可以被编程， 从而做出特定行为。这些行为基于特定因素的 出现、缺失或组合而异。举个例子，肿瘤通常 含氧量低， PH 值低，并且会过量生产特定分子。合成生物学家们 可以让细菌对这些条件敏感，因此使得细菌只对肿瘤反应， 从而避开健康组织。有一种生物电路， 名为同步裂解回路（SLC）。它不仅能使细菌携带药物， 还可使其按时间规律行动。首先，为避免伤害健康组织，抗癌药物会随着细菌的生长被释放，而整个过程仅会发生在肿瘤内部。接下来，在药物被释放完毕后，当细菌数量上升至临界值时，一个生死 开关会被启动， 致使细菌爆裂。这样既释放了药物， 又削减了细菌数量。当然，一定比例的细菌会存活下来以待继续繁殖、占领肿瘤。最终，细菌的数量将再次 增长至临界值，触发生死开关，如此循环。人们可将生物电路中 药物释放的周期进行微调，以最佳方式对抗不同癌症。这一治疗方法已在科学实验中的 小白鼠身上被证实具有前景。科学家通过注射细菌， 不仅可以消灭淋巴瘤，同时还会刺激免疫系统，引发免疫细胞识别并攻击实验鼠体内 其他未受药物影响的淋巴瘤。不同于其他疗法， 细菌并非只针对一种癌细胞，而是以实体瘤的 一些共有特征作为靶点。被基因编辑过的细菌 不局限于简单的对抗癌症，同时，还能作为复杂精密的感应器以监视未来疾病的发生部位。安全的益生菌甚至 能以休眠状态潜伏于内脏，在任何体内失调可能导致 疾病症状发生之前，进行探测、阻止及治疗。科技的发展，例如未来将会出现的能带来更多个性化药物的纳米机器人， 令人兴奋无比。不过多亏了数亿年来的进化，我们可能已经站在了研究细菌全新生物形态的起点。向其中融入合成生物学，谁人可知未来的可能呢？

**P800 2019-12-04 The Train Heist \_ Think Like A Coder, Ep 4**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=800)

Ethic, Hedge, and Adila, the leader of the revolution, plot out how they can steal an artifact called the Node of Power. It’s being used to run a heavily fortified train that runs all around the country, providing supplies to settlements and facilities. This armored behemoth undergoes a complex and unpredictable unloading procedure— a procedure which is displayed, in detail, on a screen within the engine car. Right means the train will go one car length forward, and left means the train will go the same distance backwards. While unloading, the train frequently moves back and forth, so a typical sequence might look like this. Also within the engine car is a button that can only be pressed once. When pressed, it lets down the force field over the artifact for 10 seconds. The engine car is tiny and designed for a robot. Of your team, only Hedge can fit. The members of the resistance have positioned a crane over the train tracks that can pluck the artifact once it’s exposed. They’ll know when to lower the crane by sight. But the only way Hedge can determine the train’s position and know when to lower the force field is by analyzing the unloading procedure, because he’ll be inside the windowless engine car. Hedge can’t program himself though, so it’s up to Ethic to tell him what to do. The artifact is in the car 10 positions behind the one that’s directly under the crane at the start. What instructions can Ethic give Hedge so that he hits the button at just the right moment? Here’s a hint to get you started. The key to this problem, as with many programming challenges, is to reframe the information in a way that a computer can work with. A computer doesn’t know what a train is, nor does it need to. It can, however, work with variables. Try making a variable that tracks the train’s position. How will it change as the train moves? Let’s start by breaking this problem into two objectives. The first is to know where the train will be as it carries out its instructions. The second is to hit the button when the train is in just the right position. For the first objective it’ll help to think of the train as a big number line. Let’s make 0 the car with the node, 1 the car in front of it, and so on. That means car 10 is under the crane at the start. When the train moves one car right, car 9 is under the crane. So a right arrow can be thought of as “subtract 1.” And when the train moves left from there, 10 is back under the crane, making a left arrow the same as “add 1." Let’s set our train position variable to 10, since that’s where we start. We can now use a loop to read the instructions one at a time, adding or subtracting as we go, to track which car is under the crane. The nice thing about setting up the variable this way is that it tells us how far the node is from the crane. So as soon as the variable hits 0, Hedge should hit the button. And here’s what happens. Ethic gets into position on the crane while Hedge rushes off and slips into the engine car unnoticed, just before the train lurches to life. It rolls 3 cars back. 1 forward, another 4 back. Then so far forward Ethic loses track before it reverses once more. When the artifact finally rolls into position, Adila lowers the crane, hoping Ethic and Hedge got it right. At the last possible moment, the force field sputters and falls. Ethic swoops in, and lifts the Node of Power to freedom. When Ethic gives the node to Hedge for safe keeping, something incredible happens. The artifact shimmers to life with a vision of the past: When the crystal was unearthed, no one could make the console inside work. The government put out a call for people to try their luck with it, one at a time. Ethic loved to figure out what made things tick, so she signed up. Within moments at the console, something clicked into place, and she created her first robot. The government hired Ethic as chief robotics engineer on the spot. Within a year her creations ran almost every aspect of society, and the nation and its people thrived, no longer needing to toil in the fields and factories. The vision ends, and Hedge detects the second artifact in the 198forest, to the southeast. Luckily, the train is going there next, and has just enough reserve fuel for the trip. Ethic and Hedge smuggle themselves aboard and find a hiding spot for the long journey ahead.

**P800 2019-12-04 The Train Heist \_ Think Like A Coder, Ep 4**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=800)

翻译人员: Carol Wang 校对人员: Jiasi Hao[ 像程序员一样思考 ][ 地点：BRADBARRIER ][ 第四集 劫持火车 ]艾斯克、海吉和革命领袖埃迪拉制定了偷取神器“能量晶石”的方案。它被用来运行重点防御的一列火车，该专列负责为全国的定居点 和设施提供物资。这个庞然大物全副武装，其卸货过程 非常复杂且不可预测——该过程详细显示在 发动机车厢内的屏幕上。向右的箭头表示 火车向前行驶一节车厢的距离，而向左的箭头则表示 火车向后行驶相同的距离。卸货期间，火车会不停地来回开动，因此，一个典型的移动顺序 可能是这样的。此外，在发动机车厢内还有一个按钮， 该按钮只能按下一次。按下后，将有 10 秒 解除对能量晶石的控制。发动机车厢很小，专为机器人设计。在你们的团队中，只有海吉进得去。抵抗组织成员已在车轨上方 安置了一台起重机，能量晶石一旦显现， 即可以将其快速取出。他们能目测何时降下起重机，但是，因为海吉将置身于 无窗的发动机车厢内，看不到车外情况，它只能通过分析卸货过程，才能确定火车的位置 并明确何时释放力场以解除晶石控制。海吉自己不懂编程， 所以需要艾斯克告诉它怎么做。从起重机所在车厢处算起，能量晶石在第 10 节车厢。艾斯克可以给予海吉什么指示，以便它在适当的时候按下按钮呢？[ 5 秒后公布规则 ]若想自己解题，可暂停播放。[ 5 秒后公布规则 ]解题提示：与许多编程挑战一样，解题关键，就是用计算机 运行方式来重构信息。计算机不知道火车是什么， 也不需要知道，但是，它可以使用变量。可尝试定义一个跟踪火车位置的变量，看看随着火车的移动 它会如何变化呢？[ 5 秒后公布答案 ]就从将问题分为两个目标入手吧。首先，要确定火车执行卸货指示时的位置，其次，在火车处于正确位置时按下按钮。对于第一个目标，把火车当做 一个大数轴理解就容易多了，把能量晶石所在的车厢设为 0， 它前面的车厢设为 1，依此类推，得出车厢 10 位于起重机下方。当火车向右移动一节车厢时， 车厢 9 位于起重机下方。因此，可将向右箭头视为“ - 1 ”。当火车再向左移动时， 车厢 10 将回到起重机下方，即向左箭头等同于“ + 1 ”。我们从起重机下方的车厢开始， 那应把火车位置变量设为 10 。我们现在用循环语句读取指示， 一次读一条指示，边读边对位置变量进行加减运算，得出起重机下的车厢编号。这样设置变量的好处是，它可以直接告诉我们 能量晶石距起重机有多远。因此，只要变量等于 0， 海吉就应该按下按钮。下面就是实际操作。在火车开始移动之前，海吉冲出去并滑入发动机车厢，艾斯克进入起重机就位。火车先后退 3 节车厢， 又前进 1 节，再后退 4 节，此时，艾斯克已茫然不知 起重机下是哪节车厢。当能量晶石终于处于起重机正下方时，埃迪拉放下起重机，并希望艾斯克和海吉能操作无误，在最后可能的时刻， 力场轰然崩塌。艾斯克冲过去， 成功拿到了能量晶石。当艾斯克把它交给海吉安全保管时，不可思议的事情发生了。能量晶石闪烁的光芒中 闪现出过去发生的一幕幕：水晶刚出土的时候， 没人能使其内部控制台工作。政府呼吁群众都来试试运气，每个人试一次。艾斯克想弄清水晶滴答作响的原委， 就报名了。她登上控制台的片刻间， 一片声音响起，又回归安静。她就这样创造了自己的第一个机器人。政府当场就聘请艾斯克 为首席机器人工程师。在不到一年的时间里， 她创造的机器人几乎遍及各个角落，国家及人民繁荣昌盛，不用再在工厂和田野里劳作。历史影像播放结束， 海吉发现第二件神器在 198 森林，东南方。幸运的是，火车接下来就去那里，并且有足够燃料储备抵达。艾斯克和海吉悄悄登车，为接下来的漫长旅程 找到了藏身之所。

**P801 2019-12-05 Why should you read “Lord of the Flies” by William Golding - Jill Das**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=801)

William Golding was losing his faith in humanity. Serving aboard a British destroyer in World War II, the philosophy teacher turned Royal Navy lieutenant was constantly confronted by the atrocities of his fellow man. And when he returned to England to find Cold War superpowers threatening one another with nuclear annihilation, he was forced to interrogate the very roots of human nature. These musings on the inevitability of violence would inspire his first and most famous novel: "Lord of the Flies." After being rejected by 21 publishers, the novel was finally published in 1954. It takes its title from Beelzebub, a demon associated with pride and war— two themes very much at the heart of Golding’s book. The novel was a bleak satire of a classic island adventure story, a popular genre where young boys get shipwrecked in exotic locations. The protagonists in these stories are able to master nature while evading the dangers posed by their new environments. The genre also endorsed the problematic colonialist narrative found in many British works at the time, in which the boys teach the island’s native inhabitants their allegedly superior British values. Golding’s satire even goes so far as to explicitly use the setting and character names from R.M. Ballantyne’s "Coral Island"— one of the most beloved island adventure novels. But while Ballantyne’s book promised readers "pleasure... profit... and unbounded amusement,” Golding’s had darker things in store. "Lord of the Flies" opens with the boys already on the island, but snippets of conversation hint at their terrifying journey— their plane had been shot down in the midst of an unspecified nuclear war. The boys, ranging in age from 6 to 13, are strangers to each other. All except for a choir, clad in black uniforms and led by a boy named Jack. Just as in Ballantyne’s "Coral Island," the boy’s new home appears to be a paradise— with fresh water, shelter, and abundant food sources. But even from the novel’s opening pages, a macabre darkness hangs over this seemingly tranquil situation. The boys’ shadows are compared to “black, bat-like creatures” while the choir itself first appears as “something dark... fumbling along” the beach. Within hours of their arrival, the boys are already trading terrifying rumors of a vicious “beastie” lurking in the woods. From these ominous beginnings, Golding’s narrative reveals how quickly cooperation unravels without the presence of an adult authority. Initially, the survivors try to establish some sense of order. A boy named Ralph blows into a conch shell to assemble the group, and delegate tasks. But as Jack vies for leadership with Ralph, the group splinters and the boys submit to their darker urges. The mob of children soon forgets their plans for rescue, silences the few voices of reason, and blindly follows Jack to the edge of the island, and the edge of sanity. The novel’s universal themes of morality, civility, and society have made it a literary classic, satirizing both conventions of its time and long held beliefs about humanity. While island adventure stories often support colonialism, "Lord of the Flies" turns this trope on its head. Rather than cruelly casting native populations as stereotypical savages, Golding transforms his angelic British schoolboys into savage caricatures. And as the boys fight their own battle on the island, the far more destructive war that brought them there continues off the page. Even if the boys were to be rescued from themselves, what kind of world would they be returning to? With so few references to anchor the characters in a specific place or period, the novel feels truly timeless— an examination of human nature at its most bare. And though not all readers may agree with Golding’s grim view, "Lord of the Flies" is unsettling enough to challenge even the most determined optimist.

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翻译人员: Yuxin Zhang 校对人员: Yanyan Hong威廉 · 戈尔丁（William Golding） 丧失了对人性的信心，第二次世界大战时， 他在英国驱逐舰上服役，这位哲学老师变成了 皇家海军中尉，不断遭到同胞的残暴对待。当他返回英国， 发现冷战的超级大国用核武器来互相威胁时，他不得不质疑人性的根源。这些关于暴力不可避免地沉思，激发他写出了第一本 也是最著名的一本小说：《蝇王》。在遭遇了 21 个 出版商的拒绝后这本小说终于在 1954 年出版。书名来自于巴力西卜， 一个和骄傲及战争有关的恶魔——这两个主题正是 戈尔丁这本书的核心。这是一部凄凉的讽喻小说，讲述了一个经典的岛屿冒险的故事，一种流行的体裁，即小男孩们在异国他乡遇到了海难。这些故事中的主角们 可以掌握大自然，同时规避了新环境带来的危险。这种体裁也支持了 有问题的殖民主义叙述，这在当时的英国许多作品中被发现，在故事中，男孩们教岛上的原住民他们那些所谓的 优越的英国价值观。戈尔丁的讽刺作品甚至明确使用了R · M · 巴兰坦的《珊瑚岛》的 场景设定和角色名称，《珊瑚岛》是最受人喜爱的 岛屿冒险小说之一。但是，当巴兰坦的作品向读者承诺“愉悦、利益、以及无限的娱乐”时，戈尔丁的作品中 却拥有更加的黑暗东西。《蝇王》的开头， 男孩们就已经在岛上了，但是对话的片段已经 暗示了他们恐怖的旅程——他们的飞机在一场 未指明的核战争中被击落。这些男孩的年纪 从 6 岁到 13 岁不等，彼此并不认识。除合唱团外，其余均身着黑色制服，并由一个名叫杰克的男孩带领，就像巴兰坦的《珊瑚岛》一样，这个男孩的新家似乎如天堂一般——拥有淡水，庇护所 和丰富的食物来源。但是即使从小说的开篇页来看，这个看似平静的情境 被恐怖的黑暗笼罩着。男孩们的影子被比作 “黑色的蝙蝠状的生物”，而合唱团首次出现时则是“有些黑暗……在海滩上摸索着”。在他们到达的几小时内，男孩们就已经在互相传言，潜伏在树林里的一个 邪恶“野兽”的恐怖传闻。从这些不祥的开始，戈尔丁的故事揭示了 合作如何迅速瓦解的，在没有成年人的职权下。最初，幸存者试图建立某种秩序感。一个叫做拉夫的男孩通过吹响海螺来集合大家，并委派任务。但是当杰克要争夺 拉尔夫的领导权时，这个小组分裂了， 男孩们屈服于更加黑暗的驱使。暴徒般的孩子们很快 忘记了他们的营救计划，沉默掉少数理性的声音，然后盲目地跟着杰克到了岛的边缘，以及理智的边缘。这本小说包含道德、 文明和社会这些主题，使其成为文学经典，它讽刺了时代的常规习俗和长期以来对人类的信仰。尽管岛屿冒险的故事 时常支持殖民主义，《蝇王》却调转了这种风格。戈尔丁并没有残酷地将 土著人口作为刻板印象的野蛮人，而是将天使般的英国男生 转变为野蛮的讽刺形象。并且当男孩们在岛上 打他们自己的战争时，将他们带到那里且更具 毁灭性的战争仍在继续。即使男孩们从他们自己的战争中获救，他么又将返回什么样的世界呢？由于很少有参考文献将人物对应到特定的地点和时期，这本小书似乎是永恒的巨作——从根本上考验人性。尽管并非所有读者 都同意戈尔丁的严厉观点，但《蝇王》足够令人不安，甚至可以挑战最坚定的乐观者。

**P802 2019-12-12 Why should you read “Dune” by Frank Herbert - Dan Kwartler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=802)

A mother and her son trek across an endless desert. Wearing special skin-tight suits to dissipate heat and recycle moisture, the travelers aren’t worried about dying of thirst. Their fears are much greater. The pair try to walk without rhythm, letting the vibrations of their footsteps blend into the shifting sands. But soon, the sound of the desert is drowned out by a louder hissing. As a mound of sand races towards them, the pair’s unnatural gait turns into a sprint. The two clamber into a nearby rock face, as a sandworm 400 meters long bursts from the desert floor. This is the world of "Dune." Written by Frank Herbert and published in 1965, "Dune" takes place in a far-flung future, where humanity rules the stars in a giant feudal empire. This medieval motif goes beyond just the government. Unlike most interstellar sci-fi, Herbert's humans conquered the stars without any computers. Following an ancient war with robots, humanity has forbidden the construction of any machine “in the likeness of a human mind.” But rather than stifling their expansion, this edict forced humans to evolve in startling ways— becoming biological computers, psychic witches, and prescient space pilots. Members of these super-powered factions are regularly employed by various noble houses, all competing for power and new planets to add to their kingdoms. But almost all these superhuman skills rely on the same precious resource: the spice. This mystical crop also known as “melange” is essential for all space travel, making it the cornerstone of the galactic economy. And it only grows on the desert planet Arrakis, a dangerous and inhospitable world whose native inhabitants have long rebelled against the empire. Arrakis, also called Dune, is the setting for Herbert’s novel, which follows Paul of the noble House Atreides. The book begins with Paul’s family being assigned control of Dune as part of an elaborate plot by their sworn enemies: the sadistic slave drivers of House Harkonnen. The conflict between these houses upends the delicate political balance on Arrakis. Soon, Paul is catapulted into the middle of a planetary revolution, where he must prove himself capable of leading— and surviving— on this hostile desert world. But Arrakis is not simply an endless sea of sand. Herbert was an avid environmentalist, who spent over five years creating Dune’s complex ecosystem. The planet is checkered with climate belts and wind tunnels that have shaped its rocky topography. Different temperate zones produce varying desert flora. And almost every element of Dune’s ecosystem works together to produce the planet’s essential export. Herbert’s world building also includes a rich web of philosophy and religion. Paul’s mother Jessica, is a member of the Bene Gesserit, an ancient cult of spice-assisted psychics. Sometimes called “witches” for their mysterious powers, the Bene Gesserit have operated as a shadow government for millennia in an effort to guide society towards enlightenment. Similarly ancient are the Mentats— human computers capable of processing incredible amounts of data. While the Mentats are bastions of logic and reason, their results are not mere calculations, but rather, streams of constantly shifting possibilities. However, no group is more central to "Dune" than the Fremen. Natives of Arrakis, they are the keepers of the planet’s many secrets. Paul’s journey takes him deep into the Fremen’s exclusive brotherhood, where he must prove himself trustworthy in a series of increasingly deadly challenges. All these factions have deep histories that pervade the text, and Herbert also incorporates that sense of scale into the book’s structure. Each chapter begins with a quote from a future history book, recalling elements of the events that are about to unfold. The book also contains in-universe appendices that further explore the Empire’s history; alongside a glossary of words like “Gom jabbar” and “Shai-Hulud." Dune’s epic story continues to unfold over a six-book saga that spans millennia. But every story of Arrakis’ future begins here: as Paul pursues a path that is dangerous, demanding, and always on the verge of being consumed by the oncoming storm.

**P802 2019-12-12 Why should you read “Dune” by Frank Herbert - Dan Kwartler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=802)

翻译人员: Chloe Ma 校对人员: Jiasi Hao一位母亲和她的儿子 穿过了无尽的沙漠。他们穿着用来驱除热气、 保持湿度的特质紧身衣。这两位旅行者并不担心 缺水死亡，他们的恐惧比那大得多。他们试图不规律地行走，让他们脚印的痕迹融入流沙中。但很快，沙漠被一种 更大的嘶嘶声包围笼罩。当一座沙丘向他们奔来时，他们不自然的步伐改为了短跑。他们爬上了岩石表面，与此同时，一个 400 米长的爆破 从沙漠地表拔地而起。这就是《沙丘》的世界。由弗兰克 · 赫伯特（Frank Herbert） 创作并发表于 1965 年，《沙丘》的时间背景 是遥远的未来，人类通过一个巨大的 封建帝国管理各个行星。这中世纪的理念 不仅体现在政府系统中。和大部分的星际科幻小说不同，赫伯特的人类征服宇宙时， 没有使用任何电脑。在一次与机器人的古老战争后，不论在那种机器制作中， 任何的“仿人类意识”设计都被人类禁止了。但相比于抑制他们的发展，这条法令强迫人们 用非常震惊的方式去进化——成为生物意义上的电脑， 心理上的女巫，以及有先见之明的宇航员。这些超能力组织的成员常常会被不同的贵族所聘。这些贵族为了扩张自己的王国， 互相竞争权力并夺取新的星球。但是几乎所有的超人类技能 都依赖于同一种资源：香料。这种神秘的作物也被称为“美兰极”， 是所有宇宙旅行的必需，是星际经济的基石。它只生长于阿拉吉斯星球上，一个危险且难以居住的世界，土著民长期暴乱。阿拉吉斯，也被称作“沙丘” 是赫伯特小说的背景地点，贵族亚崔迪家族 保罗的迁徙地。这本书的开头为保罗一家 被下令管理沙丘，作为他们死敌的 奴隶虐待狂贵族——哈肯尼家族缜密阴谋的一部分。这些贵族之间的矛盾 打破了阿拉吉斯脆弱的政治平衡。很快，保罗突然被迫参与到了 一场星际革命之中，他必须要证明 他的领导能力——并且在这充满敌意的沙漠中 生存下来。但是阿拉吉斯 不仅仅是一片无尽的沙海。赫伯特是一位狂热的环境学家，他用了 5 年多的时间 创造了沙丘复杂的生态系统。这个星球有复杂的气候带和风洞，这塑造了它蜿蜒的地势。不同的温度区 导致了不同的沙漠植物群。几乎每一片沙丘的 生态元素都互相作用生产星球中最重要的出口。赫伯特的世界也包括了 丰富的哲学和宗教网。保罗的母亲，杰西卡 是本尼 · 吉斯姐妹会的成员，一个古老的 香料辅助心理学组织。有时候因为她们的神秘力量 而被称作“女巫”，本尼 · 吉斯姐妹会 作为影子政府运作了千年致力于带领社会走向教化。同样古老的还有门塔特——能够处理惊人数量数据 的人类电脑。门塔特作为 逻辑与理性的城堡，他们的输出结果不仅是计算，而是一串不断变化的可能性。但是，沙丘中最中心的群体 还是弗瑞曼人。阿拉吉斯的土著人， 他们是这个星球秘密的守护者。保罗的旅程让他潜入 费瑞曼人的特有兄弟会，在那，他必须通过 一系列的致命挑战来证明他的可信度。每一部分都有 很丰富的历史蕴含在文中，赫伯特也包括了 本书结构的规模感。每一章都以未来历史书中的 一句名言开始，回忆那些即将被展开叙述的 事件中的元素。这本书也包括了宇宙中的附录来进一步解释帝国的历史。也包括词汇表，囊括像是“戈姆贾巴尔” 和“西胡鲁德”的词汇。《沙丘》的史诗性故事通过 长达 10 年时间跨度的 6 本书继续展开。但是每一个阿拉吉斯家族的 未来都由此开始：保罗继续在一条 危险苛刻的道路上不断被追赶，并且总是在处于即将到来的 风暴的吞噬边缘。

**P803 2019-12-13 The philosophy of cynicism - William D. Desmond**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=803)

In the 4th century BCE, a banker’s son threw the city of Sinope into scandal by counterfeiting coins. When the dust finally settled, the young man, Diogenes of Sinope, had been stripped of his citizenship, his money, and all his possessions. At least, that’s how the story goes. While many of the details of Diogenes’ life are shadowy, the philosophical ideas born out of his disgrace survive today. In exile, Diogenes decided that by rejecting the opinions of others and societal measures of success, he could be truly free. He would live self-sufficiently, close to nature, without materialism, vanity, or conformity. In practice, this meant he spent years wandering around Greek cities with nothing but a cloak, staff, and knapsack— outdoors year-round, forgoing technology, baths, and cooked food. He didn’t go about this new existence quietly, but is said to have teased passers-by and mocked the powerful, eating, urinating and even masturbating in public. The citizens called him a kyôn— a barking dog. Though meant as an insult, dogs were actually a good symbol for his philosophy— they’re happy creatures, free from abstractions like wealth or reputation. Diogenes and his growing number of followers became known as “dog philosophers,” or kynikoi, a designation that eventually became the word “Cynic.” These early Cynics were a carefree bunch, drawn to the freedom of a wandering lifestyle. As Diogenes’ reputation grew, others tried to challenge his commitment. Alexander the Great offered him anything he desired. But instead of asking for material goods, Diogenes only asked Alexander to get out of his sunshine. After Diogenes’ death, adherents to his philosophy continued to call themselves Cynics for about 900 years, until 500 CE. Some Greek philosophers, like the Stoics, thought everyone should follow Diogenes’ example. They also attempted to tone down his philosophy to be more acceptable to conventional society— which, of course, was fundamentally at odds with his approach. Others viewed the Cynics less charitably. In the Roman province of Syria in the 2nd century CE, the satirist Lucian described the Cynics of his own time as unprincipled, materialistic, self-promoting hypocrites, who only preached what Diogenes had once actually practiced. Reading Lucian’s texts centuries later, Renaissance and Reformation writers called their rivals cynics as an insult— meaning people who criticized others without having anything worthwhile to say. This usage eventually laid the groundwork for the modern meaning of the word “cynic:" a person who thinks everyone else is acting out of pure self-interest, even if they claim a higher motive. Still, the philosophy of cynicism had admirers, especially among those who wished to question the state of society. The 18th-century French philosopher Jean-Jacques Rousseau was called the “new Diogenes” when he argued that the arts, sciences, and technology, corrupt people. In 1882, Friedrich Nietzsche reimagined a story in which Diogenes went into the Athenian marketplace with a lantern, searching in vain for a single honest person. In Nietszche’s version, a so-called madman rushes into a town square to proclaim that “God is dead.” This was Nietzsche’s way of calling for a “revaluation of values,” and rejecting the dominant Christian and Platonic idea of universal, spiritual insights beyond the physical world. Nietzsche admired Diogenes for sticking stubbornly to the here-and-now. More recently, the hippies of the 1960s have been compared with Diogenes as counter-cultural rebels. Diogenes’ ideas have been adopted and reimagined over and over again. The original cynics might not have approved of these fresh takes: they believed that their values of rejecting custom and living closely with nature were the only true values. Whether or not you agree with that, or with any of the later incarnations, all have one thing in common: they questioned the status quo. And that’s an example we can still follow: not to blindly follow conventional or majority views, but to think hard about what is truly valuable.

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翻译人员: Jiasi Hao 校对人员: Junrui Zheng公元前 4 世纪， 一位银行家的儿子让一座土耳其城市锡诺普 陷入硬币造假的丑闻。最后尘埃落定时，这位年轻男子—— 锡诺普城的第欧根尼——被剥夺了公民权， 以及所有的金钱与财产。至少故事里是这么说的。尽管第欧根尼生平的 许多细节鲜为人知，但他羞耻的行为所孕育的 哲学思想却留存至今。流放在外的第欧根尼断定， 如果他能抗拒他人的评判以及社会对成功的标准， 他便能真正获得自由。他将会过上 自给自足、亲近自然的生活，而脱离物质崇拜与浮华虚荣， 不再随波逐流。实际上，这意味着他花费了多年时间 游荡于各个希腊城市，除了他的斗篷、拐杖和随身行囊之外 不带任何东西，一年到头都待在户外， 弃科技、洗浴和熟食于身外。据说，他并没有 悄悄地追求这种新的存在形式，而是取笑路人、嘲讽权贵，在众目睽睽之下进食、 如厕，甚至自慰。别人都称他为狗(kyôn)—— 一只不停吠叫的狗。这称呼即使本来是一种辱骂，但对于他的哲学思想来说， 实际上是一个挺好的象征——狗是一种快乐的生物，不受财富或声誉这种抽象概念困扰。第欧根尼， 和他日益增加的追随者们后来以“狗哲人”，或犬（Kynikoi）的 称呼而闻名，最终这个称呼也演变成了一个词语 “犬儒”（Cynic）。这些早期的犬儒主义者无拘无束，被徘徊流浪的生活方式所吸引。随着第欧根尼名声大噪， 人们也开始试着挑战他对自己思想的坚持。亚历山大大帝 曾承诺给予他想要的一切。但第欧根尼并没有 向他提出任何物质需求，而是让亚历山大大帝挪开， 别挡着他的阳光。第欧根尼逝世后，其哲学思想的追随者们 在之后的大约 900 年间，直到公元500年， 仍自称为犬儒主义者。一些希腊哲学家， 例如斯多葛学派学者，认为每个人 都应该以第欧根尼为榜样。他们也尝试调整并缓和 第欧根尼的哲学思想以适应大众，从而使得传统社会 更能接纳这一思想——当然，这与第欧根尼的方式 本质上是相矛盾的。其他人对犬儒主义的态度则没那么包容。公元 2 世纪， 在古罗马的叙利亚行省，讽刺作家琉善曾将 他那个时代的犬儒主义者描述为不讲原则、贪图享乐， 自我标榜的伪君子，他们只宣扬第欧根尼 实践过的东西。几个世纪后，文艺复兴和宗教改革时期的作家 阅读了琉善的文字，将他们的对手称为犬儒主义者， 以此羞辱他们——说他们只是在批判别人， 而自己却没能发表任何有价值的言论。这种说法后来为 “犬儒主义者”这个词的现代释义奠定了基础：一个人认为，即便其他人声称 自己有更高尚的动机，他们都是根据个人利益行事的。不过，犬儒主义的哲学思想 仍旧有其拥护者，尤其是那些对社会状况心存质疑的人。18 世纪法国哲学家 让-雅克·卢梭因主张 艺术、科学和科技会使人堕落，而被称为“新第欧根尼”。在 1882 年，弗里德里希·尼采 重构了一个故事。在原本的故事里， 第欧根尼提着灯前去雅典市场，徒劳地寻找一个真正诚实的人。在尼采版本的故事中，一个所谓的疯子冲进小镇广场，向大家宣告：“上帝死了。”这是尼采 呼吁“重新审视价值观”的方式，他也以此抗拒 基督教派和柏拉图派的主导思想对超越物质世界的、 客观唯心主义的认知。尼采一直以来都很欣赏 第欧根尼对当下实际的固执与执着。更近些时，1960 年代的嬉皮士， 作为一种逆文化的反叛者，被人们拿来与第欧根尼进行比较。第欧根尼的思想不断被采用、重构。最初的犬儒主义 可能不会允许这些新兴行为：他们相信，自己拒绝世俗习惯 并亲近自然的价值观，是唯一真实的价值观。不论你是否同意这个观点， 或是任何后来的衍生学说，它们都有一个共同之处： 它们质疑现状。而这仍是一个值得我们学习的榜样：不要盲从传统或大众思想，而是认真思考，真正的价值所在。

**P804 2019-12-13 Why should you read “The Joy Luck Club” by Amy Tan - Sheila Marie Orf**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=804)

In her Auntie An-mei’s home, Jing-Mei reluctantly takes her seat at the eastern corner of the mahjong table. At the north, south, and west corners are her aunties, long-time members of the Joy Luck Club. This group of immigrant families comes together weekly to trade gossip, feast on wonton and sweet chaswei, and play mahjong. However, the club’s founder, Jing-Mei’s mother Suyuan, has recently passed away. At first, Jing-Mei struggles to fill her place at the table. But when her aunties reveal a deeply buried secret about Suyuan’s life, Jing-Mei realizes she still has a lot to learn about her mother, and herself. In Amy Tan’s 1989 debut novel, "The Joy Luck Club," this gathering at the mahjong table is the point of departure for a series of interconnected vignettes. The book itself is loosely structured to imitate the format of the Chinese game. Just as mahjong is played over four rounds with at least four hands each, the book is divided into four parts, each with four chapters. Alternately set in China or San Francisco, each chapter narrates a single story from one of the four matriarchs of the Joy Luck Club or their American-born daughters. These stories take the reader through war zones and villages of rural China, and into modern marriages and tense gatherings around the dinner table. They touch upon themes of survival and loss, love and the lack of it, ambitions and their unsatisfied reality. In one, Auntie Lin plots an escape from the hostile family of her promised husband, ultimately leading to her arrival in America. In another, the Hsu family’s all-American day at the beach turns dire when Rose is overwhelmed by the responsibility her mother assigns to her. The resulting tragedy traumatizes the family for years to come. These tales illustrate the common divides that can form between generations and cultures, especially in immigrant families. The mothers have all experienced great hardships during their lives in China, and they’ve worked tirelessly to give their children better opportunities in America. But their daughters feel weighed down by their parent’s unfulfilled hopes and high expectations. Jing-Mei feels this pressure as she plays mahjong with her mother’s friends. She worries, “In me, they see their own daughters, just as ignorant, just as unmindful of all the truths and hopes they have brought to America.” Time and again, the mothers strive to remind their daughters of their history and heritage. Meanwhile, their daughters struggle to reconcile their mothers’ perception of them with who they really are. "Does my daughter know me?" some of the stories ask. "Why doesn’t my mother understand?" others respond. In her interrogation of these questions, Tan speaks to anxieties that plague many immigrants, who often feel both alienated from their homeland and disconnected from their adopted country. But by weaving the tales of these four mothers and daughters together, Tan makes it clear that Jing-Mei and her peers find strength to tackle their present-day problems through the values their mothers passed on to them. When "The Joy Luck Club" was first published, Tan expected minimal success. But against her predictions, the book was a massive critical and commercial achievement. Today, these characters still captivate readers worldwide. Not only for the way they speak to Chinese American and immigrant experiences, but also for uncovering a deeper truth: the need to be seen and understood by the ones you love.

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翻译人员: Chloe Ma 校对人员: Lipeng Chen在安梅阿姨的家中，菁妹不情愿的坐在了 麻将桌的东侧。北侧、南侧和西侧 是她的阿姨们，喜福会的老会员。这群移民家庭 每周会聚在一起聊八卦，吃一顿馄饨和甜叉烧， 打打麻将。但是这个俱乐部的创世人， 菁妹的母亲素媛，最近离世了。一开始，菁妹无法融入麻将桌。但是当阿姨们告诉了她 素媛人生深藏的那些秘密，菁妹意识到关于她母亲，也关于她自己， 她还有许多要去了解。谭恩美 1989 年出版的 首部小说《喜福会》聚集在麻将桌这一幕， 是这本书的出发点，引出一系列相互链接的小故事。这本书松散的结构 模仿了中国麻将的结构。就像是麻将是由 四位玩家打四局，这本书有四部分， 每部分有四章。地点设置是在中国或是旧金山，每章都会讲述一个 来自喜福会四个女当家或是她们美国女儿们之一 的小故事这些故事带领读者 穿过战争时期的中国农村，来到现代婚姻以及 餐桌旁的紧张聚会。故事的主题包括了 生存与死亡，爱与缺爱，野心与她们并不满足的现实。在一个故事中，林阿姨 （作为童养媳）策划逃离了小丈夫的恶毒家庭，最终来到了美国。另一个故事中，徐家的美式沙滩日 演变成了一场大战，当罗斯被她母亲 安排给她的责任淹没。最后，这场悲剧的创伤 让徐家人很久才恢复过来。这些故事刻画了 存在于年龄与文化，特别是在移民家庭里的 常见代沟。当母亲们生活在中国时， 她们经历了很多苦难，她们不辞辛苦的工作， 为了给她们的孩子在美国的更好机会。但是她们的女儿们 因为父母未被满足的希望与高期望而感到压力。当菁妹和她母亲的朋友们打麻将时， 她感受到了这种压力。她担心到，“在我身上，她们看到了 她们自己的女儿，一样的无知对于她们带来美国的 真相和希望一样的无所谓。”一次又一次，母亲们急切的提醒女儿们 她们的历史与遗产。同时，女儿们 也纠结于怎样结合母亲们眼中的她们 与她们真实的自己。“我的女儿真的了解我吗？” 一些故事中问道。“为什么我母亲不懂？” 另一些故事回答道。在谭审视下的这些问题，她讲述了困扰 许多移民家庭的焦虑，他们经常感到 与家乡的疏远与新家的隔阂。但是通过讲述这些感人的 关于四位母亲与女儿的故事，谭明确的表达了 菁妹与她同龄人通过母亲们传达给她们的价值观 去解决当今时代的问题的力量。当《喜福会》第一次发表时，谭并没有期待很多。但是与她的预计相反， 这本书广受书评家好评，也获得了商业上的成功。今天，这些人物 仍然能打动全球的读者。不仅仅是她们讲述的 美籍华人和移民经历，更多的是发掘 深埋的真相：被你爱的人 认真对待和理解的需要。

**P805 2019-12-20 Can you solve the dragon jousting riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=805)

After centuries of war, the world’s kingdoms have come to an agreement. Every five years, teams representing the elves, goblins, and treefolk will compete in a grand tournament of dragon jousting. Every team will face each of the others once. The kingdom whose team wins the most matches will rule all of Center-Realm until the next tournament. To prevent any outside meddling, the games are to be conducted in absolute secret except for a group of wizards who will make sure nobody uses enchantments, hexes, or spells to cheat. You’ve been given the extremely important job of recording the scores for the first inaugural tournament. But the opening celebrations get a bit out of control, and when you wake up, you realize the games are already underway. Fortunately, no one has noticed your absence so far. However, you need to get up to speed quickly; if your boss, the head tournament official, finds out you’ve been sleeping on the job, you’ll lose your head. After weighing your options, you decide to offer your life’s savings to one of the regulation wizards in return for the information, giving him your blank scorecard to fill out. But before he can finish, your boss walks into the tent. You barely manage to hide the scorecard in time, and the wizard excuses himself. Your boss chuckles. “Hope you didn’t believe anything Gorbak’s been saying— he’s been cursed to tell only lies, even in writing. Anyway, can you believe how low-scoring the tournament’s been? Every team has played at least once, yet not a single match with a combined score of more than five hits! Anyhow, I’ll be back in a minute to review your scorecard.” You laugh along, and when he leaves you look at the partially completed card, now knowing every single number on it is wrong. You’ve only got one chance to save yourself, so what’s the real score of each match? Pause now to figure it out for yourself. The incredible thing about this riddle is that you can reach the solution despite an almost complete lack of correct information. And that’s possible because knowing that something is false is meaningful information in its own right. The first key is to realize that no team will play more than two matches, since there are only two other teams. So if the elves didn’t actually play one match, and the goblins didn’t actually play two, the truth must be that elves played two and goblins played one. For the elves to have played two matches, they must’ve faced each of the other teams once. And since goblins have only played one match so far— against the elves— that means the match between goblins and treefolk has not occurred yet. We know it’s false that the treefolk tied zero matches, which means their bout against the elves must’ve tied. We also know that the elves won at least one match, and since they tied against the treefolk, they must have beaten the goblins. But can we figure out the actual scores? Let’s start with the elf-treefolk tie. Because no more than five total hits were scored, the final tally must’ve been 0-0, 1-1, or 2-2. But the treefolk must’ve scored some hits, and it’s false that they only had one hit scored against them. The only option that leaves is 2-2. In the match between elves and goblins, the goblins must’ve scored at least one hit. And the elf score must be 2 or more for them to have won the match. This leaves only a few possibilities that add up to 5 or less. The elves couldn’t have scored three, so that eliminates these two. And their total hits scored across both matches can’t add up to six, so this one’s out too. So the score must’ve been 2-1. With one match remaining, you’ve managed to save your job— and your neck. Gorbak the wizard may have lied, but your deductive skills quickly evened the score.

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翻译人员: Rich Lee 校对人员: Jingyu Jin几个世纪的战争后，世界各王国达成协议。每五年，代表精灵， 小妖精和树人的队伍将会在隆重的龙上骑枪比武中竞赛。每支队伍都会互相竞赛一次。赢得最多场比赛的队伍的王国 将能统治所有中心区域直到下次比武。为了预防外部干涉，比赛会在绝对机密的情况下进行除了巫师队伍要确保没人使用魔法，妖术， 或咒语来作弊。在首届比武中，你被给予了记录比分 这项非常重要的工作。但是开幕庆典变得有些失控，当你醒来时，意识到比赛已经开始了。幸运的是， 目前还没人发现你的缺席。但是，你需要快速起床；如果你的上司， 比武的首席官员，发现你在工作期间睡觉， 你就会小命不保。权衡选择后，你决定将自己一生的积蓄 交给一个管理巫师作为消息的回报，你让他将空白的记分卡填满。但在他完成之前， 你的上司走进了帐篷。你差点没能及时把记分卡藏起来，巫师为自己辩解。你的上司笑了笑。“希望你没有相信 Gorbak说的任何话——他被诅咒只能说谎， 即使书写也一样。无论如何， 你能相信比武的比分有多低吗？每支队伍至少要比一次赛，但是没有一场比赛 得分加起来超过5分的！总之， 我很快会回来复查你的记分卡。”你也跟着笑了起来，当他离开的时候 你看了看部分填完的卡片，明白了卡片上的每个数字都是错的。你只有一个机会能拯救自己，那么每场比赛的真实比分是多少？现在暂停自己来解决这个问题。这个谜题的惊人之处在于尽管几乎完全缺乏正确信息 你仍能找到解决方案。并且这是可能的， 因为知道某些东西是假的本身就是有意义的信息。首个关键是了解 每支队伍最多进行两场比赛，因为只有两支其他队伍。所以如果精灵队一场比赛都没参加，且小妖精队没有参加两场比赛，真实情况就必然是精灵队比赛两场 而小妖精队比赛一场。如果精灵队比赛两场，他们必然分别遇见过其他队伍一次。因为小妖精队目前只参加过一场比赛 对战的是精灵队这就意味着 小妖精队和树人队间的比赛还没开始。我们知道树人队0场平局是假的，意味着他们和精灵队的比赛 一定是平局。我们还知道 精灵队至少赢了一场比赛，因为他们和树人队是平局， 那么他们一定击败了小妖精队。但是我们怎么解出真实的比分呢？让我们从精灵队和 树人队的比赛开始。因为没有一场比赛的总比分 超过5分，最终的计分一定是 0-0,1-1，或2-2。但树人队一定有得分，并且他们在比赛中只得了1分 这件事是假的。那么唯一可能的比分就是2-2.在精灵队和小妖精队的比赛中，小妖精队一定至少得了一分。精灵队赢得了比赛 那么他们的分数必定为2分或更高。既然得分总计为5分或更低， 那么仅剩几种可能。精灵队不可能得3分， 所以排除了这两种。并且他们两场比赛的得分 总计达不到6分，所以这种可能也排除。即比分一定是2-1。只剩下一场比赛了，你成功保住了自己的工作--- 和性命。巫师Gorbak可能说谎，但你的推演能力很快摆平了这一切。

**P806 2019-12-20 Could a breathalyzer detect cancer - Julian Burschka**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=806)

How is it that a breathalyzer can measure the alcohol content in someone’s blood, hours after they had their last drink, based on their breath alone? Exhaled breath contains trace amounts of hundreds, even thousands, of volatile organic compounds: small molecules lightweight enough to travel easily as gases. One of these is ethanol, which we consume in alcoholic drinks. It travels through the bloodstream to tiny air sacs in the lungs, passing into exhaled air at a concentration 2,000 times lower, on average, than in the blood. When someone breathes into a breathalyzer, the ethanol in their breath passes into a reaction chamber. There, it’s converted to another molecule, called acetic acid, in a special type of reactor that produces an electric current during the reaction. The strength of the current indicates the amount of ethanol in the sample of air, and by extension in the blood. In addition to the volatile organic compounds like ethanol we consume in food and drink, the biochemical processes of our cells produce many others. And when something disrupts those processes, like a disease, the collection of volatile organic compounds in the breath may change, too. So could we detect disease by analyzing a person’s breath, without using more invasive diagnostic tools like biopsies, blood draws, and radiation? In theory, yes, but testing for disease is a lot more complicated than testing for alcohol. To identify diseases, researchers need to look at a set of tens of compounds in the breath. A given disease may cause some of these compounds to increase or decrease in concentration, while others may not change— the profile is likely to be different for every disease, and could even vary for different stages of the same disease. For example, cancers are among the most researched candidates for diagnosis through breath analysis. One of the biochemical changes many tumors cause is a large increase in an energy-generating process called glycolysis. Known as the Warburg Effect, this increase in glycolysis results in an increase of metabolites like lactate which in turn can affect a whole cascade of metabolic processes and ultimately result in altered breath composition, possibly including an increased concentration of volatile compounds such as dimethyl sulfide. But the Warburg Effect is just one potential indicator of cancerous activity, and doesn’t reveal anything about the particular type of cancer. Many more indicators are needed to make a diagnosis. To find these subtle differences, researchers compare the breath of healthy people with the breath of people who suffer from a particular disease using profiles based on hundreds of breath samples. This complex analysis requires a fundamentally different, more versatile type of sensor from the alcohol breathalyzer. There are a few being developed. Some discriminate between individual compounds by observing how the compounds move through a set of electric fields. Others use an array of resistors made of different materials that each change their resistance when exposed to a certain mix of volatile organic compounds. There are other challenges too. These substances are present at incredibly low concentrations— typically just parts per billion, much lower than ethanol concentrations in the breath. Compounds’ levels may be affected by factors other than disease, including age, gender, nutrition, and lifestyle. Finally, there’s the issue of distinguishing which compounds in the sample were produced in the patient’s body and which were inhaled from the environment shortly before the test. Because of these challenges, breath analysis isn’t quite ready yet. But preliminary clinical trials on lung, colon, and other cancers have had encouraging results. One day, catching cancer early might be as easy as breathing in and out.

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翻译人员: Meng Ren 校对人员: Yinchun Rui体内酒精检测仪到底是怎样单凭人们的呼吸就能检测饮酒几小时后的血液里的酒精含量？呼出的气息里包含着 成百上千的挥发性有机化合物：这些质量极轻的小分子， 被呼吸带了出来。其中包含着我们从酒精饮料中摄取的乙醇。它随着血流被输送到肺部的微小气囊中，然后再被呼出， 这时乙醇的平均浓度是血液中的 1/2000 。当一个人向检测仪呼气时，呼吸中的乙醇进入到一个反应器中。在那儿，它被转化成了另一种分子， 那就是醋酸，在这个特别的反应器里， 一股电流在反应中产生了。电流的强度反映了气息中乙醇的浓度然后通过估算可得出血液里的乙醇浓度。除了我们从饮食中摄取的像乙醇这样的挥发性有机化合物，人体细胞的生化反应 还产生去许多其他的物质。当这些反应受到干扰时， 比如疾病，呼吸中包含的挥发性有机化合物可能也会改变。因此，我们是否可以通过分析人体的呼吸 来检测疾病，从而避免使用更具侵入性的诊断工具，例如活组织切片、抽血和放射扫描呢？理论上来说，行得通。但是检测疾病可比检测酒精浓度复杂多了。为了识别病症，研究人员需要检测 数十种呼吸中所含的化合物。某种特定疾病可能导致某些化合物数量上的增加或减少， 同时并不影响其他化合物——而不同疾病造成的这类数量影响 也各有区别，甚至同一种疾病的各个阶段 也会产生不同影响。比如，癌症是运用呼吸分析的诊断方法最广泛的疾病之一。肿瘤会造成众多生化反应改变，其中之一，是一种能量产出反应的大幅增加，被称为“糖酵解”。也称“瓦氏效应”，糖酵解的增加导致代谢物增加， 比如产生大量乳酸，这反过来影响了一系列的新陈代谢反应，最终改变了呼吸中的化合物组成，某些挥发性化合物可能会大量聚集，例如二甲基硫醚。但是瓦氏效应仅仅是 癌性活动的一个可能性指标，并且不能揭示癌症的具体种类。想要确诊， 还需要获得许多其他的指标。为了明确这些细微差别，研究人员向健康者的呼吸样本与罹患某种特定疾病的人的呼吸样本进行数百次的比对。完成这一复杂的分析过程所需的探测器，比酒精测定仪更加全能。人们正在研发一些这样的机器。有的通过观察化合物们 经过一系列电场的路径，辨别出不同的化合物。有的利用一组由不同材料制成的电阻器，通过观测每种电阻器在接触 挥发性有机化合物的混合物时，其阻力发生的变化， 来进行辨别。这一过程困难重重。这些化合物的浓度极低，通常只有十亿分之一，这可比呼吸中乙醇的浓度低多了。化合物的数量水平 同时还受到其他因素的影响包括年龄、性别、 营养状况和生活方式。最后，要在取得样本后，快速分辨其中有哪些化合物来自于患者体内，哪些来源于外界，也颇具挑战。基于这些困难与挑战， 利用呼吸分析疾病的技术还很不成熟。即便如此，基于肺癌、结肠癌以及其他癌症的临床试验方兴未艾。总有一天，探测出早期癌变会 变得如同呼吸一般轻而易举。

**P807 2019-12-23 A brief history of alcohol - Rod Phillips**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=807)

This chimpanzee stumbles across a windfall of overripe plums. Many of them have split open, drawing him to their intoxicating fruity odor. He gorges himself and begins to experience some… strange effects. This unwitting ape has stumbled on a process that humans will eventually harness to create beer, wine, and other alcoholic drinks. The sugars in overripe fruit attract microscopic organisms known as yeasts. As the yeasts feed on the fruit sugars they produce a compound called ethanol— the type of alcohol in alcoholic beverages. This process is called fermentation. Nobody knows exactly when humans began to create fermented beverages. The earliest known evidence comes from 7,000 BCE in China, where residue in clay pots has revealed that people were making an alcoholic beverage from fermented rice, millet, grapes, and honey. Within a few thousand years, cultures all over the world were fermenting their own drinks. Ancient Mesopotamians and Egyptians made beer throughout the year from stored cereal grains. This beer was available to all social classes, and workers even received it in their daily rations. They also made wine, but because the climate wasn’t ideal for growing grapes, it was a rare and expensive delicacy. By contrast, in Greece and Rome, where grapes grew more easily, wine was as readily available as beer was in Egypt and Mesopotamia. Because yeasts will ferment basically any plant sugars, ancient peoples made alcohol from whatever crops and plants grew where they lived. In South America, people made chicha from grains, sometimes adding hallucinogenic herbs. In what’s now Mexico, pulque, made from cactus sap, was the drink of choice, while East Africans made banana and palm beer. And in the area that’s now Japan, people made sake from rice. Almost every region of the globe had its own fermented drinks. As alcohol consumption became part of everyday life, some authorities latched onto effects they perceived as positive— Greek physicians considered wine to be good for health, and poets testified to its creative qualities. Others were more concerned about alcohol’s potential for abuse. Greek philosophers promoted temperance. Early Jewish and Christian writers in Europe integrated wine into rituals but considered excessive intoxication a sin. And in the middle east, Africa, and Spain, an Islamic rule against praying while drunk gradually solidified into a general ban on alcohol. Ancient fermented beverages had relatively low alcohol content. At about 13% alcohol, the by-products wild yeasts generate during fermentation become toxic and kill them. When the yeasts die, fermentation stops and the alcohol content levels off. So for thousands of years, alcohol content was limited. That changed with the invention of a process called distillation. 9th century Arabic writings describe boiling fermented liquids to vaporize the alcohol in them. Alcohol boils at a lower temperature than water, so it vaporizes first. Capture this vapor, cool it down, and what’s left is liquid alcohol much more concentrated than any fermented beverage. At first, these stronger spirits were used for medicinal purposes. Then, spirits became an important trade commodity because, unlike beer and wine, they didn’t spoil. Rum made from sugar harvested in European colonies in the Caribbean became a staple for sailors and was traded to North America. Europeans brought brandy and gin to Africa and traded it for enslaved people, land, and goods like palm oil and rubber. Spirits became a form of money in these regions. During the Age of Exploration, spirits played a crucial role in long distance sea voyages. Sailing from Europe to east Asia and the Americas could take months, and keeping water fresh for the crews was a challenge. Adding a bucket of brandy to a water barrel kept water fresh longer because alcohol is a preservative that kills harmful microbes. So by the 1600s, alcohol had gone from simply giving animals a buzz to fueling global trade and exploration— along with all their consequences. As time went on, its role in human society would only get more complicated.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=807)

翻译人员: Meng Ren 校对人员: Jiasi Hao这只黑猩猩偶然发现了 一堆熟透了的李子。好多已经烂熟得咧开了口子， 飘出醉人的水果香气。它不由得狼吞虎咽起来， 然后一些……奇怪的感觉产生了。这只不知情的黑猩猩 碰巧经历了一种作用过程，这一过程后来被人类 所运用于制造啤酒、红酒和其他酒精饮料。熟透的水果里的糖分 吸引来一些名为酵母的微生物。当酵母进食果糖后， 便产出一种名为乙醇的化合物，即酒精饮料里的酒精。这个过程被称为发酵。我们不知道人类第一次 制作发酵饮料的确切时间。已有的证据显示 最早可追溯到公元前 7000 年的中国，出土陶罐中的残留物表明那时人们已经开始利用经过发酵的 稻米、粟米、葡萄和蜂蜜制作酒精饮料了。在几千年间，世界上各个文明利用发酵， 制造着属于自己的饮品。古代美索不达米亚和埃及地区一年到头都在 利用储存的谷物酿造啤酒。这种啤酒向社会各个阶层开放，甚至每日向工人们定量发放。他们还制作红酒，但由于当地气候不适宜种植葡萄，那是一种稀有而昂贵的佳酿。相反，希腊和罗马的环境 适合葡萄生长，那儿的红酒就如同埃及和 美索不达米亚的啤酒一般平常。由于酵母几乎能使 任何一种植物糖发酵，古人就利用当地的 各种农作物和植物酿酒。在南美洲，人们用粮食酿奇恰酒，有时还添加致幻草药。在墨西哥，由仙人掌汁液制成的 龙舌兰酒也大受欢迎。东非的人们制作 香蕉啤酒和棕榈啤酒，而在如今是日本的地区， 人们用大米制成清酒。世界上几乎各个角落都 创造了其独属的酒饮。随着饮酒成为了一项生活日常，权威们对酒精带来的积极效用 产生了浓厚的兴趣。希腊医师们宣称 红酒有益于身体健康，诗人们也赞叹 酒精对创造力的显著裨益。其他人则对酒精的滥用表达了隐忧。例如，希腊的哲学家们就提倡要节制慎饮。早期的欧洲犹太教和基督教的 作家们将红酒融入礼教，但将醉酒斥为罪孽。在中东、非洲和西班牙，一项伊斯兰律法从禁止醉酒时祈祷逐渐演化成对酒精的全面抵制。古法发酵饮品的酒精浓度相对较低。大约发酵到 13% 时，野生酵母就会产生有毒副产品并杀死酵母。酵母失效后，发酵过程也终止了， 酒精浓度便随之稳定。所以几千年来， 酒精浓度都是有限的。而蒸馏的发明改变了这一切。9 世纪的阿拉伯文献有记载，沸腾的发酵液体能挥发出酒精。由于酒精的沸点比水低， 所以会首先挥发掉。将挥发的气体收集起来，并冷却， 便能得到比任何发酵饮料纯度高很多的液体酒精。一开始，这些高浓度酒精被用于医疗中。接着，它成了一种重要的交易品，这是因为酒精 不像啤酒和红酒那样会变质。欧洲在加勒比的殖民地 所收获的糖，发酵产生了朗姆酒，并成为贸易中的主要商品， 被海员们卖到了北美。欧洲人又将白兰地和金酒引进了非洲，用它们来交换奴隶、土地和物品， 例如棕榈油和橡胶。烈酒在这些地区成为了一种货币。在大航海时代，烈酒在长途航海中有着重要的作用。从欧洲到东亚和美洲 常常要航行数月，保持海员生存所需的淡水清洁， 是严峻的挑战。往水桶中添加一勺白兰地 能延长淡水的保质期，因为酒精作为一种防腐剂 能杀死有害微生物。到了 17 世纪，酒精从一种能让动物感到晕眩的物质，演变成全球贸易和探险开拓的重要产品， 同时带来了种种影响。随着时间的推移，酒精在人类社会中的 角色将会变得越来越复杂。

**P808 2020-01-06 The mysterious life and death of Rasputin - Eden Girma**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=808)

On a cold winter night in 1916, Felix Yusupov anxiously prepared to pick up his dinner guest. If all went as planned, his guest would be dead by morning, though four others had already tried and failed to finish him off. The Russian monarchy was on the brink of collapse, and to Yusupov and his fellow aristocrats, the holy man they’d invited to dinner was the single cause of it all. But who was he, and how could a single monk be to blame for the fate of an empire? Grigori Yefimovich Rasputin began his life in Siberia, born in 1869 to a peasant family. He might have lived a life of obscurity in his small village, if not for his conversion to the Russian Orthodox Church in the 1890s. Inspired by the humbled monks that wandered endlessly from holy site to holy site, he spent years on pilgrimages across Russia. On his travels, strangers were captivated by Rasputin’s magnetic presence. Some even believed he had mystical gifts of prediction and healing. Despite Rasputin’s heavy drinking, petty theft, and promiscuity, his reputation as a monk quickly spread beyond Siberia and attracted both laypeople and powerful Orthodox clergymen. When he finally reached the capital, St. Petersburg, Rasputin used his charisma and connections to win favor with the imperial family’s spiritual advisor. In November 1905, Rasputin was finally introduced to Russian Tsar Nicholas II. Nicholas and his wife Alexandra devoutly believed in the Orthodox Church, as well as in mysticism and supernatural powers, and this Siberian holy man had them transfixed. It was a particularly tumultuous period for Russia and their family. The monarchy was barely clinging to control after the Revolution of 1905. Their political struggles were only intensified by personal turmoil: Alexei, the heir to the throne, had a life-threatening blood disease called hemophilia. When Alexei suffered a severe medical crisis in 1912, Rasputin advised his parents to reject treatment from doctors. Alexei’s health improved, cementing the royal family’s belief that Rasputin had magical healing powers, and guaranteeing his privileged place on the royal court. Today, we know that the doctors had prescribed aspirin, a drug that worsens hemophilia. After this incident, Rasputin made a prophecy: if he died, or the royal family deserted him, both their son and their crown would soon be gone. Outside the royal family, people had mixed views on Rasputin. On one hand, peasants regarded him as one of their own, amplifying their often-unheard voice to the monarchy. But nobles and clergymen came to despise his presence. Rasputin never ceased his scandalous behavior, and they were skeptical of his so-called powers and thought he was corrupting the royal family. By the end of World War I, they were convinced the only way to maintain order was to eliminate this sham of a holy man. With this conviction, Yusupov began to plot Rasputin’s assassination. Though the exact details remain mysterious, our best guess at how it all unfolded comes from Yusupov’s memoirs. He served Rasputin a number of pastries, believing they contained cyanide. But unbeknownst to Yusupov, one of his co-conspirators had a change of heart, and substituted the poison with a harmless substance. To Yusupov’s shock, Rasputin ate them without ill effect. In desperation, he shot Rasputin at point-blank range. But Rasputin recovered, punched his attacker, and fled. Yusupov and his accomplices pursued him, finally killing Rasputin with a bullet to the forehead and dumping his body in the Malaya Nevka river. But far from stabilizing the monarchy’s authority, Rasputin’s death enraged the peasantry. Just as Rasputin prophesied, his murder was swiftly followed by that of the royal family. Whether the downfall of the Russian monarchy was a product of the monk’s curse, or the result of political tensions decades in the making, well, we may never know.

**P808 2020-01-06 The mysterious life and death of Rasputin - Eden Girma**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=808)

翻译人员: Harper Chang 校对人员: Jiasi Hao1916 年，冬夜寒凉，费利克斯 · 尤苏波夫 坐立不安，等待着晚餐来客。如果一切顺利， 这位客人将在早晨前死亡。在此之前，这位客人逃过了四次谋杀。俄罗斯帝国已是危在旦夕，以尤苏波夫为首的贵族认为，这位客人是罪魁祸首。他是谁呢？为什么一个修道士会导致王朝覆灭？格里戈里 · 拉斯普京 出生于西伯利亚，他在 1869 年诞生于一个乡下家庭。他本可能会在村庄的平淡生活中 度过一生——如果他没有在十八世纪九十年代皈依俄罗斯正教会的话。虔诚的修士不息跋涉朝圣，目睹此景， 拉斯普京被深深地鼓舞，于是他花费数年踏上了 跨越俄罗斯的朝圣之旅。旅途当中，他的迷人气质吸引众人。更有甚者相信他拥有 预知和治愈的能力。即便拉斯普京 酗酒、偷盗、淫逸放荡，西伯利亚乃至之外的人们 还是十分敬仰这个朝圣的修道士，不论正统教徒还是平民百姓， 都纷纷被其吸引。当他抵达首都圣彼得堡时，拉斯普京利用魅力和人脉换取到皇室家族宗教顾问的席位。1905 年 11 月，拉斯普京被引荐给尼古拉斯二世。尼古拉斯和妻子亚历山德拉 是正教会的虔诚信徒，他们拥护神秘主义、 相信超自然力量的存在，而这个西伯利亚修士的到来， 正如同一道神谕的降临。当时正值王朝与皇室的动荡时期，1905 年第一次俄国革命之后，帝国正走向失控。然而，皇子的疾病 让形势进一步恶化：皇位继承人，阿列克谢，患上了危及性命的血友病。1912 年，阿列克谢的病情加重，拉斯普京让他的父母放弃医生的治疗。阿列克谢的病情好转， 皇室家族越发坚信拉斯普京拥有治愈的魔力，并赐予他在皇室中的特权地位。今天，我们知道 当年医生开的药是阿司匹林，而这种药会加重血友病。此事过后，拉斯普京作出预言：若他死亡，或被皇室抛弃， （此处指他本人）则皇子与王朝必死无疑。皇宫之外，百姓对拉斯普京意见不一。一方面，农民们将他视为同党，因为他向皇室传达了被忽视的声音。但贵族和神职人员渐渐开始鄙视他，他们不满拉斯普京放纵无度的行为，并开始怀疑他所谓的“力量”，认为他正在腐蚀皇室。到了一战后期，他们坚信要想维护秩序，便应除掉这个虚伪的神棍。尤苏波夫下定决心，开始谋划对拉斯普京的暗杀，虽然各种细节仍然充满未知，但我们能从尤苏波夫的 回忆录中探知一二。他先将注入氰化物的点心送给拉斯普京，但尤苏波夫不曾料到，其中一个同谋者起了慈悲心，将点心中的毒药换成了无害物质。于是尤苏波夫惊讶地看到 点心对拉斯普京没有丝毫影响。在绝望中，他把枪头指向拉斯普京—— 当时他们之间的距离非常近。但拉斯普京没有死， 他打倒了攻击者并趁机逃跑。尤苏波夫和同伴追捕他，拉斯普京终于在被射中额头后身亡。他的尸体沉入马来亚涅夫卡河中。然而，俄罗斯帝国的政权并没有变稳定，反而激怒了拥护他的农民。就像拉斯普京的预言那样，他死后，皇室家族的死亡随之降临。俄罗斯帝国的覆灭，究竟因修士的诅咒所致，还是数十年政局紧张积下的恶果，或许永远不为世人所知。

**P810 2020-01-08 The Artists \_ Think Like A Coder, Ep 5**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=810)

Dawn and the train are both breaking when Ethic and Hedge arrive in the woods. The adventurers have recovered the first artifact— the Node of Power— and have come to the 198forest in search of the second. Here they’re welcomed by the director of the colony, Octavia. She established this treehouse sanctuary after the robots freed everyone from having to work. It was meant to be a haven where people could follow their passions, take up crafts, and find fulfillment. Which they did… at first. Some years ago everyone forgot the point. They abandoned arts and crafts and instead just painted and exhibited pictures of themselves over, and over, and over. The location of the second artifact is no secret; it’s in a tower, guarded by a garrison of bots, a bottomless ravine, and who knows what other traps. As soon as the tower went up with the node inside, human communication across the land went dark. Octavia’s been after it for years, but try as she might, the defenses thwart her. In order to even get to the tower, the team will need a distraction. Octavia has an idea: stir up the people through some well-intentioned vandalism. The residents’ paintings are all squares that come in different sizes, all an odd number of pixels across. Helper-bots pick up the finished portraits and hang them in public places for everyone to admire. There’s a slim margin of time when Hedge can access the paintings. If he were to deface each one with an X, the people would blame the helper-bots, creating just the distraction the team needs. If only it were so easy. Hedge can’t just paint an X— his painting processor requires very specific instructions. Treating the paintings as square grids, he can fill in one pixel, or little square, at a time. He can move forwards and make 90 degree turns over the canvas, but can’t move diagonally. How does Ethic program Hedge to paint an X over each portrait? Pause now to figure it out for yourself. Here’s a hint. Try drawing a square grid like this, and simulating Hedge’s path over it. What patterns can you find to guide him? Pause now to figure it out for yourself. The challenge here is to craft a set of instructions that will work for any square grid. Fortunately, one of the strengths of programming is the flexibility to solve not just one problem, but a whole class of them all at once. It often helps to start with one case, and work towards the general. Let’s say we had this square. Hedge can measure the length of its sides and store that number as a variable. Now, what we need is a plan for how Hedge will paint an X, pixel by pixel. There’s more than one right answer for how to do this; let’s look at two. First, what if Hedge went row by row, like a typewriter? If it’s a 9 pixel by 9 pixel painting, in the first row he’d paint, skip 7, and then paint again. In the second row he’d skip the first, paint, skip 5, and paint. And so on. The pattern here is that for each row the pixels skipped at the beginning go up by one, and the pixels skipped in the middle go down by 2. Things get more complicated when Hedge reaches the center. Here there’s a row with just one pixel painted. Then the whole thing reverses— the number of pixels skipped goes down by one each time on the left, and up by two each time in the middle. Instructing Hedge to do this with a series of loops will work and is a perfectly fine solution. The main drawback is that this requires quite a bit of logic— knowing what to do in the middle, when to reverse the process, and exactly how to reverse it. So how might we approach this so that the logic remains consistent from start to finish? The key insight is to look at a grid as a series of concentric squares. Each square follows the same pattern— painted pixels in the corners, and unaltered pixels in between. So if we can figure out a way to paint one nested square, transition to the next, and repeat, we can paint them all. Painting the outermost one is easy. Start in a corner and paint that pixel. If we call the length of the painting n, fly forward n minus 1 spaces. Paint another pixel, and turn right. Now do the whole thing again… and again. Now move forward one less space, turn right, fly forward once, and Hedge will be in the next concentric square and ready to repeat the whole process. Each square is n minus 2 pixels smaller than the last in length and width, and we can follow this spiral pattern all the way to the center with a loop and a variable that tracks how far Hedge should fly. Is one of these methods better than the other? It really depends on what you value. The strength of the spiral is the simplicity of finding a pattern and reusing the same logic from start to finish. The advantage of the typewriter approach is that it’s a more generalized solution, meaning it can be adapted much more simply to fill in any pattern. For Ethic’s sake, either will do just fine. So here’s what happens. Hedge rapidly defaces all of the portraits. And within moments cries of anguish break out all over the forest. The garrison guarding the tower abandon their posts to calm the agitated people, and Ethic, Hedge, and Octavia slip through— and nearly slip into the depths of the gorge standing between them and the tower.

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翻译人员: Carol Wang 校对人员: Jiasi Hao[ 像程序员一样思考 ][ 地点：198 树林 ][ 第五集 艺术家们 ]破晓时分，火车停下， 艾斯克和海吉抵达了树林。这两位冒险者 已找到第一件神器 ——能量晶石，现抵达 198 森林， 来找寻第二件神器，殖民首领奥克塔维亚 欢迎他们的到来。机器人把人们从工作中解放后，她建立了这个树屋保护区。这本应是人们追随自己激情、从事手工业，获得成就感的港湾，一开始，人们也确实是这么做的，但几年前，大家都忘记了初衷，他们放弃了艺术和手工，只是不停地画自己， 并展示自己的照片，日复一日，年复一年。第二件神器的位置众所周知，位于一个万丈深谷的塔里，由机器人看守， 有众多不为人知的陷阱。藏有能量晶石的塔高耸入云，整个地球的人类交流 在该塔建成后从此中断。奥克塔维亚关注它好几年了，但无论她怎么尝试， 都无法突破其防御系统。艾斯克团队为到达塔下， 需要分散守卫的注意力。奥克塔维亚有个主意：通过一些善意的破坏公物行为， 来煽动人们（从而转移守卫视线）。居民画像是大小不一的正方形，每个方向的像素数都是奇数。机器人助手收集画完的肖像，并挂在公共场所供大家欣赏。海吉只有极短的时间窗口 能接触到这些画，如果它在每幅画上涂个 X，人们就会责怪机器人助手，从而实现他们 分散机器人注意力的目的，要是实现起来 也如此容易就好了，海吉不是如此简单就能画上 X，它的绘画处理器 需要非常具体的指令。它把这些画当作正方形网格，一次只能填一个像素， 即只能填一个小正方形。它在画布上可以向前移动， 也能进行 90 度旋转，但不能斜着移动。艾斯克如何编程， 才能让海吉在自画像上涂上 X 呢?[ 可暂停播放自行解题 ][ 涂画规则 4 ][ 涂画规则 3 ][ 涂画规则 2 ][ 涂画规则 1 ][ 思路 5 ][ 思路 4 ][ 思路 3 ][ 思路 2 ]思路如下：先画一个正方形网格，如图，然后模拟海吉的涂画路径。如何指导海吉完成任务呢？[ 按暂停自己解题 ][ 答案公布 3 ][ 答案公布 2 ][ 答案公布 1 ]这里的挑战是如何设计指令组，以适用任何大小的正方形网格。幸运的是，编程的优点之一 就是其灵活性，它并非只能解决一个问题，而是一次性解决一类问题。先从一个案例开始着手， 总有助于找到整体方案。我们假设正方形如图所示，海吉可测量其边长， 并保存为变量值。现在，我们需要一个计划， 让海吉把像素逐个画上 X 。实现方法不止一个，我们先来看两个方法。第一种，打字机模式， 让海吉一行一行地画。如果画像是 9 X 9 像素，它先画第一行第一格， 跳过七格，然后画一格，第二行，他跳过第一格再画， 跳过五格再画，继续画下一行。规则是，每行开始跳过的像素 +1，中间跳过的像素 -2，海吉画到中心点时， 情况变得更加复杂。这一行只画一个像素。然后，画的顺序就全反了 ——左边跳过的像素数每行 -1，每行中间跳过的像素数 +2。海吉执行这组循环指令是可行的，且是完美解决方案。主要缺点是其中涉及的逻辑很多——每行中间做什么、何时反向操作，以及如何精确反向操作。那么，我们如何操作，才能使逻辑始终一致呢?关键是把网格 看作是一系列的同心正方形。每个正方形遵循相同模式——只画四个角的像素， 其余像素不变。因此，如果我们能找到 绘制一个嵌套正方形的方法，即可应用到下一个，不断重复， 就能把它们全部绘制出来。最外层正方形最容易绘制。从一角开始，先画该角的像素。假设画的长度为 n 像素，就向前移动 n - 1 格，再画一个像素，然后右转。接着再做一次循环操作 ， 接着再做一次，现在向前少移动一格， 右转，再向前移动一格，海吉正好位于 下个同心正方形一角，即可重复下一个循环过程。每个正方形的长宽 都比上一个少 n - 2 像素，继续该螺旋模式，通过变量和循环控制海吉的步伐， 最终一直画到中心点。两种方式哪种更优呢?这取决于你的侧重点。螺旋循环的优点在于， 它简单地找到一个模式，并从头到尾循序相同逻辑。打字机方法的优点在于，它是一个更通用的解决方案，即它容易适应任何模式。对艾斯克来说，哪种都能达成目的。所以结果是这样的，海吉很快弄脏了所有的肖像，不一会儿，痛苦的哭声响彻整个森林。守卫塔的守卫们 离开了他们的岗位，以安抚骚动的人们，艾斯克、海吉和奥克塔维亚 悄悄穿了过去 ——差一点掉进幽幽深谷，那位于他们和塔之间的万丈峡谷。

**P811 2020-01-15 What's so special about Viking ships - Jan Bill**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=811)

The Vikings came from the rugged, inhospitable north known today as Scandinavia. As the Roman Empire flourished further south, Scandinavians had small settlements, no central government, and no coinage. Yet by the 11th century, the Vikings had spread far from Scandinavia, gaining control of trade routes throughout Europe, conquering kingdoms as far as Africa, and even building outposts in North America. The secret to their success was their ships. The formidable Viking longship had its origins in the humble dugout canoe, or log boat. For millennia, the inhabitants of Scandinavia had used these canoes for transportation. Dense forests and tall mountains made overland travel difficult, but long coastlines and numerous rivers, lakes, and fjords provided a viable alternative. The first canoes were simply hollowed out logs rowed with paddles. Over time, they added planks to the log boat base using the clinker, or "lapstrake," technique, meaning the planks overlapped and were fastened to each other along their edges. As the Roman Empire expanded north, some Scandinavians served in their new neighbors’ armies— and brought home Roman maritime technology. The Mediterranean cultures at the heart of the Roman Empire had large warships that controlled the sea, and cargo ships that transported goods along the waterways. These ships were powered by sail and oars and relied on a strong skeleton of internal timbers fastened to the outer planks with copper, iron, and wood nails. At first, Scandinavians incorporated this new technology by replacing their loose paddles with anchored oars. This change hugely improved the crew’s efficiency, but also required stronger ships. So boat builders began to use iron nails for fasteners rather than sewing. They abandoned the log boat base for a keel plank, and the boats became higher and more seaworthy. But these early ships retained the concept of the original log boat: their strength depended on the outer shell of wood, not internal frames and beams. They were built as shells— thin-walled but strong, and much lighter than the Roman ships. Competing chieftains quickly refined the new ships to be even more efficient. The lighter the boat, the more versatile it would be and the less investment of resources it would require— an essential advantage in a decentralized culture without large supplies of people. These ships still had no sails— sails were costly, and for now the rowed ships could meet their needs. That changed after the Western Roman Empire collapsed in the 5th century. Western Europe took a heavy economic blow, leveling the playing field a bit for the Scandinavians. As the region revived, new and vigorous trade routes extended into and through Scandinavia. The wealth that flowed along these routes helped create a new, more prosperous and powerful class of Scandinavians, whose members competed constantly with each other over trade routes and territory. By the 8th century, a sailing ship began to make sense: it could go further, faster, in search of newly available plunder. With the addition of sails, the already light and speedy ships became nearly unbeatable. The Viking ship was born. Viking longships could soon carry as many as 100 Vikings to battle. Fleets of them could land on open beaches, penetrate deep into river systems, and be moved over land if need be. When not at war, the vessels were used to transport goods and make trade journeys. There were smaller versions for fishing and local excursions, and larger adaptations for open sea voyages capable of carrying tens of tons of cargo. Thanks to their inventiveness in the face of difficult terrain and weak economies, the Vikings sailed west, settled the North Atlantic and explored the North American coast centuries before any other Europeans would set foot there.

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翻译人员: Carol Wang 校对人员: Candace Hwang维京人来自崎岖、荒凉的北方，也就是今天的斯堪的纳维亚。随着罗马帝国进一步向南扩张，斯堪的纳维亚人居住范围小， 没有中央政府，也没有货币。然而到了十一世纪，维京人已从斯堪的纳维亚半岛 蔓延到达了很远的地方，控制了整个欧洲的贸易路线，征服了远至非洲的王国，甚至在北美建立了前哨站。其成功秘诀就是他们的船只。强大的维京长船起源于简陋的独木舟，数千年来，斯堪的纳维亚的居民 一直使用这些独木舟来运输。茂密的森林和高山 令陆路旅行困难重重，但漫长的海岸线 和众多的河流、湖泊和峡湾提供了可行的选择。最早的独木舟只是掏空的树干， 用船桨划动前行。随着时间的推移，他们使用 船壳板堆压（也称为叠压）技术，在船基座上增加了木板，即将交叠的船板沿边缘固定在一起。随着罗马帝国向北扩张，一些斯堪的纳维亚人 在新邻国的军队里服役，并带回了罗马的航海技术。罗马帝国核心的地中海文化有大型战舰控制着海洋，还有货船沿水路运输货物。这些船由帆和桨提供动力，依靠坚固的内部木材骨架，用铜、铁和木钉固定在外板上。起初，斯堪的纳维亚人 采用了这种新技术，用固定桨取代了自由单桨。这一改变极大提高了船员的效率，但也需要更强大的船。因此造船工人不再使用拼接工艺， 开始用铁钉加固船板，船底不再是独木舟基底， 而是改用龙骨板，船变得更高，且更适合航海。但这些早期船只 保留了原始独木舟的概念:船的强度取决于外壳木材，而不是内部框架和梁。船建得像贝壳一样—— 薄壁但坚固，比罗马船轻得多。相互竞争的首领们 迅速改进新船，使其更高效。船越轻，它的用途就越广，所需投入的资源就越少——对一个没有大量人力并 去中心化的文化来说，这是一项基本优势。这些船仍然没有帆—— 船帆很昂贵，当时划桨船可以满足他们需求。在西罗马帝国五世纪灭亡后，情况发生了改变。西欧遭受了沉重的经济打击，为斯堪的纳维亚人 提供了一个公平的竞争环境。随着该地区的复苏，充满活力的新贸易路线 延伸并通过斯堪的纳维亚。沿着这些路线流动的财富催生了一个更繁荣、更强大的 新斯堪的纳维亚阶级，其成员之间不断争夺贸易路线和领土。到了八世纪， 帆船才应运而生:在搜寻新战利品时， 它可以航行更快、更远。船加上船帆后，本来就轻而快的船只 变得几乎不可战胜，维京船诞生了。维京长船可以快速运载 多达 100 名维京人去战斗，船队可以在开阔海滩上登陆、 也可以深入到河流系统，如果需要的话， 还可以运到陆地上。在非战争时期，这些船被用来运输货物 和进行贸易旅行。有用于钓鱼和本地短途旅行的 型号小一点的船只，也有用于海上航行的大型号船，可以装载数十吨货物。面对恶劣地理条件 和经济疲软的形式，维京人得益于其创造性， 他们才能向西航行，在北大西洋定居，并探索北美海岸，比其它欧洲人涉足此地 领先了几个世纪。

**P812 2020-01-23 Why is cotton in everything - Michael R. Stiff**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=812)

Centuries ago, the Inca developed ingenuous suits of armor that could flex with the blows of sharp spears and maces, protecting warriors from even the fiercest physical attacks. These hardy structures were made not from iron or steel, but rather something unexpectedly soft: cotton. These thickly woven, layered quilts of cotton could distribute the energy from a blow across a large surface area, shielding warriors without restricting their mobility. These seemingly contradictory features— strength and flexibility, softness and durability— have their roots in the intricate biology of the nearly invisible cotton fiber. These fibers begin life deep within a cotton flower, on the surface of a seed. As many as 16,000 fibers will festoon a single seed, bulging from the seed’s surface like miniature water balloons. Each cotton fiber, no matter how large it grows, is made of just one cell. That cell has multiple layers of cell wall. After a few days, the sides of the first layer, called the primary cell wall, stiffen, pushing cell growth in one direction and causing the fiber to elongate. The fiber elongates quickly for about 16 days. Then it begins the next stage: strengthening the cell wall. It does this by making more of the carbohydrate cellulose. Cellulose will make up 34% of the cell wall at this stage and swiftly increases. This new growth also reinforces the cell wall by going against the grain of the existing wall. The strengthened wall is more rigid, restricting further growth. That means if the fiber remodels its walls too early, it will be short, and ultimately make rough, weak fabrics. But if cell wall strengthening begins too late, the wall won’t be sturdy enough— producing fibers that are too weak to hold fabrics together well. In ideal growing conditions— with the right temperature, water, fertilizer, pest control, and light— a cotton fiber can grow up to 3.6 centimeters long with only a 25 micrometer width. Long, fine fibers can wrap around one another better than shorter, less fine fibers, which means those long, fine fibers make stronger threads that hang together better as fabric. Cotton with these qualities has diverse uses— from soft textiles to the U.S. dollar bill, which is 75% cotton. The next crucial stage of the cotton fiber’s growth begins as it thickens its secondary cell wall by depositing large quantities of cellulose into the secondary layer. Cellulose goes on to make up over 90% of the fiber’s weight. The more cellulose that gets deposited, the denser that secondary layer becomes— and this determines the strength of the final fiber. This stage is essential for developing long-lasting material for the likes of, say, a t-shirt. The garment’s capacity to withstand years of washing and wear is largely determined by the density of that secondary cell wall. On the other hand, its softness is strongly influenced by the length of the fiber, established with the remodeling of the primary wall layer. Finally, after about 50 days, the fiber is fully grown. The living matter within the cell dies off, leaving behind only the cellulose. The dried cotton seed pod, or boll, that surrounds the fibers cracks open, unveiling a burst of several thousand fiber cells in a fluffy mass. The thread-like fibers we see— thinner than a human hair— are the remains of those dense, dried out walls of cellulose. Tens of thousands of these fibers spun into yarn will go on to make everything from fabric, to coffee filters, diapers, and fishing nets. And with the help of modern science, cotton might soon be softer, stronger, and more resilient than ever as researchers investigate how to optimize its growth based on nutrients, weather conditions, and genetics.

**P812 2020-01-23 Why is cotton in everything - Michael R. Stiff**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=812)

翻译人员: Jiasi Hao 校对人员: Harper Chang几个世纪前， 印加人发明了一种独特的盔甲，这种盔甲能够随着锋利长矛 和狼牙棒的打击而弯曲，从而保护士兵免受于 哪怕是最猛烈的物理攻击。这些坚固的结构 并不是由铁或钢制成的，而是由一个极其柔软的材料制成： 棉花。这些厚厚编织、层层堆叠的棉花能够将击打的力量 分散在一块较大的表面积，因此在保护士兵的同时， 也不会局限他们的活动能力。这些看似相互矛盾的特性——强硬度和灵活性、 柔软度和耐用性，来源于复杂生物学中 肉眼几乎无法看见的棉纤维。这些纤维的生命始于棉花花朵表面的种籽。一个种子中能被 多达 16,000 根的纤维充斥，宛如迷你水气球， 从种子表面向外膨胀。不论长成多大个， 每根棉纤维这种细胞有好几层细胞壁。几天后，第一层细胞壁，亦称为初生细胞壁，变硬，向一个方向推动细胞生长，从而使纤维被拉长。在 16 天左右的时间， 纤维被快速拉长。其后，它便进入下一个生长阶段： 强化细胞壁。这是通过产生更多的 碳水化合物纤维素来完成的。在这一阶段，该纤维素 占细胞壁构成成分的 34%，且占比仍旧快速上升。这一生长促使 对现有细胞壁纹理的抵触，因此也强化了细胞壁。被强化的细胞壁变得更加坚硬， 会限制其进一步生长。这意味着如果纤维素过早 改变细胞壁结构，棉花纤维就会很短，最终只能产出粗糙且易破的布料。但如果细胞壁强化阶段开始得过晚，那层细胞壁就会不够坚固，生成的纤维会过为柔弱， 难以很好地将布料合成。理想的生长条件是：适宜的温度、水、肥料、 害虫防治，还有光线。这样，一根棉纤维 可以生长至长 3.6 厘米，宽仅为 25 微米。细长且高品质的纤维 相较于短且质量较次的纤维，能更好地缠绕彼此。这表示那些细长且高品质的 纤维能够制造出更坚韧的棉线，编织成更好的面料。因为棉花的特性， 它们被广泛使用，从柔软的纺织品到美元纸钞——内含 75% 的棉成分。在下一个棉花纤维 成长的关键阶段，大量纤维素在次生细胞壁内堆积并从而强化细胞壁。纤维素的重量占比上升， 超过纤维净重的 90% 。越多纤维素堆积，次生细胞壁 就变得更紧实——这决定了最终棉花纤维的强度。对于后阶段是否能产出 经久耐用的材料，比如 T 恤，这一生长阶段至关重要。一件成衣经受多年穿洗的能力很大程度上 取决于次生细胞壁的密度。从另一方面来说，成衣的柔软性 主要受到棉纤维长度的影响，而纤维长度是由 初生细胞壁重塑的。终于，在大约 50 天后， 纤维生长完毕。细胞死亡，只留下纤维素。包裹纤维的干燥的 棉籽荚，也叫棉铃裂开了，露出一簇簇柔软蓬松的纤维细胞。我们看到的丝状纤维—— 比人类毛发还要细——是那些紧实干燥的 纤维素壁（原细胞壁）的残留物。数以万计的这些纤维被纺织成纱线，随后继续加工生产为各种东西， 从面料织物，到咖啡过滤器、尿布，还有渔网。利用现代科学的帮助，调整营养、气候和基因等学科因素，科研人员正在研究如何优化棉花生长。棉花可能在不久将来 变得更柔软、更坚硬，以及更有韧性。

**P813 2020-01-24 How bones make blood - Melody Smith**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=813)

At any given moment, trillions of cells are traveling through your blood vessels, sometimes circling the body in just one minute. Each of these cells has its origins deep in your bones. Bones might seem rock-solid, but they’re actually quite porous inside. Large and small blood vessels enter through these holes. And inside most of the large bones of your skeleton is a hollow core filled with soft bone marrow. Marrow contains fat and other supportive tissue, but its most essential elements are blood stem cells. These stem cells are constantly dividing. They can differentiate into red blood cells, white blood cells, and platelets, and send about hundreds of billions of new blood cells into circulation every day. These new cells enter the bloodstream through holes in small capillaries in the marrow. Through the capillaries, they reach larger blood vessels and exit the bone. If there’s a problem with your blood, there’s a good chance it can be traced back to the bone marrow. Blood cancers often begin with genetic mutations in the stem cells. The stem cells themselves are not cancerous, but these mutations can interfere with the process of differentiation and result in malignant blood cells. So for patients with advanced blood cancers like leukemia and lymphoma, the best chance for a cure is often an allogeneic bone marrow transplant, which replaces the patient’s bone marrow with a donor’s. Here’s how it works. First, blood stem cells are extracted from the donor. Most commonly, blood stem cells are filtered out of the donor’s bloodstream by circulating the blood through a machine that separates it into different components. In other cases, the marrow is extracted directly from a bone in the hip, the iliac crest, with a needle. Meanwhile, the recipient prepares for the transplant. High doses of chemotherapy or radiation kill the patient’s existing marrow, destroying both malignant cells and blood stem cells. This also weakens the immune system, making it less likely to attack the transplanted cells. Then the donor cells are infused into the patient’s body through a central line. They initially circulate in the recipient’s peripheral bloodstream, but molecules on the stem cells, called chemokines, act as homing devices and quickly traffic them back to the marrow. Over the course of a few weeks, they begin to multiply and start producing new, healthy blood cells. Just a small population of blood stem cells can regenerate a whole body’s worth of healthy marrow. A bone marrow transplant can also lead to something called graft-versus-tumor activity, when new immune cells generated by the donated marrow can wipe out cancer cells the recipient’s original immune system couldn’t. This phenomenon can help eradicate stubborn blood cancers. But bone marrow transplants also come with risks, including graft-versus-host disease. It happens when the immune system generated by the donor cells attacks the patient’s organs. This life-threatening condition occurs in about 30–50% of patients who receive donor cells from anyone other than an identical twin, particularly when the stem cells are collected from the blood as opposed to the bone marrow. Patients may take immunosuppressant medications or certain immune cells may be removed from the donated sample in order to reduce the risk of graft-versus-host disease. But even if a patient avoids graft-versus-host disease, their immune system may reject the donor cells. So it’s crucial to find the best match possible in the first place. Key regions of the genetic code determine how the immune system identifies foreign cells. If these regions are similar in the donor and the recipient, the recipient’s immune system is more likely to accept the donor cells. Because these genes are inherited, the best matches are often siblings. But many patients who need a bone marrow transplant don’t have a matched family member. Those patients turn to donor registries of volunteers willing to offer their bone marrow. All it takes to be on the registry is a cheek swab to test for a genetic match. And in many cases, the donation itself isn’t much more complicated than giving blood. It’s a way to save someone’s life with a resource that’s completely renewable.

**P813 2020-01-24 How bones make blood - Melody Smith**

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翻译人员: Wanting Zhong 校对人员: Haylin Qin在任何时刻，你的血管内 有几万亿细胞经过，有时候能在一分钟内 在身体里循环一周。这些细胞中的每一员 都起源于你的骨头深处。骨头看上去和石块一样坚固， 但它们中心其实有相当多孔。大小血管从这些洞里进入。而你骨骼中的大骨头大多数是空心的，其中填满了柔软的骨髓。骨髓中含有脂肪和其它支持组织，但它最重要的成分是造血干细胞。这些干细胞一直在进行分裂。它们可以分化成红细胞、白细胞和血小板，每天能将数千亿新生的血细胞投入人体循环。这些新细胞通过骨髓里小毛细血管上的洞 进入血液循环。通过毛细血管，它们可以抵达更大的血管， 离开骨头。如果你的血液出了问题，这个问题很有可能 可以追溯回骨髓。血癌往往是由干细胞中 的基因突变开始的。干细胞本身并没有癌变，但这些突变会干扰 分化的过程，产生恶性的血细胞。因此，对于重症血癌， 例如白血病或淋巴癌的患者来说，最有可能治愈的手段 通常是异体骨髓移植，能将患者的骨髓替换成捐献者的骨髓。以下是它的原理：首先，从供者的体内采集造血干细胞。最常见的做法是，通过将血液循环通过机器将其分离成不同成分，从而将造血干细胞 从供者的血液中过滤出来。另外的做法是，用针直接从供者髋部的骨头髂嵴中抽取骨髓。与此同时，受者将为移植做准备。用高剂量的化疗或放射线照射 杀死患者现存的骨髓，将癌细胞与造血干细胞同时破坏掉。这也会弱化患者的免疫系统，降低其攻击移植细胞的几率。接下来，供者的细胞将通过静脉注射输注给患者。这些细胞先在受者的外周血液中循环，不过干细胞上被称为“趋化因子“的分子 起到归巢作用，引导这些干细胞快速迁移回骨髓中。在几个星期的时间里，它们的数量开始增长， 并开始制造新的健康血细胞。只需要少许造血干细胞，就能再生整个身体所需的健康的骨髓。一次骨髓移植也可以产生所谓的“移植物抗肿瘤”效应，即移植骨髓产生的新免疫细胞能够抹杀受者原来的免疫系统 无法杀灭的癌细胞。这个现象能帮助患者 清除顽固的血癌细胞。但是骨髓移植也伴随风险，包括移植物抗宿主病。这种病症会让由供体细胞生成的免疫系统攻击患者的器官。这种危机生命的病症 会发生在约 30% - 50% 那些没有从同卵双胞胎获得 供体细胞的患者身上，尤其是在干细胞是从血液中而不是从骨髓中采集的情况下。通过让患者服用免疫抑制药，或者将特定免疫细胞 从捐献的样本中移除，可以降低移植物抗宿主病的风险。然而即使患者躲过了移植物抗宿主病，他们的免疫系统 还是有可能排斥供体细胞。因此，在第一步找到尽可能 匹配的捐献者至关重要。遗传基因中有关键区域决定免疫系统如何识别外来细胞。如果供者和受者的这些区域比较相似，受者的免疫系统就更有可能接受供者的细胞。因为这些基因是遗传的， 最好的配型一般是兄弟姐妹。但是很多需要骨髓移植的患者并没有匹配的家庭成员。这些患者转而求助于愿意捐献骨髓的志愿者资料库。想成为骨髓捐献者， 只需用棉签刮口腔进行基因配型。大多数情况下，骨髓捐献本身并不比献血麻烦多少。这种办法可以通过完全可再生的资源拯救某个人的生命。

**P814 2020-01-27 Licking bees and pulping trees - The reign of a wasp queen - Kenny Co**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=814)

As the April sun rises on a pile of firewood, something royal stirs inside. This wasp queen is one of thousands who mated in late autumn and hibernated through the winter. Now she emerges into the spring air to begin her reign. Most of her sisters weren’t so lucky. While hibernating in compost piles and underground burrows, many sleeping queens were eaten by spiders. Warm winters caused by climate change led other queens to emerge early, only to find there was no available food. And some queens that survived the winter fell victim to the threats of spring, such as carnivorous plants, birds, and manmade pesticides. Our queen is the lone survivor of her old hive, and now, she must become the foundress of a new one. But first, breakfast. The queen heads for a citrus grove full of honeybee hives. The bees can be dangerous if provoked, but right now they’re paralyzed by the morning cold. Their hairy bodies are dripping with sugar water from an earlier feeding, and the resourceful queen licks them for a morning snack. Newly energized, our queen searches for a safe nesting area. This tree hollow, safe from rain, wind, and predators, is ideal. She chews the surrounding wood and plant fibers to make a paper-like pulp. Then she builds around 50 brood cells that comprise the beginning of her nest. Using sperm stored from last fall, the queen lays a fertilized egg into each cell, producing as many as 12 in 20 minutes. Within a week, these will hatch into female larva. But until then, the queen must hunt down smaller insects to feed her brood, all while expanding the hive, laying eggs, and defending against intruders. Fortunately, our queen is well prepared. Unlike bees, wasps can sting as many times as they need to. With such a busy schedule, the queen barely has time to feed herself. Luckily, she doesn’t have to. When she feeds an insect to her grubs, they digest the bug into a sugary substance that sustains their mother. By the end of July, these first larva have matured into adult workers, ready to take on foraging, building, and defense. The queen can now lay eggs full-time, sustaining herself on her worker’s spoils and their unfertilized eggs. Although each worker only lives for roughly 3 weeks, the queen’s continuous egg-laying swells their ranks. In just one summer, the nest reaches the size of a basketball, supporting thousands of workers. Such a large population needs to eat, and the nearby garden provides a veritable buffet. As the swarm descends, alarmed humans try to swat them. They even fight back with pesticides that purposefully poison wasps, and inadvertently impact a wide-range of local wildlife. But the wasps are actually vital to this ecosystem. Sitting at the top of the local invertebrate food chain, these insects keep spiders, mites, and centipedes, in check. Wasps consume crop-eating insects, making them particularly helpful for farms and gardens. They even pollinate fruits and vegetables, and help winemakers by biting into their grapes and jump-starting fermentation. This feast continues until autumn, when the foundress changes course. She begins grooming some eggs into a new generation of queens, while also laying unfertilized eggs that will mature into reproductive males called drones. This new crop of queens and males requires more food. But with summer over, the usual sources run dry, and the foraging wasps start taking more aggressive risks. By September, the hive’s organization deteriorates. Hungry workers no longer clean the nest and various scavengers move in. Just when it seems the hive can no longer sustain itself, the fertile queens and their drones depart in a massive swarm. As the days grow colder, the workers starve, and our queen reaches the end of her lifespan. But above, a swarm of reproductive wasps has successfully mated. The males die off shortly after, but the newly fertilized queens are ready to find shelter for their long sleep. And this woodpile looks like the perfect place to spend the winter.

**P814 2020-01-27 Licking bees and pulping trees - The reign of a wasp queen - Kenny Co**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=814)

翻译人员: QIQI PU 校对人员: Jiasi Hao四月，太阳从一堆木柴上方升起,皇室的气息开始在其中蔓延。这只黄蜂蜂后 是上千只在去年秋天交配过的且冬眠熬过寒冬的蜂后中的一员。现在，它在春风中苏醒， 开始它的王朝。然而，它大多数的姐妹并没有这么幸运。在堆肥和地洞中冬眠时，许多沉睡中的蜂后都被蜘蛛吃掉了。气候变化导致的暖冬 使得许多蜂后们早早苏醒却发现无法找到食物。一些熬过冬天的蜂后则未能逃过春日危机，例如食虫植物、鸟类和人造杀虫剂。我们的蜂后是它旧蜂巢中的 唯一幸存者，而现在，它必须成为一个新蜂巢的创建者。但首要问题，是早餐。这位蜂后朝一片蜂巢遍布的柑橘林飞去。这里的蜜蜂如果被激怒了将会非常危险，但现在它们在清晨的寒冷中动弹不得。它们毛茸茸的身体 滴落着之前进食获得的糖水而机智的蜂后 舔食这些糖水当作清晨小食。补充完能量， 蜂后开始寻找安全的筑巢地。这棵中空的树很理想， 防风雨又可抵御天敌。它咀嚼周围木头和植物的纤维，来制造一种纸浆一样的浆状物。然后建造 50 个蜂室作为巢穴的基底。借助去年秋天储存的精子，这只蜂后在每个蜂室中 产下一枚受精卵，每 20 分钟产量高达 12 枚。一周内，这些受精卵会孵化为雌性幼虫。在那之前，蜂后必须捕食小昆虫 来喂养幼卵，与此同时还要扩建巢穴、 产卵、并抵御入侵者。还好，我们的蜂后做好了充足的准备。和蜜蜂不同，黄蜂的叮蛰没有次数限制。在如此繁忙的行程下， 蜂后基本没空进食。幸运的是，它也不一定需要。当它给幼虫喂食昆虫时，幼虫会将虫子消化为含糖物质 来供养母亲。等到七月末，最初的幼虫 成长为成年工蜂，开始接手觅食、建造和防御的工作。蜂后一心一意地开始产卵，依靠工蜂的供养和它们未受精的卵 维持生存。尽管每只工蜂仅能存活 大约三周的时间，但蜂后不停地产卵 使得它们的队伍持续增长。仅仅一个夏天， 巢穴就变得像篮球一样大，可供上千工蜂栖息。数量如此庞大的蜂群需要食物来维持，而旁边花园里名副其实的“自助餐” 可以满足它们的需求。随着蜂群逼近， 警惕的人类尝试拍打它们。他们甚至使用 专灭黄蜂的杀虫剂来回击，不经意间影响到了当地 很多的野生动物。事实上，黄蜂对于生态系统非常关键。坐拥无脊椎动物食物链顶端，这些昆虫控制着 蜘蛛、螨虫和蜈蚣的数量。黄蜂会消耗吃农作物的昆虫，以此帮助农田和花园。它们甚至帮助水果和蔬菜授粉，并且通过叮咬葡萄， 使其快速启动发酵的方法来帮助酿酒人。秋天，这场盛会 随着蜂后目标的改变而落幕。它开始将一些卵 养育为新一代的蜂后，同时也继续产下未受精的可成长为工蜂的雄性生殖蜂。新出生的雌蜂和雄蜂需要更多的食物，但随着夏季的结束， 食物来源消耗殆尽。觅食的黄蜂开始面对更多凶险。九月，蜂巢的组织体系逐渐恶化。饥饿的工蜂不再清理巢穴， 于是许多清道夫侵入。当巢穴无法再继续维持时，具有繁殖能力的蜂后和它的守护者们 浩浩荡荡地离开了。随着天气逐渐寒冷，工蜂们会被饿死。我们的蜂后已走到了人生最后阶段。好在一群生殖黄蜂已成功交配。雄蜂不久之后就会死去，新受孕的蜂后也已经准备好 去寻找冬眠的庇护所了。这堆木柴看起来像是过冬的完美之地。

**P815 2020-01-28 Do politics make us irrational - Jay Van Bavel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=815)

In 2013, a team of researchers held a math test. The exam was administered to over 1,100 American adults, and designed, in part, to test their ability to evaluate sets of data. Hidden among these math problems were two almost identical questions. Both problems used the same difficult data set, and each had one objectively correct answer. The first asked about the correlation between rashes and a new skin cream. The second asked about the correlation between crime rates and gun control legislation. Participants with strong math skills were much more likely to get the first question correct. But despite being mathematically identical, the results for the second question looked totally different. Here, math skills weren’t the best predictor of which participants answered correctly. Instead, another variable the researchers had been tracking came into play: political identity. Participants whose political beliefs aligned with a correct interpretation of the data were far more likely to answer the problem right. Even the study’s top mathematicians were 45% more likely to get the second question wrong when the correct answer challenged their political beliefs. What is it about politics that inspires this kind of illogical error? Can someone’s political identity actually affect their ability to process information? The answer lies in a cognitive phenomenon that has become increasingly visible in public life: partisanship. While it’s often invoked in the context of politics, partisanship is more broadly defined as a strong preference or bias towards any particular group or idea. Our political, ethnic, religious, and national identities are all different forms of partisanship. Of course, identifying with social groups is an essential and healthy part of human life. Our sense of self is defined not only by who we are as individuals, but also by the groups we belong to. As a result, we’re strongly motivated to defend our group identities, protecting both our sense of self and our social communities. But this becomes a problem when the group’s beliefs are at odds with reality. Imagine watching your favorite sports team commit a serious foul. You know that’s against the rules, but your fellow fans think it’s totally acceptable. The tension between these two incompatible thoughts is called cognitive dissonance, and most people are driven to resolve this uncomfortable state of limbo. You might start to blame the referee, complain that the other team started it, or even convince yourself there was no foul in the first place. In a case like this, people are often more motivated to maintain a positive relationship with their group than perceive the world accurately. This behavior is especially dangerous in politics. On an individual scale, allegiance to a party allows people to create a political identity and support policies they agree with. But partisan-based cognitive dissonance can lead people to reject evidence that’s inconsistent with the party line or discredits party leaders. And when entire groups of people revise the facts in service of partisan beliefs, it can lead to policies that aren’t grounded in truth or reason. This problem isn’t new— political identities have been around for centuries. But studies show that partisan polarization has increased dramatically in the last few decades. One theory explaining this increase is the trend towards clustering geographically in like-minded communities. Another is the growing tendency to rely on partisan news or social media bubbles. These often act like echo chambers, delivering news and ideas from people with similar views. Fortunately, cognitive scientists have uncovered some strategies for resisting this distortion filter. One is to remember that you’re probably more biased than you think. So when you encounter new information, make a deliberate effort to push through your initial intuition and evaluate it analytically. In your own groups, try to make fact-checking and questioning assumptions a valued part of the culture. Warning people that they might have been presented with misinformation can also help. And when you’re trying to persuade someone else, affirming their values and framing the issue in their language can help make people more receptive. We still have a long way to go before solving the problem of partisanship. But hopefully, these tools can help keep us better informed, and capable of making evidence-based decisions about our shared reality.

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翻译人员: Carol Wang 校对人员: Candace Hwang2013 年，一组研究人员 进行了一次数学测试。测试对象是 1100 多名美国成年人，测试设计为从某种程度上 检测其评估数据集的能力。在这些数学问题中， 隐藏着两个几乎相同的问题。这两个问题都使用了 相同难度的数据集，且每个问题 都有一个客观正确的答案。第一个问题是关于皮疹 和一种新护肤霜间的相关性，第二个问题则是关于犯罪率 和枪支管制立法间的关系。对数学能力强的测试者来说，他们更可能答对第一题。尽管从数学上来看 这是两个相同的问题，但第二个问题的答案 看起来却大相径庭。这时，数学能力并不能有效预测哪些测试者回答正确。相反，研究人员跟踪的 另一个变量发挥了作用：政治认同。对于正确解读数据的结果与其政治信仰一致的参与者来说，他们更容易答对第二题，当正确答案挑战其政治信仰时，即使是这项研究中最顶尖的数学家，也有 45% 的可能会答错第二题。到底政治与导致该不合逻辑的 错误之间存在什么关系呢?一个人的政治认知真会影响其处理信息的能力吗？答案就在公众生活中一个 越来越明显的认知现象：党派偏见。虽然这是政治环境中常提到的词，但党派偏见被广泛定义为对任何特定群体 或观点的强烈偏好或偏见。我们的政治、种族、宗教和国家认同都是党派偏见的不同形式。当然，社会群体认同是人类生活中不可或缺 而又健康的组成部分。我们的自我意识 不仅由我们作为个体的身份决定，也由我们所属的群体决定。因此，我们有强烈的动机 去捍卫我们的群体身份，保护我们的自我意识 和我们的社会群体。但当团队的信念与现实不符时，问题就产生了。试想一下，你看到 自己最喜欢的球队严重犯规了，你知道这违反比赛规则，但你们这些粉丝 则认为这是完全可以接受的。这两种矛盾思想之间的紧张关系，就称为认知失调，它会驱使多数人 去解决这种不舒服的悬疑状态。你可能会开始责怪裁判， 抱怨是对方先开始犯规的，甚至说服自己其实根本就没犯规。在这种情况下，人们往往更愿选择 与其团队观点保持一致，而非准确地感知世界。这种行为在政治上尤其危险，从个人层面来看，效忠政党给人们创建了政治身份，并支持他们赞同的政策。但是，基于党派的认知失调会导致人们拒绝接受与政党路线相左 或使党领导人名誉扫地的证据。当整个群体为了自己的党派信仰 而去篡改事实的时候，会引导并非以事实 或正当理由为基础的政策。这个问题并不新鲜——政治认同已经存在了几个世纪。但研究表明，在过去的几十年里， 党派分化程度急速加剧。一种解释这种增长的理论说，是由思想主张相似的社区 在地理上聚集的趋势所造成；另一种解释是，因为人们越来越依赖党派新闻 或社交媒体泡沫的趋势所导致。这些现象的作用就像回音室，只传递观点相似的人的新闻和主张。幸运的是，认知科学家 已经发现了一些策略，来反抗这种扭曲过滤。一是要记住，你可能 比自己想象的更有偏见。因此，当遇到新信息时，你要有意识地努力推动 你最初的直觉，并进行分析性评估。在你自己的团队中，努力将事实核查和质疑假设 变成团队文化的重要部分。警告人们得到的可能是错误信息，这也会有所帮助。当你试图说服别人的时候，先肯定他们的价值观， 并用他们的语言来阐述问题，会更有助于他们接受你的观点。在解决党派偏见之前， 我们还有很长的路要走，希望这些工具 能帮助我们更好地了解情况、并针对你我的共同现实 做出基于证据的决策。

**P816 2020-01-29 Everything changed when the fire crystal got stolen - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=816)

Someone has tripped the magical alarms in the Element Temple. By the time you and the other monks arrive on the scene, you know you have a disaster on your hands. Overnight, four young apprentices broke into the temple’s inner chamber to steal the sacred element crystals. But when the alarm went off they panicked, and each of them swallowed the crystal they held right before they were caught. With no idea how to control the crystals’ vast powers, they’ll soon transform into uncontrollable elemental spirits. Improbably enough, the old monk next to you has seen something similar happen before. He explains: “You must determine who ate which crystal and get each into the proper containment field before they transform. The elements compel their masters: those who ate the Earth and Water Crystals must speak the truth, while those who consumed Fire and Air must lie." The youths are too scared to confess their own transgressions. Instead, they fall to accusing each other. “Rikku took the Water crystal!” Sumi blurts out. Rikku interrupts angrily. “It was Bella, she stole the Fire crystal!” So Bella yells: “Jonah ate the Air crystal, I saw him!” Jonah looks up timidly and shakes his head. “I… I don’t know what happened, but Sumi doesn’t have the Earth crystal.” So who ate which crystal? Pause now to figure it out for yourself. There’s no getting around it— this will take some trial and error. But that’s not a bad thing. If we make a wrong guess, we’ll eventually reach a point where our conclusions contradict each other. That would allow us to confirm that our initial guess was wrong and work from there. This is a technique known as proof by contradiction. The trick is in being strategic about where we begin our guessing. Some assumptions might not lead to contradictions without making further assumptions. We want to pick one that creates the most constraints on its own, and thus gives us the most information when it turns out to be right or wrong. Take, for example, Sumi’s statement. If we assume she’s telling the truth, we’d know the identity of both truth tellers. Rikku would have the Water crystal, and since she’s not lying about him, Sumi would have Earth. So Bella would have the Fire crystal, as Rikku says. But then Bella would have to be lying about Jonah having the Air crystal. And yet that’s the only remaining option. This is a contradiction, and it tells us our initial assumption was wrong. So now we can go back to the start, but with the added knowledge that Sumi is lying. As a liar, Sumi must either have the Fire or Air crystal. That means Jonah was telling the truth about her, so he can’t have taken either of those. And that means Bella was lying about him, so she must also have either Fire or Air. Since Sumi was lying, Rikku can’t have taken the Water crystal— the only one left who could have it is Jonah. And because we’ve already identified the two liars, Rikku must have the Earth crystal. That means Bella has the Fire crystal and Sumi has Air. You manage to get them all in the proper containment fields just as the crystals’ magic begins to manifest. Compared with the difficult task of training these kids to control their new powers, figuring out who had which crystal was elementary.

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翻译人员: Carol Wang 校对人员: Candace Hwang有人触发了元素神殿的魔法警报，当你和其他僧人赶到现场时，你知道自己需要处理这场灾难。一夜之间， 四个年轻学徒闯入了寺庙的内室，偷走了神圣的元素水晶。但当警报响起时，他们惊慌失措，在被抓之前， 每人都吞下了他们手里的水晶。由于不知如何控制 这些水晶的巨大力量，他们很快就会变成 无法控制的元素精灵。令人难以置信的是，你旁边的老僧以前曾见过类似事情。他解释说： “你必须弄清谁吃了哪块水晶，并在他们变形之前 把他们放入各自晶石的容器中。元素能胁迫它们的主人，吞下地球晶石 或水晶石的人必须说真话，而吞了火晶石 和空气晶石的人必须说谎。”这些年轻人吓坏了， 不敢承认自己的罪过；相反，他们互相指责。苏米脱口说道： “瑞丘拿了水晶石！”瑞丘生气地打断道，“是贝拉偷走了火晶石！”而贝拉大叫道， “乔纳吞了空气水晶，我看见了！”乔纳胆怯地抬起头来，摇了摇头。“我……我不知道发生了什么， 但苏米没拿地球晶石。”那么，到底谁吃了哪块晶石呢？[ 可暂停播放，自己解题 ]需要经历一些尝试和错误， 这些都是回避不掉的，但这也并非坏事。如果我们猜错了，就会得出互相矛盾的结论，这使我们确定最初的猜想错了，然后再继续猜。这就是所谓的技巧反证法，其关键是如何有策略的入手猜测。如果不作进一步假设，有些假设可能不会导致矛盾。我们要选一个 对自己产生最多约束的假设，当最终证明它对或错时， 就能给提供最多的信息。以苏米的声明为例，若假设她说真话，就能确定两个说真话的人。那么，瑞丘拿的是水晶石，既然她没撒谎， 苏米就拿了地球晶石。如瑞丘所说，贝拉则拿了火晶石。但如此一来，贝拉说的 有关乔纳有空气晶石就是谎言。这是仅剩的唯一选择，但它与假设相矛盾， 说明我们最初的假设错了。这样，我们又回到起点，但已知苏米在撒谎。苏米既然是说谎者， 她拿了火晶石或空气晶石，意味着乔纳说的 有关她的话是实情，那么他不会有空气晶石或火晶石。这意味着贝拉说的 有关他的话是撒谎，所以，贝拉要么有火晶石， 要么有空气晶石。既然苏米在撒谎， 瑞丘不可能有水晶石了——剩下能拿水晶石的人只有乔纳。因为我们已经确定了两个撒谎者，瑞丘一定有地球晶石。也就是说，贝拉有火晶石， 苏米有空气晶石。当晶石魔力要开始显现时，你刚好设法把他们四人 关进了有效控制区内。训练孩子们如何控制其新能力 是一项无比艰巨的任务，与该训练任务相比，弄清谁拿了哪块晶石不过小事一桩。

**P817 2020-01-29 The legend of Annapurna, Hindu goddess of nourishment - Antara Raycha**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=817)

Lord Shiva— primordial destroyer of evil, slayer of demons, protector, and omniscient observer of the universe— was testing his wife’s patience. Historically, the union between Shiva and Parvati was a glorious one. They maintained the equilibrium between thought and action on which the well-being of the world depended. Without Parvati as the agent of energy, growth, and transformation on Earth, Shiva would become a detached observer, and the world would remain static. But together, the two formed a divine union known as Ardhanarishvara–– a sacred combination which brought fertility and connection to all living things. For these reasons, Parvati was worshipped far and wide as the mother of the natural world–– and the essential counterpart to Shiva’s powers of raw creation. She oversaw humanity’s material comforts; and ensured that the Earth’s inhabitants were bonded to each other physically, emotionally, and spiritually. Yet a rift had grown between these two formidable forces. While Parvati sustained daily life with care and control, Shiva had begun to belittle his wife’s essential work— and insisted on quarreling about their roles in the universe. He believed that Brahma, the Creator of the world, had conceived the material plane purely for his own fancy. And therefore, all material things were merely distractions called māyā— nothing but a cosmic illusion. For millennia Parvati had merely smiled knowingly as Shiva dismissed the things she nurtured. But upon His latest rebuke, she knew she had to prove the importance of her work once and for all. She took flight from the world, withdrawing her half of the cosmic energy that kept the Earth turning. At her disappearance, a sudden, terrifying and all-encompassing scarcity enveloped the world in eerie silence. Without Parvati, the land became dry and barren. Rivers shrank and crops shriveled in the fields. Hunger descended on humanity. Parents struggled to console their starving children while their own stomachs rumbled. With nothing to eat, people no longer gathered over heaped bowls of rice, but withdrew and shrank from the darkening world. To His shock and awe, Shiva also felt the profound emptiness left by his wife’s absence. Despite His supreme power, He too realized that He was not immune to the need for sustenance, and His yearning felt bottomless and unbearable. As Shiva despaired over the desolate Earth, He came to realize that the material world could not be so easily dismissed. At her husband’s epiphany, the compassionate Parvati could no longer stand by and watch her devotees wasting away. To walk among them and restore their health, she took the form of a new avatar, carrying a golden bowl of porridge and armed with a jewel-encrusted ladle. As word of this hopeful figure spread, she was worshipped as Annapurna, the Goddess of food. With the arrival of Annapurna, the world blossomed anew. People rejoiced at fertility and food, and communed together to give thanks. Some believe that Annapurna first appeared in the sacred city of Kashi, or the Place of Freedom, on the banks of the Ganges— where she opened a kitchen to fill the bellies of the people until they could eat no more. But it was not only mere mortals who were served at her feast. Humbled at the scenes of earthly pleasure blooming all around him, Lord Shiva himself approached the goddess with an empty bowl and begged for food and forgiveness. For this reason, the supreme deity is sometimes portrayed as a poor beggar at the mercy of Annapurna; holding her golden bowl in her left hand, while the right forms the abhaya mudra–– a gesture of safety and assurance. With these symbols, this powerful avatar makes it clear that the material world is anything but an illusion. Rather, it is a cycle of life that must be sustained— from the feeding of open mouths and rumbling bellies, to the equilibrium of the Earth.

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翻译人员: 圆圆 刘 校对人员: Yanyan Hong湿婆神——原始的 邪恶毁灭者，屠魔者，宇宙之守护者和全知者——正在考验着他妻子的耐心。历史上，湿婆和帕尔瓦蒂的 结合是十分动人的。他们维持着世界的幸福所依赖的思想与行动之间的平衡。若没有了帕尔瓦蒂来掌管 世间的能量、生长和转化，湿婆就会变成一位被失去了 双眼的观察者，世界将不再运转。但他们共同组成了 一个神圣合体——半女世尊，一个能为所有生物带来 生育和连结之力的神圣结合。因此，帕尔瓦蒂作为 与湿婆的原始创造力相对应的自然之母而被广泛的崇拜——她监管着人类的物质享受；并确保着地球上的居民在 物质、情感和精神上的相通。然而这两个强大的力量之间 却产生了嫌隙。在帕尔瓦蒂小心的维持着 日常生活的同时，湿婆开始贬低他的妻子 所做的重要的工作——并执着于争论他们 在宇宙中的作用。他相信创世神梵天 设计出的物质世界纯粹出于他自己的喜好。因此，所有的物质仅仅是一种被称为“幻（玛雅 MAYA）” 的消遣——除了宇宙的幻像之外， 什么也不是。几千年以来，帕尔瓦蒂 总是放纵湿婆拆散她造物的行为，报之以微笑。但在他最近的指责下，帕尔瓦蒂明白 她必须要一劳永逸地证明她工作的的重要性。她离开了这个世界，同时，带走了属于她那一半 用以维持世界运转的能量。当她消失之际，一下子， 可怕的、包罗万象的虚空将世界笼罩在阴森恐怖的寂静中。没有了帕尔瓦蒂， 土地干旱而贫瘠。河流干涸，作物枯萎。饥饿降临人间。父母挣扎着安慰 他们挨饿的孩子，尽管他们自己也已饥肠辘辘。没有了食物，人们食不果腹，退避了这个黑暗的世界。同时，让湿婆震惊与害怕的是妻子的离开带来了深深的空虚。尽管拥有至高无上的力量，湿婆意识到自己也 不能免于对食物的需求，对帕尔瓦蒂的怀念 也变得无穷无尽，难以忍受。当湿婆在荒凉的地球上 感到绝望的同时，他开始意识到物质世界不可能被轻易的毁灭。既然有了丈夫的顿悟，帕尔瓦蒂的同情心 也不允许她再袖手旁观，眼睁睁地看着信徒们日益消瘦。为了游走在信徒之中 并恢复他们的健康，她使用了一个新的化身，手持一个金色的装满粥的碗 和一个镶嵌宝石的勺子。随着这个代表着 希望的形象的传播，她被尊称为安娜普尔，食物之神。随着安娜普尔的到来， 世界重新充满了活力。人们被丰收和食物所鼓舞， 聚集在一起感谢女神。有人认为，安娜普尔最初出现在恒河两岸的圣城喀什， 或自由之地，[喀什的开放厨房]在那里她开设了 一个厨房来为人们充饥，直到他们再也吃不下。但来到她宴会上的不只有凡人。谦逊地融入在他周围 绽放着世俗的欢乐，湿婆神拿着一个空碗 接近女神并乞求食物和宽恕。由此，这个至尊神有时被描绘成 被安娜普尔怜悯的可怜乞丐。左手捧着她的金碗，右手做着 象征着安全、安心的无畏手印，这个强大的化身 用这些符号来表明，物质世界绝不是幻想， 而是必须维持的生命循环。小到喂养嗷嗷待哺 和饥肠辘辘的人们大到地球的平衡。

**P818 2020-01-29 The life, legacy & assassination of an African revolutionary - Lisa J**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=818)

In 1972, Thomas Sankara was swept into a revolution for a country not his own. Hailing from the West African nation of Burkina Faso— then known as Upper Volta— the 22-year-old soldier had travelled to Madagascar to study at their military academy. But upon arriving, he found a nation in conflict. Local revolutionaries sought to wrest control of Madagascar from France’s lingering colonial rule. These protestors inspired Sankara to read works by socialist leaders like Karl Marx and seek wisdom from military strategy. When he returned to Upper Volta in 1973, Sankara was determined to free his country from its colonial legacy. Born in 1949, Sankara was raised in a relatively privileged household as the third of ten children. His parents wanted him to be a priest, but like many of his peers, Sankara saw the military as the perfect institution to rid Upper Volta of corruption. After returning from Madagascar, he became famous for his charisma and transparent oratorial style— but he was less popular with the reigning government. Led by President Jean-Baptiste Ouédraogo, this administration came to power in the 3rd consecutive coup d’état in Upper Volta’s recent history. The administration’s policies were a far cry from the sweeping changes Sankara proposed, but, by 1981, Sankara’s popularity won out, earning him a role in Ouédraogo’s government. Nicknamed “Africa’s Che Guevara," Sankara rapidly rose through the ranks, and within two years, he was appointed Prime Minister. In his new role, he delivered rallying speeches to impoverished communities, women, and young people. He even tried to persuade other governments to form alliances based on their shared colonial legacy. But Ouédraogo and his advisors felt threatened by Sankara’s new position. They thought his communist beliefs would harm alliances with capitalist countries, and just months after becoming Prime Minister, Ouédraogo’s administration forced Sankara from the job and placed him on house arrest. Little did the President know this act would fuel Upper Volta’s 4th coup d’état in 17 years. Civilian protests ensued around the capital, and the government ground to a halt while Sankara tried to negotiate a peaceful transition. During this time, Blaise Compaoré, Sankara’s friend and fellow former soldier, foiled another coup that included an attempt on Sankara’s life. Eventually, Ouédraogo resigned without further violence, and on August 4, 1983, Thomas Sankara became the new President of Upper Volta. Finally in charge, Sankara launched an ambitious program for social and economic change. As one of his first agenda items, he renamed the country from its French colonial title "Upper Volta" to "Burkina Faso," which translates to “Land of Upright Men." Over the next four years he established a nation-wide literacy campaign, ordered the planting of over 10 million trees, and composed a new national anthem— all while cutting down inflated government employee salaries. But perhaps the most unique element of Sankara’s revolution was his dedication to gender equality. He cultivated a movement for women’s liberation, outlawing forced marriages, polygamy and genital mutilation. He was the first African leader to appoint women to key political positions and actively recruit them to the military. However, Sankara’s socialist policies were met with much resistance. Many students and elites believed his economic plans would alienate Burkina Faso from its capitalist peers. His crackdown on the misuse of public funds turned government officials against him as well. After four years, what began as an empowering revolution had isolated many influential Burkinabes. But Sankara was not ready to yield his power. He executed increasingly authoritarian actions, including banning trade unions and the free press. Eventually, his autocratic tendencies turned even his closest friends against him. On October 15, 1987, Sankara was conducting a meeting when a group of assailants swarmed his headquarters. Sankara was assassinated in the attack, and many believe the raid was ordered by his friend Blaise Compaoré. Though his legacy is complicated, many of Sankara’s policies have proven themselves to be ahead of their time. In the past decade, Burkinabe youth have celebrated Sankara’s political philosophy, and nearby countries like Ghana have even adopted Sankara’s economic models. On March 2, 2019 a statue of Sankara was erected in Burkina Faso’s capital, establishing his place as an icon of revolution for his country and throughout the world.

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翻译人员: Chloe Ma 校对人员: Yanyan Hong1972 年，托马斯·桑卡拉 （Thomas Sankara）被卷入了一场他国的革命。这名 22 岁的士兵来自西非国家 布基纳法索 (Burkina Faso)——这里在当时还叫做 上伏尔特 (Upper Volta) ，并曾前往马达加斯加的军事学院学习。但在到达目的地之后， 他发现自己身处一个战乱中的国家。当地的革命者们试图从 法国长期的殖民统治中夺取对马达加斯加的控制权。这些抗议者激励了桑卡拉去阅读诸如卡尔·马克思（Karl Marx） 等社会主义领袖的作品，并从中寻找军事智慧。在 1973 年，当他回到上伏尔特时，桑卡拉决心将他的国家 从残余的殖民统治中解放。出生于 1949 年的桑卡拉在一个相对富有的家庭中长大，在家中十个孩子里排行第三。他的父母想让他成为一名牧师， 但是就像大多数的同龄人，桑卡拉将军事学院视作 摆脱上伏尔特腐败的完美机构。从马达加斯加回来后，他的个人魅力以及开诚布公的 演讲风格让他名声大振——但却引起了政治领导层的警惕。近代的上伏尔特境内 不断发生政变（coup d’éta），由总统让 · 巴蒂斯特 · 韦德拉奥果 ( Jean-Baptiste Ouédraogo) 带领的这届政府在第三场政变中上台。这届政府的政策 与桑卡拉提议的大幅改革相差甚远。但是，在 1891 年， 桑卡拉在民意支持中胜出，在韦德拉奥果的政府内部 获得了一席之地。被冠以 “非洲切 · 格瓦拉” 的绰号， 桑卡拉的职业发展可谓平步青云，不到两年，他就被任命为总理。在就职时，他发表了致力于服务女性和年轻人社区的集会演讲。他甚至还试图说服 其他有共同殖民经历的国家结为同盟。但是，韦德拉奥果和他的顾问 察觉到了桑卡拉的新职位带来的威胁。他们认为桑卡拉的共产主义信仰 会伤害资本主义联盟。在成为总理的几个月过后，桑卡拉就被迫离职，并被韦德拉奥果的行政部门 软禁在家中。可总统不知道的是，这一举动会在 17 年后 引发上伏尔特的第四场军事政变。首都一带爆发了平民抗议，导致政府停摆，而桑卡拉则试图 通过谈判实现和平过渡。在此期间，布莱兹 · 孔波雷 （Blaise Compaoré），桑卡拉的朋友兼前战友，粉碎了另一场试图 谋害桑卡拉的政变。韦德拉奥果最终辞职， 政变也随之平息。1983 年 8 月 4 日，托马斯 · 桑卡拉 成为了上伏尔特的新总统。终于掌权的桑卡拉一展宏图，大举推行了改革社会经济的项目。他最先着手的计划是更改国名，从原法国殖民地名称 “上伏尔特” 改成了 “布基纳法索”，意思是 “正人君子的土地”。在接下来的四年里， 他推行了全国性的扫盲运动，下令种植了超过一千万棵树，并且创作了一首新的国歌——同时还减少了公务员虚高的工资。然而桑卡拉的革命中 最独树一帜的地方或许是致力于推行性别平等。他筹划了一场女性平权运动，取缔强制性婚姻， 一夫多妻制与割礼。他是第一位为女性赋予 重要政治角色的非洲领导人，并且积极地招收女兵。但是，桑卡拉的社会主义政策 也遇到了很多阻碍。很多学生和精英 认为他的经济计划会导致布基纳法索与其他 资本主义同盟国家的关系日渐疏远。他对于滥用公共资金行为的镇压使政府官员也对他产生了不满。四年后，当初的赋权革命孤立了许多有影响力的布基纳法索人。但是桑卡拉还没准备好让位。他执行了越来越多的独裁议案，比如禁止贸易同盟 和扼杀舆论自由。最终，他的独裁政治 使他与他的密友们倒戈相向。1987 年 10 月15 日，当桑卡拉正在主持一场会议时，一群刺客闯进了司令部。桑卡拉遇刺身亡，很多人认为雇佣这群杀手的是他的好友布莱兹 · 孔波雷。虽然桑卡拉为后世留下的 政治遗产很复杂，他的许多政策后来 被证明走在了时代的前端。在过去的十年里，布基纳法索的年轻人 歌颂了桑卡拉的政治哲学，而一些邻近的国家，像加纳， 甚至采纳了桑卡拉的经济模型。2019 年 3 月 2 日，一尊桑卡拉的雕像 矗立在了布基纳法索的首都，确立了属于他的位置—— 一个国家革命以及世界革命的标志性人物。

**P819 2020-01-30 The Chasm \_ Think Like A Coder, Ep 6**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=819)

Ethic, Hedge, and Octavia stand on the edge of a bottomless ravine. It’s the only thing between them and the tower that houses the second of three powerful artifacts. They’ve got a brief window of time to get across before the guards return. With Hedge’s fuel gauge on empty he won’t be able to fly Ethic across, so the only option is to make a bridge. Fortunately, the floating stacks of stones nearby are bridge components— invented by Octavia herself— called hover-blocks. Activate a pile with a burst of energy, and they’ll self-assemble to span the ravine as Ethic walks across. But there is, of course, a catch. The hover-blocks are only stable when they’re perfectly palindromic. Meaning they have to form a sequence that’s the same when viewed forwards and backwards. The stacks start in random orders, but will always put themselves into a palindromic configuration if they can. If they get to a point where a palindrome isn’t possible, the bridge will collapse, and whoever’s on it will fall into the ravine. Let’s look at an example. This stack would make itself stable. First the A blocks hold themselves in place. Then the B’s. And finally the C would nestle right between the B’s. However, suppose there was one more A. First two A blocks form up, then two B’s, but now the remaining C and A have nowhere to go, so the whole thing falls apart. The Node of Power enables Hedge to energize a single stack of blocks. What instructions can Ethic give Hedge to allow him to efficiently find and power a stable palindromic stack? Pause now to figure it out for yourself. Examples of palindromes include ANNA, RACECAR, and MADAM IM ADAM. Counting the number of times a given letter appears in a palindrome will reveal a helpful pattern. Pause now to figure it out for yourself. Let’s first look at a naïve solution to this problem. A naïve solution is a simple, brute-force approach that isn’t optimized— but will get the job done. Naïve solutions are helpful ways to analyze problems, and work as stepping stones to better solutions. In this case, a naïve solution is to approach a pile of blocks, try all the arrangements, and see if one is a palindrome by reading it forward and then backwards. The problem with this approach is that it would take a tremendous amount of time. If Hedge tried one combination every second, a stack of just 10 different blocks would take him 42 days to exhaust. That’s because the total time is a function of the factorial of the number of blocks there are. 10 blocks have over 3 million combinations. What this naïve solution shows is that we need a much faster way to tell whether a pile of blocks can form a palindrome. To start, it may be intuitively clear that a pile of all different blocks will never form one. Why? The first and last blocks can’t be the same if there are no repeats. So when can a given sequence become a palindrome? One way to figure that out is to analyze a few existing palindromes. In ANNA, there are 2 A’s and 2 N’s. RACECAR has 2 R’s, 2 A’s, 2 C’s, and 1 E. And MADAM IM ADAM has 4 M’s, 4 A’s, 2 D’s, and 1 I. The pattern here is that most of the letters occur an even number of times, and there’s at most 1 that occurs just once. Is that it? What if RACECAR had 3 E’s instead of 1? We could tack the new E’s onto the ends and still get a palindrome, so 3 is ok. But make that 3 E’s and 3 C’s, and there’s nowhere for the last C to go. So the most generalized insight is that at most one letter can appear an odd number of times, but the rest have to be even. Hedge can count the letters in each stack and organize them into a dictionary, which is a tidy way of storing information. A loop could then go through and count how many times odd numbers appear. If there are less than 2 odd characters, the stack can be made into a palindrome. This approach is much, much faster than the naïve solution. Instead of factorial time, it takes linear time. That’s where the time increases in proportion to the number of blocks there are. Now write a loop for Hedge to approach the piles individually, and stop when he finds a good one, and you’ll be ready to go. Here’s what happens: Hedge is fast, but there are so many piles it takes a long time. Too long. Ethic and Hedge are safe. But Octavia is not so lucky.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=819)

翻译人员: Yizhuo He 校对人员: Yanyan Hong[ 像程序员一样思考 ][ 地点：198 森林 ][ 第六集 峡谷 ]艾斯克、海吉和奥克塔维亚 站在无底峡谷的边缘。峡谷是他们与塔之间的唯一阻碍，塔里藏有三个强大神器中的第二个。他们在警卫回来前只有一小段时间可以跨越这个峡谷。海吉的燃料箱空了， 无法带艾斯克飞越过去，所以，唯一选择是建一座桥。幸运的是，附近漂浮的石头堆 可以用来搭一座桥，石头堆是奥克塔维亚 自己发明的——叫作“飘浮块”。他们可以用一股能量 激活一堆飘浮块，这样在这些飘浮块自动组装时， 艾斯克就能跨越峡谷。但现在存在一个问题。这些飘浮块只有在组合成 完美的回文结构时才能保持稳定。也就是说，它们得被组合成正序看和倒序看都一致的结构才行。飘浮块最初是随机排列的，但如果可行，它们随后会自动拼装成回文结构。但如果它们无法被拼成回文结构，桥就会坍塌掉，走在上面的人就会坠入深谷。让我们来看一个例子。这堆飘浮块能被组成稳定的结构。首先，A 型方块 能被排列在左右两侧。接着是 B 型方块。最后，C 型方块正好 能被放在两块 B 之间。但假设多一块 A 型方块的话。首先两块 A 排列好， 然后两块 B 也排列好，但剩下的 A 块 和 C 块就没地方放了，因此整座桥都会塌掉。力量节点晶石只够海吉 激活一堆飘浮块，艾斯克要给海吉什么指令，才能让它有效地找到并激活 一堆稳固且为回文结构的飘浮块呢?[ 可暂停播放自行解题 ]回文排列的例子如：ANNA、RACECAR、 以及 MADAM IM ADAM。通过数一个字母 在回文中出现的次数，你会发现一个有用的模式。[ 可暂停播放自行解题 ]我们先来看一个简单的方案。简易方案是一种简单的、未被优化的粗暴方法，但是它可以达成目标。简单方案是分析问题的有用方法，是更优方案的铺路石。在这种情况下，一个简单方案是：尝试这堆飘浮块的所有可能组合，并通过正向，反向阅读 来确定其是否为回文结构。但这种方法有个缺陷，它需要大量的时间。如果海吉每秒 能判断一种组合可不可行，那么只有 10 块的飘浮块堆， 需要 42 天才能算完。这是因为总时间是总块数的阶乘。10 个飘浮块就有 超过 300 万种组合方式。这个简单的解决方案表明， 我们需要一种更快的方法来判断一堆飘浮块 是否可以形成回文。首先，很明显的是， 一堆各不相同的飘浮块永远不可能形成回文结构。为什么？因为如果没有重复，第一块和最后一块就不可能相同。那么什么时候一个给定的 序列可以形成回文呢?一种方法是分析 一些现有的回文。ANNA 有两个 A 和两个 N，RACECAR 有两个 R、 两个 A、两个 C 和一个 E，MADAM IM ADAM 中， 有四个 M、四个 A、两个 D 和 一个 I。模式是，大多数字母会出现偶数次，最多只有一个字母 可以只出现一次。这就完了吗？如果 RACECAR 有3个 E 而不是1个呢?我们可以把新的两个 E 钉在两端， 仍能得到一个回文，所以字母出现 3 次是可以的。但如果有 3 个 E 和 3 个 C ， 最后一个 C 就没有地方放了。让我们来概括一下思路，最多只有一个字母能出现奇数次，但其他字母必须出现偶数次。海吉可以数每个字母 在飘浮堆中出现的次数，把这些信息存放到 字典这种数据结构中，这是一种储存信息的简洁方式。可以通过一个循环遍历这个字典， 数有几个字母出现了奇数次。如果有少于两个字母出现了奇数次，那么这堆飘浮块 就能被组成回文结构。这种方法比之前的 那个简单解决方案要快得多。它只需线性时间， 而不是阶乘时间。线性时间指的是程序运行时间与方块数量成正比。现在，请你为海吉编写一个循环， 来分别处理这些飘浮块堆，当它找到可行的方案时， 暂停程序，这样就成功了。接下来会发生的是：虽然海吉的速度很快，但有很多的飘浮块堆， 要花很长的时间，很长很长的时间。艾斯克和海吉现在安全了，但奥克塔维亚就没那么幸运了。

**P820 2020-01-31 The accident that changed the world - Allison Ramsey and Mary Staicu**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=820)

London, 1928: a group of mold spores surf a breeze through a lab. They drift onto a petri dish, and when they land, they germinate a medical revolution. This lab belongs to Alexander Fleming, a Scottish scientist investigating the properties of infectious bacteria. At this time, Fleming is away on vacation. When he returns, he finds a colony of mold growing on a petri dish he’d forgotten to place in his incubator. And around this colony of mold is a zone completely and unexpectedly clear of bacteria. In studying this mysterious phenomenon, Fleming came to realize that the mold was secreting some kind of compound that was killing the bacteria. The mold was a species in the Penicillium genus, so Fleming dubbed the antibacterial compound “penicillin.” What Fleming stumbled upon was a microbial defense system. The penicillium mold constantly produces penicillin in order to defend itself from threats, such as nearby bacterial colonies that might consume its resources. Penicillin destroys many types of bacteria by disrupting synthesis of their cell walls. These walls get their strength from a thick, protective mesh of sugars and amino acids, that are constantly being broken down and rebuilt. Penicillin binds to one of the compounds that weaves this mesh together and prevents the wall from being reconstructed at a critical phase. Meanwhile, penicillin stimulates the release of highly reactive molecules that cause additional damage. Eventually, the cell’s structure breaks down completely. This two-pronged attack is lethal to a wide range of bacteria, whether in petri-dishes, our bodies, or elsewhere. It’s not, however, harmful to our own cells, because those don’t have cell walls. For a decade or so after Fleming’s discovery, penicillin remained a laboratory curiosity. But during World War II, researchers figured out how to isolate the active compound and grow the mold in larger quantities. They then went on to win the Nobel Prize for their work. Teams at Oxford and several American drug companies continued development, and within a few years it was commercially available. Penicillin and similar compounds quickly transformed the treatment of infections. For the time being, they remain some of the most important, life-saving antibiotics used in medicine. However, the more we use any antibiotic, the more bacteria evolve resistance to it. In the case of penicillin, some bacteria produce compounds that can break down the key structure that interferes with cell wall synthesis. As antibiotic use has increased, more and more bacteria have evolved this defense, making these antibiotics ineffective against a growing number of bacterial infections. This means it’s essential that doctors not overprescribe the drug. Meanwhile, 5 to 15% of patients in developed countries self-identify as allergic to penicillin, making it the most commonly reported drug allergy. However, the vast majority— over 90%— of people who think they’re allergic to penicillin actually are not. Why the misperception? Many patients acquire the allergy label as children, when a rash appears after they’re treated for an infection with penicillin or closely related drugs. The rash is often blamed on penicillin, while the more likely culprit is the original infection, or a reaction between the infection and the antibiotic. However, genuine penicillin allergies, where our immune systems mistake penicillin for an attacker, do occur rarely and can be very dangerous. So if you think you’re allergic but don’t know for sure, your best bet is to visit an allergist. They’ll complete an evaluation that’ll confirm whether or not you have the allergy. Even if you do have a penicillin allergy, your immune cells that react to the drug may lose their ability to recognize it. In fact, about 80% of people who are allergic to penicillin outgrow their allergy within ten years. This is great news for people who currently identify as allergic to penicillin; the drug may one day save their lives, as it has done for so many others.

**P820 2020-01-31 The accident that changed the world - Allison Ramsey and Mary Staicu**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=820)

翻译人员: Isabella Lu 校对人员: 宁玥 沈伦敦，1928 年： 一组霉菌孢子被一阵风吹过实验室，它们飘过一个培养皿， 当它们降落之后，一场医学革命开始生根发芽。这个实验室的负责人是 亚历山大·弗莱明（Alexander Fleming），一位正在研究细菌感染 特性的苏格兰科学家。这时，弗莱明正在度假。回来时，他发现他忘记放在恒温器内的培养皿上他忘记放在恒温器内的培养皿上。在这个霉菌群周围的一片区域出乎意料地没有任何细菌。在研究这一神秘现象时，弗莱明发现霉菌中隐藏着一种能杀死细菌的化合物。这个霉菌是青霉菌属中的一株，于是弗莱明将这种 抗菌化合物命名为“青霉素”。弗莱明偶然发现的其实是 一种微生物防御系统。青霉属真菌不停地产生青霉素来保护自己免受威胁，比如周围可能会占用它资源的菌落。青霉素通过破坏细菌细胞壁的合成来摧毁多种细菌。这些细胞壁的强度来自于一个由糖和氨基酸组成的厚实、 且有保护性的网状结构，它们不停地瓦解、再生。青霉素将自己和其中一种 编织保护网的化合物绑在一起，在关键阶段阻止了细胞壁的重建。同时，青霉素刺激并释放 具有破坏作用的高度活跃的分子。最终，细胞的结构完全崩塌了。这种双向攻击 对很多种类的细菌都是致命的，不论是在培养皿中、我们身体里， 还是其他的地方。但它对我们自身的细胞是无害的，因为人体细胞没有细胞壁。在弗莱明这一发现诞生的十年后，青霉素仍然只停留在实验室阶段。但在二战期间，研究人员发现了 如何分离出活性化合物并大量培养这种霉菌。这项成就随后让他们获得了诺贝尔奖。牛津和一些美国制药公司的 研究团队继续推进了这个项目，几年之内就实现了商业化。青霉素和其他相似的化合物 迅速改变了感染的治疗方式。直到现在，它们仍是医学上最重要的 挽救生命的抗生素之一。但是，我们越多地使用一种抗生素， 细菌就会更容易产生抗药性。对于青霉素，一些细菌生产出了可以瓦解抑制细胞壁合成结构的化合物。随着抗生素的使用频率越来越高，越来越多的细菌进化出了 这种保护机制，使这些抗生素对越来越多的细菌感染不再有效。这使得医生不滥用抗生素 处方变得尤为重要。同时，发达国家中有 5-15% 的病患自认为他们对青霉素过敏，使青霉素成为最普遍的药物过敏源。但是，大多数，即超过 90%自认为对青霉素过敏的人， 但其实并不过敏。这个误解从何而来？很多病人在孩童时期 就被认为是过敏者，因为他们用青霉素或相关 药物治疗后出现了皮疹。皮疹的出现通常被归罪于青霉素，但其实更大可能是因为原始的感染，或者感染和抗生素之间的反应。但是，真正的青霉素过敏，也就是当我们的免疫系统 错把青霉素当成入侵者时，的确会以很低的概率出现， 并且可能危及生命。所以如果你认为自己 对青霉素过敏，但并不确定，最好的办法是去看过敏症专家。他们会做一项评估来证实你是否对青霉素过敏。就算你的确对青霉素过敏，你对青霉素产生反应的免疫细胞 也有可能已经丧失识别出它们的能力。实际上，大约 80% 的青霉素过敏者可以在十年内自己摆脱过敏症状。这对于现在被认为 对青霉素过敏的人来说是很好的消息。或许某一天，这个挽救了无数人的药物 也会同样挽救他们的生命。

**P821 2020-02-03 How do blood transfusions work - Bill Schutt**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=821)

In 1881, doctor William Halsted rushed to help his sister Minnie, who was hemorrhaging after childbirth. He quickly inserted a needle into his arm, withdrew his own blood, and transferred it to her. After a few uncertain minutes, she began to recover. Halsted didn’t know how lucky they’d gotten. His transfusion only worked because he and his sister happened to have the same blood type— something that isn’t guaranteed, even among close relatives. Blood types hadn’t been discovered by Halsted’s time, though people had been experimenting with transfusions for centuries— mostly unsuccessfully. In 1667, a French physician named Jean-Baptiste Denis became the first to try the technique on a human. Denis transfused sheep’s blood into Antoine Mauroy, a man likely suffering from psychosis, in the hopes that it would reduce his symptoms. Afterward, Mauroy was in good spirits. But after a second transfusion, he developed a fever, severe pain in his lower back, intense burning in his arm, and he urinated a thick, black liquid. Though nobody knew it at the time, these were the signs of a dangerous immune response unfolding inside his body. This immune response starts with the production of proteins called antibodies, which distinguish the body’s own cells from intruders. They do so by recognizing the foreign proteins, or antigens, embedded in an intruder’s cell membrane. Antibodies latch onto the antigens, signaling other immune cells to attack and destroy the foreign cells. The destroyed cells are flushed from the body in urine. In extreme cases, the massive break down of cells causes clots in the bloodstream that disrupt the flow of blood to vital organs, overload the kidneys, and cause organ failure. Fortunately, Denis’s patient survived the transfusion. But, after other cross-species transfusions proved fatal, the procedure was outlawed across Europe, falling out of favor for several centuries. It wasn’t until 1901 that Austrian physician Karl Landsteiner discovered blood types, the crucial step in the success of human to human blood transfusions. He noticed that when different types were mixed together, they formed clots. This happens when antibodies latch on to cells with foreign antigens, causing blood cells to clump together. But if the donor cells are the same blood type as the recipient’s cells, the donor cells won’t be flagged for destruction, and won’t form clumps. By 1907, doctors were mixing together small amounts of blood before transfusing it. If there were no clumps, the types were a match. This enabled them to save thousands of lives, laying the foundation for modern transfusions. Up to this point, all transfusions had occurred in real time, directly between two individuals. That’s because blood begins to clot almost immediately after coming into contact with air— a defense mechanism to prevent excessive blood loss after injury. In 1914, researchers discovered that the chemical sodium citrate stopped blood coagulating by removing the calcium necessary for clot formation. Citrated blood could be stored for later use— the first step in making large scale blood transfusions possible. In 1916, a pair of American scientists found an even more effective anticoagulant called heparin, which works by deactivating enzymes that enable clotting. We still use heparin today. At the same time, American and British researchers developed portable machines that could transport donor blood onto the battlefields of World War I. Combined with the newly-discovered heparin, medics safely stored and preserved liters of blood, wheeling it directly onto the battlefield to transfuse wounded soldiers. After the war, this crude portable box would become the inspiration for the modern-day blood bank, a fixture of hospitals around the world.

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翻译人员: Yizhuo He 校对人员: Yanyan Hong在 1881年，威廉 · 哈尔斯特医生匆匆忙忙赶去抢救他产后大出血的妹妹敏妮。他很快地将一根针头 插进自己的胳膊，从中抽取出他自己的血， 并将其输送给他妹妹。不安的几分钟过去后， 她的身体开始恢复了。哈尔斯特并不知道 他们当时其实很幸运。他的输血过程之所以成功， 是因为他和他妹妹恰好是同一种血型——而实际上，即使是至亲， 都不一定能保证血型一致。在哈尔斯特所处的时代， 血型还没有被人类发现，尽管到那时为止，人类已经试验过 几千年的输血过程了——当然大部分情况下都失败了。在 1667 年，法国物理学家约翰-巴布缇斯 · 丹尼斯是第一位尝试 在人身上进行输血的。丹尼斯将羊的血转移到了安东尼 · 玛瓦的身体中，一位精神病患者，希望输血能改善他的症状。第一次输血之后， 玛瓦变得精神抖擞。但在第二次输血后， 他的症状转为了发烧，腰部感到剧痛， 胳膊有强烈的灼烧感，并且他在小便的时候 排出了一种浓黑的液体。尽管在当时还没人 了解那些症状，但那些症状其实标志着 严重的免疫反应在他的体内进行着。这种免疫反应从产生一种叫作“抗体”的蛋白质开始，它能将身体内部的细胞 与入侵细胞区分开，通过识别嵌于入侵细胞膜中的蛋白质和抗原。抗体附着于抗原上，标志着其他的免疫细胞 开始攻击并摧毁外来细胞。被摧毁的细胞 通过尿液从体内被排出。在极端情况下， 这种大规模的细胞分解会堵住血管， 影响流到重要器官的血流，造成肾脏过载， 并最终导致器官衰竭。幸运地是，丹尼斯的病人 在那次输血后活了下来但后来，跨物种输血 被发现是致命的，这种手术后来 在欧洲被法律禁止了，之后的几个世纪， 这种手术渐渐被大家所遗忘了。直到 1901 年， 奥地利物理学家卡尔 · 兰德施泰纳发现了血型，人与人之间 血液传输的关键步骤。他发现当不同血型的血 混在一起时，会形成血块。当抗体依附于带有 外来抗原的细胞上时，就会导致血细胞聚集在一起。但是当献血者的血型与 受血者的血型相同时，献血者的血细胞就不会被标记为待摧毁， 也不会形成血块。到了 1907 年，医生们会在输血前 先把少量的血混合在一起。如果不会形成血块， 就说明血型相符。这使得他们拯救了 成百上千的生命，为现代的输血手术 奠定了基础。到了现在， 输血过程已经可以直接在两个个体之间实时传输了。因为当血接触了空气之后，就会马上开始结块——一种用于避免受伤后 大量失血的防御机制。在 1914 年，研究者们发现 柠檬酸钠这种化学物质可以通过去除血液凝结所必须的钙物质 来防止血液结块。柠檬酸钠血可被储存下来 供之后使用——这使得大规模的 血液传输变得有希望了。在 1916 年，两位美国科学家 发现了一种更有效的抗凝剂：肝素，它可以灭活 会造成血凝结成块的酶。直到现在我们都在使用着肝素。与此同时，美国与英国的研究人员 发明了便携式的机器用它甚至能将献血者的血 运往第一次世界大战的战场。再加上新发现的肝素，救护人员能安全地 存储好几升的血，将它推到前线战场 为受伤的士兵输血。在战争结束后， 这种简略的便携式运血盒为现代血库提供了灵感，现在血库已成为 世界各地医院的固定设施了。

**P822 2020-02-06 Vultures - The acid-puking, plague-busting heroes of the ecosystem -**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=822)

In the grasslands of Mauritania, a gazelle suffering from tuberculosis takes its last breath. Collapsing near a small pool, the animal’s corpse threatens to infect the water. But for the desert’s cleanup crew, this body isn’t a problem: it’s a feast. Weighing up to 10 kilograms and possessing a wingspan of nearly 3 meters, the lappet-faced vulture is the undisputed king of the carcass. This bird’s powerful beak and strong neck easily tear through tough hide and muscle tissue, opening entry points for weaker vultures to dig in. This colossal competition is too dangerous for the tiny Egyptian vulture. With a wingspan of only 180 centimeters, this vulture migrated to Africa from his family nest in Portugal, using thermal updrafts to stay aloft for hours at a time. But upon arrival, he finds himself near the bottom of the pecking order. Fortunately, what he lacks in size, he makes up for in intelligence. A short distance away, he spots an unguarded ostrich nest, full of immense, but impenetrable eggs. Using a large rock, he smashes one open for a well-earned meal— though he’ll circle back to the gazelle once the larger birds are gone. High above the commotion are Ruppell’s Griffon vultures. Soaring at an altitude of over 11,000 meters, these birds fly higher than any other animal. At this height, they can’t see individual carcasses. But the sight of their fellow vultures guides them to the feeding. Their featherless heads help them regulate the sudden rise in temperature as they descend— and keep them clean as they tear into the decaying gazelle. The carcass is stripped clean in hours, well before the rotting meat infects the water supply. And the tuberculosis doesn’t stand a chance at infecting the vultures. These birds have evolved the lowest gastric pH in the animal kingdom, allowing them to digest diseased carrion and waste without becoming sick. In fact, species like the mountain-dwelling bearded vulture have stomachs so acidic, they can digest most bones in just 24 hours. This adaptation helps smaller vultures supplement their diet with dung, while larger vultures can consume diseased meat up to 3 days old. Their acidic stomachs protect them from living animals too: their rancid vomit scares off most predators. These stomachs of steel are essential to removing pathogens like cholera, anthrax, and rabies from the African ecosystem. But while vultures can easily digest natural waste, man-made chemicals are another story. Diclofenac, a common veterinary drug used to treat cattle in India, is fatal to vultures. And because local religious beliefs prohibit eating beef, scavengers often consume cattle carcasses. Since the 1990s, the drug, along with threats from electricity pylons and habitat loss, has contributed to a 95% decline in the region’s vulture population. In nearby Africa, poachers intentionally poison carcasses to prevent the birds’ presence from alerting authorities to their location. One poisoned carcass can kill over 500 vultures. Today, more than 50% of all vulture species are endangered. In regions where vultures have gone extinct, corpses take three times longer to decay. These carcasses contaminate drinking water, while feral dogs and rats carry the diseases into human communities. The Asian and African Vulture Crisis has led to an epidemic of rabies in India, where infections kill roughly 20,000 people each year. Fortunately, some communities have already realized how important vultures are. Conservationists have successfully banned drugs like Diclofenac, while other researchers are working to repopulate vulture communities through breeding programs. Some regions have even opened vulture restaurants where farmers safely dispose of drug-free livestock. With help, vultures will be able to continue their role conserving the health of our planet— transforming death and decay into life.

**P822 2020-02-06 Vultures - The acid-puking, plague-busting heroes of the ecosystem -**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=822)

翻译人员: Yifei Liu 校对人员: Yanyan Hong在毛里坦尼亚的草地上，一只患结核病的瞪羚 呼出了它最后一口气，倒在了一个小水池边。它的尸体有感染水源的危险。但是对于沙漠里清洁工， 这不是问题，而是美餐。体重可达 10 千克，翼幅接近 3 米，肉垂秃鹫可以说是 当之无愧的死尸之王。这种鸟有力的喙和强大的脖颈，能轻松地撕裂坚硬的兽皮和肌肉组织，打开了一个开口 使得更弱小的秃鹫能够享用。与这种巨大的秃鹫竞争对于体型较小的 埃及秃鹫来说太危险了。埃及秃鹫翼幅仅有 180 厘米，它从远在葡萄牙的家迁徙来到非洲，利用上升热气流来使自己 一次可以维持飞行好几个小时。但是一到目的地，它就发现自己在啄食 顺序中几乎排名最后。幸运的是，它的智慧 弥补了它体型上的缺陷。不远处，它发现了 一个没有保护的鸵鸟巢，里面全是巨大且难以穿透的鸵鸟蛋。它用一块巨石打碎了一只蛋 作为一顿应得的美餐——尽管那些大鸟走后 它还会绕回到瞪羚旁。在空中远离这场喧闹的是黑白兀鹫。翱翔在海拔 11,000 米的高空，这些鸟比其它任何动物都飞得高。在这样的高度， 它们看不见单个的尸体。但是它们秃鹫同胞们的身影 带着他们到了有食物的地方。在它们下降时，没毛的头会帮助调节骤升的温度——还可以在它们撕扯 腐烂的瞪羚时保持清洁。瞪羚的残骸在几小时内 就被吃干净了，腐烂的肉还来不及污染到水源。而结核病完全没机会感染秃鹫。这些秃鹫已经演化出了 动物界酸碱度最低的胃酸，这使得它们可以消化 病变的腐肉和排泄物而不生病。事实上，像山居的胡兀鹫有着酸性很强的胃，以至于它们可以在 24 小时内 消化绝大多数的骨头。这种适应使得体型小的秃鹫 吃动物粪便来补充食物，而更大的秃鹫可以 消化病死三天的腐肉。它们的胃酸也保护它们 不受活物的威胁：它们令人作呕的呕吐物 能吓跑大部分的捕食者。它们钢铁般的胃对于去除 非洲生态系统中的霍乱弧菌、炭疽杆菌和狂犬病毒等 病原体来说十分重要。尽管秃鹫可以轻易地 消化自然界的废物，人造化学试剂就是另一回事了。双氯芬酸——一种在印度 常见的用于治疗家牛的兽用药对秃鹫是致命的。因为当地宗教信仰禁止吃牛肉，食腐动物经常清理家牛的残骸。从 1990 年代，这种药物和其他威胁， 从高压电线塔到栖息地的缩减，导致了这一区域 秃鹫数量下降了 95%。在邻近的非洲， 偷猎者故意在尸体里投毒来防止这些秃鹫的出现 把他们所处的位置暴露给当局 。一具有毒的尸体 可以杀死超过 500 只秃鹫。当下，超过 50% 的秃鹫物种濒临灭绝。在秃鹫已经灭绝的区域，尸体要花三倍长的时间降解。这些尸体污染饮用水，然后野狗和老鼠 把这些疾病带到居民区。亚洲和非洲的秃鹫危机 已经造成了狂犬病在印度的流行，“双氯芬酸——一种在印度常见的 用于治疗家牛的兽用药” 在印度后断开更好一些。幸运的是，一些地方 已经意识到了秃鹫的重要性。环保主义者已经成功地禁止了 双氯芬酸等药物的使用，与此同时，另一些研究者 在通过繁殖方案重新恢复秃鹫群落。一些区域已经开设了供农民丢弃无毒牲口的秃鹫餐厅。有了这些帮助，秃鹫将会继续它们 扮演它们的角色，保护地球的健康——化死亡和腐烂为生机。

**P823 2020-02-07 The secret messages of Viking runestones - Jesse Byock**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=823)

In the 8th century CE, Vikings surged across the misty seas. They came from Scandinavia in Northern Europe but would travel far and wide. Some plundered and settled in the British Isles and France; others braved Artic exploration or forged clever new trade routes to the Middle East. With their steely navigational skills, advanced long-ships and fearsome tactics, the Vikings sustained their seafaring for over three hundred years. But for all their might, they left few monuments. Instead, fragments of stone, bark, and bone provide the keys to their culture. Found in graves, bogs, and sites of ancient settlements, many of these objects are inscribed with messages in Old Norse written in runic letters. But the Vikings also scratched runes into household goods, jewellery, weapons, and even shoes. Deciphering these messages is no easy task. Runes are short, straight, and diagonal lines that make up an alphabet called the “futhark.” All classes of people spoke and wrote this language, in many different dialects. There was no standard spelling, they wrote the individual runic letters by pronouncing the sounds of their regional accents. Some of these inscriptions also bore the influence of other cultures the Vikings interacted with— the runic inscription “love conquers all,” for example, is originally a Latin phrase from the poet Virgil. Many, like the enigmatic Rok runestone, were carved in verse, highlighting the tradition of Old Norse poetry. So even though modern runologists can read runes, their meaning isn’t always obvious. Still, in spite of the remaining mysteries, many inscriptions memorializing the dead and recording local histories have been deciphered— along with some containing magical incantations. The Ramsund runes in Sweden are carved on a rocky outcrop beside a bridge for travelers passing over swampy ground. This causeway was commissioned by a prominent local woman named Sigríðr. She proclaimed both her importance and her family’s power by carving their names in stone, and even associated herself and her family with mythical heroism by carving illustrations of Sigurd the dragon slayer. In the town of Jelling in Denmark, two standing stones from the 10th century memorialize different generations of a royal family. The first was erected by King Gorm the Old in memory of his Queen Thyrvi, and the second by their son, Harald Bluetooth, after Gorm’s death. The stones announce the power of this Viking Age dynasty, and they are among the earliest historical documents of Denmark. They indicate that Denmark was the earliest major Viking Age kingdom, by telling that Harald controlled southern Norway, and that he converted to Christianity. Today, Harald Bluetooth’s initials make up the Bluetooth logo. The 10th century warrior poet Egil was a well-known carver of runes. According to poetic accounts, he once carved runes on a horn filled with poison, causing the horn to shatter. In another story, Egil saves a young girl’s life by placing a piece of whale bone carved with healing runes under her pillow. Norse poetry tells of runic spells, cast to ensure calm seas, safe childbirth and triumphant battles. But the exact nature of these spells isn’t fully understood— many of the inscriptions on swords, axes, and spears are indecipherable. Other objects, like the Lindholm amulet, have inscriptions that could be incantations, riddles, or religious messages. While it’s difficult to pinpoint the end of the Viking era, by 1100 CE their sea-borne expansion had mostly come to an end. However, people continued to speak versions of Old Norse throughout Scandinavia; and runes remained in use in rural areas into the 19th century. Today, many runestones remain standing at their original sites. The inscription on the Danish Glavendrup stone has fearsomely declared for a thousand years: “A warlock be he who damages this stone or drags it in memory of another!”

**P823 2020-02-07 The secret messages of Viking runestones - Jesse Byock**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=823)

翻译人员: Lesley Zhang 校对人员: Yu Xie公元 8 世纪，维京人航行穿过 浓雾笼罩的海洋。他们从北欧的 斯堪的纳维亚出发，向世界各地进发。他们有的掠夺、侵占了 不列颠岛屿和法国，有的进行了艰难的南极探险，还有的开辟了通向 中东的新贸易通道。凭借他们出色的航行技巧、 先进的狭长快速战船和骇人的战术，三百年来，维京人延续着 他们的航海事业。尽管力量强大， 但他们并未留下自己的痕迹。人们只有从残留的石头、 树皮和骨头的碎片中窥得他们的文化。这些物品是在墓穴、沼泽和 古村落遗址中被发现的，上面刻着用如尼文字写成的古斯堪的纳维亚语。除此之外，维京人也会在日常用品 上刻下类似的文字，如珠宝、武器，甚至是鞋子上。破译其中的信息并非易事。如尼字母由 短的直线或斜线组成，其字母表被称为 “futhark”。所有阶层的人都用这种语言读写， 只是各地之间有一些出入。如尼文字并没有标准的拼写方式，人们根据自己地区口音的 发音方式来拼写。一些碑文甚至体现了 维京人所接触到的其他各地文化的影响。比如，如尼文字表示的 “爱战胜一切”，是一则来自诗人 维吉尔的拉丁语短句。以神秘的 Rok （瑞典城市） 符文石为例，许多所刻文字也反映了 古斯堪的纳维亚的诗歌文化。所以即使现代如尼文字学家 能够分辨如尼字母，辨清其中传达的信息 却仍困难重重。不过，尽管还有 不少文字的意义未知，那些用来纪念逝去之人的、记录当地历史事件的、以及包含魔法咒符的雕刻文字 都已经被破译了。Ramsund 符文被刻在了瑞典 一座桥边的突出岩石上，该桥是为行人通过沼泽地所建。当地名声显赫的 Sigríðr 女士 委托人修筑了它。她让人在石头中刻上她和家人的名字，以此彰显自己和家人的影响力。她甚至将自己以及家人 与古代神话英雄联系起来，让人刻上了屠龙者 Sigurd 的故事。在丹麦的耶灵小镇中，伫立着两块 10 世纪时期的巨石，以纪念一个皇室家族的几代人。第一块是老葛姆国王 为纪念他的王后丝德薇而竖立，第二块则是他们的儿子哈尔德·布鲁图斯 为纪念父亲的去世而竖立。这两块石头展现了 维京时代的王朝统治力量，同时也是丹麦最早的历史文献之一。石头上记载了哈尔德控制了南挪威、以及他皈依基督教等事件，表明了丹麦是维京时代 最早建立的重要王国。如今，哈尔德·布鲁图斯的首字母 成了“蓝牙”的图标。10 世纪的战争诗人埃吉尔（Egil） 是著名的如尼文字雕刻家。据诗学记载，他曾将如尼文字 雕刻在盛满毒药的动物角上，这一举动粉碎了这只角。在另一则记载中，埃吉尔通过在鲸骨上 刻下有治愈效果的如尼文字，并将其放在一个年轻女孩的枕头下， 以此救了她的命。古斯堪的纳维亚语诗歌讲述了 如尼文字的符咒如何使大海平静、孩子安全出生以及战争获得胜利。不过，人们未能彻底 理解这些咒符确切的内涵，因为那些刻在剑、斧头、 矛上的文字至今还无法破译。而在诸如林霍尔姆 护身符的其他物品上，还刻着可能是符咒、谜语，或是宗教信息的文字。尽管我们很难明确维京时代的 具体终结时间，不过 11 世纪时，维京人的 海上扩张已基本结束了。然而，在整个斯堪的纳维亚，人们还是继续说着各种版本的 古斯堪的纳维亚语；直到 19 世纪， 乡间仍在使用着如尼文字。如今，许多符文石 还竖立在原始的地点。千年里，丹麦 Glavendrup 石碑上的文字一直告诫世人：“破坏这个石头或者是因纪念他人 搬动石头的人一定是术士！”

**P824 2020-02-10 One of the most epic engineering feats in history - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=824)

In the mid-19th century, suspension bridges were collapsing all across Europe. Their industrial cables frayed during turbulent weather and snapped under the weight of their decks. So when a German-American engineer named John Roebling proposed building the largest and most expensive suspension bridge ever conceived over New York’s East River, city officials were understandably skeptical. But Manhattan was increasingly overcrowded, and commuters from Brooklyn clogged the river. In February of 1867, the government approved Roebling’s proposal. To avoid the failures of European bridges, Roebling designed a hybrid bridge model. From suspension bridges, he incorporated large cables supported by central pillars and anchored at each bank. This design was ideal for supporting long decks, which hung from smaller vertical cables. But Roebling’s model also drew from cable-stayed bridges. These shorter structures held up their decks with diagonal cables that ran directly to support towers. By adding these additional cables, Roebling improved the bridge’s stability, while also reducing the weight on its anchor cables. Similar designs had been used for some other bridges but the scope of Roebling’s plan here dwarfed them all. His new bridge’s deck spanned over 480 meters— 1.5 times longer than any previously built suspension bridge. Since standard hemp rope would tear under the deck’s 14,680 tons, his proposal called for over 5,600 kilometers of metal wire to create the bridge’s cables. To support all this weight, the towers would need to stand over 90 meters above sea level— making them the tallest structures in the Western Hemisphere. Roebling was confident his design would work, but while surveying the site in 1869, an incoming boat crushed his foot against the dock. Within a month, tetanus had claimed his life. Fortunately, John Roebling's son, Washington, was also a trained engineer and took over his father’s role. The following year, construction on the tower foundations finally began. This first step in construction was also the most challenging. Building on the rocky river bed involved the use of a largely untested technology: pneumatic caissons. Workers lowered these airtight wooden boxes into the river, where a system of pipes pumped pressurized air in and water out. Once established, air locks allowed workers to enter the chamber and excavate the river bottom. They placed layers of stone on top of the caisson as they dug. When it finally hit the bedrock, they filled it with concrete, becoming the tower’s permanent foundation. Working conditions in these caissons were dismal and dangerous. Lit only by candles and gas lamps, the chambers caught fire several times, forcing them to be evacuated and flooded. Even more dangerous was a mysterious ailment called "the bends." Today, we understand this as decompression sickness, but at the time, it appeared to be an unexplainable pain or dizziness that killed several workmen. In 1872, it nearly claimed the life of the chief engineer. Washington survived, but was left paralyzed and bedridden. Yet once again, the Roeblings proved indomitable. Washington’s wife Emily not only carried communications between her husband and the engineers, but soon took over day-to-day project management. Unfortunately, the bridge’s troubles were far from over. By 1877, construction was over budget and behind schedule. Worse still, it turned out the bridge’s cable contractor had been selling them faulty wires. This would have been a fatal flaw if not for the abundant failsafes in John Roebling’s design. After reinforcing the cables with additional wires, they suspended the deck piece by piece. It took 14 years, the modern equivalent of over 400 million dollars, and the life’s work of three different Roeblings, but when the Brooklyn Bridge finally opened on May 24, 1883, its splendor was undeniable. Today, the Brooklyn Bridge still stands atop its antique caissons, supporting the gothic towers and intersecting cables that frame a gateway to New York City.

**P824 2020-02-10 One of the most epic engineering feats in history - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=824)

翻译人员: Keun Jeong Mo 校对人员: Yolanda Zhang十九世纪中期，欧洲不断发生悬索桥坍塌事故。用于悬索桥的工业钢缆 因善变的天气而受损，支撑不住桥的重量而断裂。当一位名叫约翰 · 罗布林（John Roebling）的 德裔美国工程师提出横跨纽约东河建造一座最大且最贵的吊桥，纽约的市政官员们 纷纷对此表示了怀疑。但是当时的曼哈顿人口过于密集，而且来自布鲁克林的通勤者 都需要经过这条河，于是在 1867 年 2 月， 政府批准了罗布林的建议。为了避免类似欧洲悬索桥坍塌的 事故再次发生，罗布林设计了一个混合桥梁模型。他将悬索桥上由中心桥塔支撑的大型钢缆 固定在每个河岸上。这样的设计将大桥悬挂在 一排较短的垂直钢缆上，有助于支撑桥面。罗布林的灵感还来自斜拉桥。这些较短的构造有助于 直接与桥塔相连的斜拉索固定桥面。通过添加这些钢缆， 罗布林增强了桥的稳定性，同时减少了施加于锚缆的重量。虽然相似的设计已经被采用过，但是罗布林这次的计划 使其他设计都相形见绌。他设计的桥面长达 480 米——比之前的任何一座悬索桥 都要长 1.5 倍。因为普通麻绳会在 近 1.5 万吨的桥面重量下断裂，罗布林建议使用 5.6 公里长的钢丝制作悬索桥的钢缆。为了承受这个重量，这些支撑桥塔必须 高出海平面 90 米以上——使得这座桥成为了 西半球最高的建筑。罗布林对自己的设计很有信心，但是当他在 1869 年 进行实地勘察时，一艘渡船冲向码头， 他的脚严重受伤。不到一个月，他就因破伤风离世。幸运的是，罗布林的儿子华盛顿 也是一位训练有素的工程师，因此他接替了父亲的工作。在接下来的一年， 桥基的建设工作终于开始了。建桥的第一步是最具挑战性的。为了在布满石块的河床上建造桥基， 华盛顿采用了未经测试的技术：气压沉箱。工人们把很多密封的木箱放进河里，用一套管道注入压缩空气， 将水排出。这一项工作完成后， 工人才能进入沉箱里挖掘河底。他们挖掘河底的同时， 把一层层石头堆积在箱体顶部。当沉箱最终到达基岩时， 工人用混凝土把沉箱填满，塔基也随之建成。但是沉箱里的工作条件 是非常危险的。由于只能用蜡烛和煤气灯照明， 在沉箱里发生过几次火灾，导致工人被迫撤离， 或是因海水涌入而丧命。更危险的是一种如今我们称之为“减压病”的疾病，但是在当时，这种未知的疾病 带来了无法解释的疼痛或头晕，许多工人因此丧命。1872 年，减压病也差点 要了总工程师的命。虽然华盛顿活下来了， 但是从此瘫痪，卧床不起。然而，事实再一次证明， 罗布林家族是不屈不挠的。华盛顿的妻子艾米丽 不仅负责起了丈夫和工程师之间的沟通，还接管了日常的管理工作。不幸的是，这座桥的麻烦还远未结束。到 1877 年，桥塔的建造 超出了预算，进度落后。更糟糕的是， 这座桥的钢缆供应商其实一直在向他们供应不合格的钢丝。多亏了罗布林设计中 包含的多重安全保障，才没有酿成大祸。使用额外的钢丝加固了钢缆之后，工人们把桥面一个一个悬吊起来。这项工程历时十四年， 造价相当于现在的 4 亿美元，汇聚了罗夫林家族三代人的心血，但当布鲁克林大桥终于在 1883 年 5 月 24 日竣工时，它的辉煌壮丽是不可否认的。今天的布鲁克林大桥 依然矗立在古老沉箱上，支撑着哥特式桥塔和交叉的钢缆，肩负着连通纽约市的使命。

**P825 2020-02-11 The Egyptian myth of Isis and the seven scorpions - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=825)

A woman in rags emerged from the swamp flanked by seven giant scorpions. Carrying a baby, she headed for the nearest village to beg for food. She approached a magnificent mansion, but the mistress of the house took one look at her grimy clothes and unusual companions and slammed the door in her face. So she continued down the road until she came to a cottage. The woman there took pity on the stranger and offered her what she could: a simple meal and a bed of straw. Her guest was no ordinary beggar. She was Isis, the most powerful goddess in Egypt. Isis was in hiding from her brother Set, who murdered her husband and wanted to murder her infant son, Horus. Set was also a powerful god, and he was looking for them. So to keep her cover, Isis had to be very discreet— she couldn’t risk using her powers. But she was not without aid. Serket, goddess of venomous creatures, had sent seven of her fiercest servants to guard Isis and her son. As Isis and Horus settled into their humble accommodation, the scorpions fumed at how the wealthy woman had offended their divine mistress. They all combined their venom and gave it to one of the seven, Tefen. In the dead of night, Tefen crept over to the mansion. As he crawled under the door, he saw the owner’s young son sleeping peacefully and gave him a mighty sting. Isis and her hostess were soon awakened by loud wailing. As they peered out of the doorway of the cottage, they saw a mother running through the street, weeping as she cradled her son. When Isis recognized the woman who had turned her away, she understood what her scorpions had done. Isis took the boy in her arms and began to recite a powerful spell: "O poison of Tefen, come out of him and fall upon the ground! Poison of Befen, advance not, penetrate no farther, come out of him, and fall upon the ground! For I am Isis, the great Enchantress, the Speaker of spells. Fall down, O poison of Mestet! Hasten not, poison of Mestetef! Rise not, poison of Petet and Thetet! Approach not, poison of Matet!" With each name she invoked, that scorpion’s poison was neutralized. The child stirred, and his mother wept with gratitude and lamented her earlier callousness, offering all her wealth to Isis in repentance. The woman who had taken Isis in watched in awe— she had had no idea who she’d brought under her roof. And from that day on, the people learned to make a poultice to treat scorpion bites, speaking magical incantations just as the goddess had.

**P825 2020-02-11 The Egyptian myth of Isis and the seven scorpions - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=825)

翻译人员: Yizhuo He 校对人员: Jiasi Hao一名衣衫褴褛的女子渐渐地 从沼泽地中浮现，她的旁边有七只巨蝎。她怀抱着一个婴儿，往最近的村庄走去， 乞求人们能给她点食物。她走到一座富丽堂皇的府邸跟前，府邸的女主人瞥了一眼 她沾满污垢的衣裳和并不寻常的同伴， 随之重重地砸上了门。于是她只能继续前进， 直到她走到了一座小村舍门前。村舍的女主人觉得这位陌生人很可怜， 于是尽其所能为她提供的一切援助：一顿简餐和一张稻草制成的床。其实她的这位客人 并不只是一个普通的乞讨者。她是伊西斯， 埃及最无所不能的女神。伊西斯在躲着她的哥哥塞特，塞特谋杀了她的丈夫， 还想谋杀她刚出生的儿子荷鲁斯。塞特也是一位强大的神， 此时他正在寻找伊西丝和她儿子的踪迹。为了不被塞特发现， 伊西丝必须非常小心谨慎——她不敢冒险使用她的法术。但她也并非孤立无援。赛尔凯特，蝎子之神，派了她七个最凶猛的仆人， 去守护伊西丝和她的儿子。伊西丝和荷鲁斯 在简陋的村舍安置下来后，蝎子们想起那位富有的女人 冒犯了它们神圣的女神，于是变得很愤怒。于是它们把毒液全部结合起来， 传给了它们七个中的一个：特芬。夜深人静的时候， 特芬悄悄地往府邸爬去。它从门缝底下爬进了屋子,看见女主人的儿子睡得正香，狠狠地蛰了他一口。不久后，伊西丝和村舍女主人 被阵阵哭号惊醒了。她们从门口望出去，看到有位母亲在街上，怀里抱着她的儿子，边跑边哭。伊西斯认出了那个之前拒绝她的女人，于是意识到了 她那七只蝎子做了些什么。伊西斯把她怀中的孩子抱过来， 并开始吟诵一则强大的咒语：“特芬之毒，速速出来，归于尘土！贝芬之毒，莫再前进， 莫再渗透，速速出来，归于尘土！因我是魔力强大的施咒者伊西斯。梅斯特之毒，莫再停留！ 梅斯特夫之毒，速速出来！皮特与特提之毒，莫再上升！ 麦特之毒，莫再前进。”随着她提到每个名字， 相应蝎子的毒液就失去了效力。孩子苏醒了过来， 她的母亲落下了感激的泪水，为自己先前的冷漠追悔莫及，并提出要把她所有的财产 都交给伊西斯以忏悔自己的罪过。而那位款待伊西斯的贫穷女子 带着敬畏之心看着这一切发生——她没想到自己的客人 身份竟然如此尊贵。从那天起，人们学会了敷膏药以解蝎子之毒，并模仿伊西斯女神，念那则咒语。

**P826 2020-02-11 Why do people fear the wrong things - Gerd Gigerenzer**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=826)

A new drug reduces the risk of heart attacks by 40%. Shark attacks are up by a factor of two. Drinking a liter of soda per day doubles your chance of developing cancer. These are all examples of relative risk, a common way risk is presented in news articles. Risk evaluation is a complicated tangle of statistical thinking and personal preference. One common stumbling block is the difference between relative risks like these and what are called absolute risks. Risk is the likelihood that an event will occur. It can be expressed as either a percentage— for example, that heart attacks occur in 11% of men between the ages of 60 and 79— or as a rate— that one in two million divers along Australia’s western coast will suffer a fatal shark bite each year. These numbers express the absolute risk of heart attacks and shark attacks in these groups. Changes in risk can be expressed in relative or absolute terms. For example, a review in 2009 found that mammography screenings reduced the number of breast cancer deaths from five women in one thousand to four. The absolute risk reduction was about .1%. But the relative risk reduction from 5 cases of cancer mortality to four is 20%. Based on reports of this higher number, people overestimated the impact of screening. To see why the difference between the two ways of expressing risk matters, let’s consider the hypothetical example of a drug that reduces heart attack risk by 40%. Imagine that out of a group of 1,000 people who didn’t take the new drug, 10 would have heart attacks. The absolute risk is 10 out of 1,000, or 1%. If a similar group of 1,000 people did take the drug, the number of heart attacks would be six. In other words, the drug could prevent four out of ten heart attacks— a relative risk reduction of 40%. Meanwhile, the absolute risk only dropped from 1% to 0.6%— but the 40% relative risk decrease sounds a lot more significant. Surely preventing even a handful of heart attacks, or any other negative outcome, is worthwhile— isn’t it? Not necessarily. The problem is that choices that reduce some risks can put you in the path of others. Suppose the heart-attack drug caused cancer in one half of 1% of patients. In our group of 1,000 people, four heart attacks would be prevented by taking the drug, but there would be five new cases of cancer. The relative reduction in heart attack risk sounds substantial and the absolute risk of cancer sounds small, but they work out to about the same number of cases. In real life, everyone’s individual evaluation of risk will vary depending on their personal circumstances. If you know you have a family history of heart disease you might be more strongly motivated to take a medication that would lower your heart-attack risk, even knowing it provided only a small reduction in absolute risk. Sometimes, we have to decide between exposing ourselves to risks that aren’t directly comparable. If, for example, the heart attack drug carried a higher risk of a debilitating, but not life-threatening, side effect like migraines rather than cancer, our evaluation of whether that risk is worth taking might change. And sometimes there isn’t necessarily a correct choice: some might say even a minuscule risk of shark attack is worth avoiding, because all you’d miss out on is an ocean swim, while others wouldn’t even consider skipping a swim to avoid an objectively tiny risk of shark attack. For all these reasons, risk evaluation is tricky at baseline, and reporting on risk can be misleading, especially when it shares some numbers in absolute terms and others in relative terms. Understanding how these measures work will help you cut through some of the confusion and better evaluate risk.

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翻译人员: Yizhuo He 校对人员: Thomas Tam一种新药可以降低 40% 患心脏病的概率。鲨鱼袭击人类的概率翻了两倍。每天喝一公升汽水会使 你患癌症的概率倍增。这些都是相对风险的例子，也是风险通常出现在 新闻报道中的方式。风险评估的复杂在于 它混合了统计思考和个人偏好。使人摸不着头脑的是相对风险与绝对风险之间的区别。风险是指一个事件会发生的可能性。它可以用百分比来表示——比如，11%年龄在60至79岁的男性可能突发心脏病——风险也可用比率来表示—— 每年每两百万沿澳洲西岸潜水的人就会有一个遇上致命的鲨鱼袭击。这些数字表示的是患心脏病和鲨鱼袭击的绝对风险。风险的变化既可以用相对数值 也可以用绝对数值来表示。比如，一篇2009年的报道 发现乳房X光筛查可将患乳腺癌的概率 从千分之五降低至千分之四。绝对风险降低了大约0.1%。而癌症死亡率从5例降至4例， 相对风险降低了20%。基于对较高的数字的报道，会导致人们高估X光筛查的影响。为了说明为什么 两种风险表示形式的区别很重要，让我们假设有一种药可以降低40%患心脏病的风险。想象有一千多个没有服用新药的人，他们中有十个会犯心脏病。绝对风险就是千分之十， 或百分之一。假设有类似的一千多人服用了新药，那么犯心脏病的人数就减少至6。换言之，这种药可以避免 十分之四的人犯心脏病——相当于降低了40%的相对风险。与此同时，绝对风险 只从1%降低至0.6%——但是降低了40%的相对风险 听上去效果更显著。哪怕只能让很少的一部分人 免于患上心脏病，即使药物有其他副作用， 都是值得尝试的，不是吗？这也不一定。问题在于当某些风险被降低时，另一些风险会相对上升。假设预防心脏病的药物 会导致0.5%的人得癌症。那么在我们举例的一千人中，服用此药能避免4个人犯心脏病，但却会导致五个人患癌症。相对下降的心脏病 患病风险听上去很显著，患癌症的绝对风险听上去也很小，但它们的结果却是类似的。在现实生活中，每个人对风险的评估都会因个人境遇而不同。如果你知道自己有 心脏病的家族史，那么你可能更倾向于服用能降低心脏病患病风险的药物，尽管你知道它只能降低 很少一部分的绝对风险。有时，我们做出的选择 会让我们面临不同风险，但是这些风险 并不能相提并论。假如，这个预防心脏病的药物只会产生使人虚弱， 或是偏头痛等副作用，并非可致命的癌症，那我们对此药的风险评估 就会产生变化。有时，绝对正确的选择 并不一定存在：有些人可能会觉得就算 被鲨鱼袭击的风险极小，都应尽量避免，毕竟你只是错过一次 在海里游泳的机会而已，但其他人就甚至不考虑因为被鲨鱼袭击的 极小几率而错过游泳。由于以上原因， 风险评估通常都比较棘手，同时风险报告也会有误导作用，尤其使用绝对值表示一些数字，用相对值表示另一些数字时。理解风险评估的原理会帮助你理清头绪，更好的评估风险。

**P827 2020-02-12 Can you solve the death race riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=827)

The night before the Death Race across the Wastelands is set to begin, your uncle, the great inventor Slate Kanoli, got kidnapped by the ruthless No-Side gang. The only way to get him back is to race his Coil Runner against the gang yourself. Win and they’ll give back your uncle. Lose and you’ll forfeit the Coil Runner and all his other creations. As the grueling race gets underway, you find yourself falling further and further behind. Your only chance is to take a shortcut your uncle told you about–– the Flux Ravine gambit. Fortunately, the Coil Runner comes equipped with emergency turbo thrusters. Unfortunately, your uncle was a notorious tinkerer, and the system still had some kinks to work out. Just minor things like the ignition exploding, the reactor leaking, or the oxygen levels depleting— any of which would end your racing career immediately. Before his kidnapping, Uncle Slate determined that each of these critical failures was the ultimate result of a chain reaction originating in the thrusters. He was also certain that while one factor could trigger two different effects, and two factors could each independently lead to the same effect, no effect is caused by two factors in conjunction. However, Uncle Slate never got around to pinpointing which thruster was responsible for which error. All you have are the notes from his test runs: 1. When thrusters B and C are on, the Fuel gauge glows. 2. When thrusters A, B, and D are on, the Fuel gauge glows and the Helium tank rattles. 3. When thrusters C, D, and E are on, the Fuel gauge glows and the Gravitometer spins. 4. When thrusters A, D, and E are on, the Gravitometer spins and the Helium tank rattles. 5. Shortly after the Helium tank rattles and the Gravitometer spins, the Ignition explodes and the Oxygen levels deplete. 6. Shortly after the Fuel gauge glows and the Gravitometer spins, the Reactor leaks. You need to use as many thrusters as possible to give yourself the best chance at clearing the gap, without triggering any of the three catastrophic failures. Which thrusters should you activate? Answer in 3 Answer in 2 Answer in 1 The most important thing to remember here is that even if we know that one thing causes another, the converse is not necessarily true. For example, this panic switch shuts off the coil runner’s engine. But the engine being off doesn’t necessarily mean the panic switch was engaged— the coil runner could be out of fuel, or damaged— or turned off normally. We can, however, conclude that if the engine is running, the panic switch hasn’t been engaged. With that in mind, one way we can start is to work backwards from the three defects that could knock you out of the race. So let’s look at Slate’s last two notes, since they give direct information about those. The Gravitometer spins in both cases, but the results are different. That means the spinning Gravitometer can’t be the cause of any particular malfunction. If it were, the same thing would happen each time. So we can conclude that a glowing Fuel gauge makes the reactor leak, while a rattling Helium tank makes the Ignition explode and depletes the Oxygen levels. Once we know which two errors we need to avoid, we can make a table and use the logic of cause and effect to see which thrusters trigger them. Since the Helium tank is fine during the first test run when thrusters B and C are active, we can assume neither makes it rattle. And from the third run we know that D and E don’t either. That leaves thruster A, which was indeed used in the second and fourth test runs where the Helium tank rattled. Now what causes the glowing Fuel gauge? From the fourth test run we know it can’t be thrusters A, D, or E. So is the culprit, B, C, or each of them separately? The answer can be found in the second and third test runs: the fuel tank glowed in both, but B was activated in one, and C in the other. That means the B and C thrusters each independently make the Fuel tank glow. It looks like the A, B, and C thrusters are off limits. Fortunately, the other two are just enough to clear the jump. You rocket into first place and the gang begrudgingly hands over your uncle. He thanks you profusely, and decides to celebrate your victory with a cup of tea from his latest contraption...

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翻译人员: Yifei Liu 校对人员: Meng Ren在荒地死亡竞速开始的前一天晚上，你的叔叔，伟大的发明家 斯雷特 · 卡诺利被残忍的无帮派人士绑架了。唯一救回他的方法 就是驾驶他的螺旋跑车亲自和无帮派赛车。赢了，他们就会放了你叔叔。输了，你就会失去螺旋跑车 和他所有的发明。艰难的竞速赛正在进行，你发现自己正落后得越来越远。你唯一的机会是走 叔叔曾告诉你的那条近道——熔岩谷。幸运的是，螺旋跑车 装备了紧急涡轮增压推进器。不幸的是，你叔叔的 修理水平是远近闻名的差，车的系统仍有 一些小问题需要解决。仅仅一些小问题， 如火星塞爆炸，反应器泄漏，或者氧气用尽——当中的任何一个都可以 立即结束你的赛车生涯。在你叔叔被绑架之前，他判断出这些严重故障中的任何一个都是推进器中一个链式反应的最终结果。他十分肯定 一个因素会引发两个不同的结果，并且两个因素可以 各自独立地引起同一个结果，没有一个结果 是由两个因素共同引起的。但是，斯雷特叔叔还没来得及找出哪个推进器会引起哪个问题 就被绑架了。你只有他测试跑车时记下的笔记：1. 当开启推进器 B 和 C 时， 燃油量表会闪烁发光。2. 当开启推进器 A、B 和 D 时，燃油量表闪烁发光 并且氦气瓶发出咔嗒声。3. 当开启推进器 C、D 和 E 时，燃油量表闪烁发光 并且比重计旋转。4. 当开启推进器 A、D 和 E 时，比重计旋转 并且氦气瓶发出咔嗒声。5. 在氦气瓶发出咔嗒声 并且比重计旋转不久之后，火星塞爆炸并且氧气耗尽。6. 在燃油量表闪烁发光 并且比重计旋转不久之后，反应器泄漏。你需要用尽可能多的推进器使自己尽量缩小差距，且不会引起三个 毁灭性故障中的任何一个。你应该启动哪个推进器？答案揭晓倒计时：3，2 ，1 。这里你需要记住的最重要的信息是，即使一件事会引发另外一件事，反过来却不一定成立。比如，应急开关 可以熄灭螺旋跑车的引擎。但是引擎熄灭了并不意味着用了应急开关——螺旋跑车可能没油了 或者坏了——或者被正常关掉了。但是我们可以推断出 如果引擎还在运行，应急开关就没有打开。知道了这个，我们可以从会导致挑战失败的 三个缺陷中反向推导。现在我们一起看看 斯雷特的最后两条笔记，因为它们给出了 有关上述笔记的直接信息。在两个情况下比重计都会旋转， 但它们的结果不同。这意味着比重计旋转不会是任何具体故障的原因。如果它是， 那么每次都会发生同样的结果。所以我们可以推断 闪烁发光的燃油量表使反应器泄漏，咔嗒作响的氦气瓶使点火塞爆炸，并且使氧气耗尽。一旦我们知道了 哪两个故障需要避免，我们就可列一张表，用因果逻辑来判断哪一个启动器引起它们。因为氦气瓶在第一次测验启动推进器 B 和 C 时正常，我们可以推断这两个推进器 都不会使它发出咔嗒声。从第三次测验我们知道 推进器 D 和 E 也不会。那就只剩下推进器 A 了，当第二和第四次测试启动它时，氦气瓶会咔嗒作响。那什么会引起燃油量表闪烁发光呢？从第四次测试我们知道 不会是推进器 A、D 或 E 。那么 B 和 C 到底谁是罪魁祸首， 还是说它们都是 ？从第二次和第三次的测试中 可以得到答案：燃油量表在两次测试中都闪烁发光， 但是 B 只在一次测试中被启动，而 C 在另一次被启动。这就说明 B 和 C 推进器 各自独立地使燃油量表闪烁发光。看来 A、B 和 C 推进器不能用。幸运的是，另两个推进器 足够完成这次跳跃。你一跃成为第一名，无帮派人士不情愿地交出了你叔叔。他对你表示了由衷的感谢， 并且决定庆祝你的胜利，奖励了你从他那最新的 奇特装置里倒出的一杯茶······

**P828 2020-02-12 NASA’s first software engineer - Margaret Hamilton - Matt Porter & Ma**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=828)

At roughly 4pm on July 20, 1969, mankind was just minutes away from landing on the surface of the moon. But before the astronauts began their final descent, an emergency alarm lit up. Something was overloading the computer, and threatened to abort the landing. Back on Earth, Margaret Hamilton held her breath. She'd led the team developing the pioneering in-flight software, so she knew this mission had no room for error. But the nature of this last-second emergency would soon prove her software was working exactly as planned. Born 33 years earlier in Paoli, Indiana, Hamilton had always been inquisitive. In college, she studied mathematics and philosophy, before taking a research position at the Massachusetts Institute of Technology to pay for grad school. Here, she encountered her first computer while developing software to support research into the new field of chaos theory. Next at MIT's Lincoln Laboratory, Hamilton developed software for America’s first air defense system to search for enemy aircraft. But when she heard that renowned engineer Charles Draper was looking for help sending mankind to the moon, she immediately joined his team. NASA looked to Draper and his group of over 400 engineers to invent the first compact digital flight computer, the Apollo Guidance Computer. Using input from astronauts, this device would be responsible for guiding, navigating and controlling the spacecraft. At a time when unreliable computers filled entire rooms, the AGC needed to operate without any errors, and fit in one cubic foot of space. Draper divided the lab into two teams, one for designing hardware and one for developing software. Hamilton led the team that built the on-board flight software for both the Command and Lunar Modules. This work, for which she coined the term “software engineering," was incredibly high stakes. Human lives were on the line, so every program had to be perfect. Margaret’s software needed to quickly detect unexpected errors and recover from them in real time. But this kind of adaptable program was difficult to build, since early software could only process jobs in a predetermined order. To solve this problem, Margaret designed her program to be “asynchronous,” meaning the software's more important jobs would interrupt less important ones. Her team assigned every task a unique priority to ensure that each job occurred in the correct order and at the right time— regardless of any surprises. After this breakthrough, Margaret realized her software could help the astronauts work in an asynchronous environment as well. She designed Priority Displays that would interrupt astronaut’s regularly scheduled tasks to warn them of emergencies. The astronaut could then communicate with Mission Control to determine the best path forward. This marked the first time flight software communicated directly— and asynchronously— with a pilot. It was these fail safes that triggered the alarms just before the lunar landing. Buzz Aldrin quickly realized his mistake— he’d inadvertently flipped the rendezvous radar switch. This radar would be essential on their journey home, but here it was using up vital computational resources. Fortunately, the Apollo Guidance Computer was well equipped to manage this. During the overload, the software restart programs allowed only the highest priority jobs to be processed— including the programs necessary for landing. The Priority Displays gave the astronauts a choice— to land or not to land. With minutes to spare, Mission Control gave the order. The Apollo 11 landing was about the astronauts, Mission Control, software and hardware all working together as an integrated system of systems. Hamilton’s contributions were essential to the work of engineers and scientists inspired by President John F. Kennedy’s goal to reach the Moon. And her life-saving work went far beyond Apollo 11— no bugs were ever found in the in-flight software for any crewed Apollo missions. After her work on Apollo, Hamilton founded a company that uses its unique universal systems language to create breakthroughs for systems and software. In 2003, NASA honored her achievements with the largest financial award they’d ever given to an individual. And 47 years after her software first guided astronauts to the moon, Hamilton was awarded the Presidential Medal of Freedom for changing the way we think about technology.

**P828 2020-02-12 NASA’s first software engineer - Margaret Hamilton - Matt Porter & Ma**

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翻译人员: shuyu he 校对人员: Yanyan Hong1969 年 7 月 20 日， 大约下午四点，人类离降落月球表面 只差几分钟的路程。但是在宇航员开始 着手最后的降落之前，有一个紧急信号灯亮起了。有某样东西造成了电脑超负荷，导致登月舱可能需要迫降。地面上的玛格丽特·汉密尔顿 （Margaret Hamilton) 摒住了呼吸。她领导的团队负责开发 开创性的飞行软件，所以她知道这次任务必须万无一失。但是在这最后关头 发生的紧急情况，很快将证明她的软件 正在如计划正常运作。出生在印第安纳州保利（Paoli）， 今年 33 岁的汉密尔顿总是充满好奇。大学期间，她主修的是数学和哲学，之后在麻省理工学院 取得了一个研究岗位，以支付研究生院的学费。在这儿，她首次接触了电脑，开发了支援研究混沌理念 这个新领域的软件。随后，在麻省理工学院的林肯实验室，汉密尔顿为美国的第一个 防空系统开发出了用以侦察敌机的软件。但当她听说著名工程师 查尔斯 · 德雷帕（Charles Draper）在找将人类送上月球的助手时，她马上加入了他的团队。美国航空航天局（NASA）指望德雷帕 以及他由 400 多名工程师组成的团队能够发明出第一台 小型数字飞行计算机，阿波罗制导计算机。这套装置会根据宇航员输入的信息进行导航、矫正航线，并控制航天飞船。那个时候的电脑不仅不可靠， 还大到能塞满整个房间，而阿波罗制导计算机 在运作时必须零失误，并且能放进一立方英尺的空间中。德雷帕将实验室分为两个组，一个团队设计计算机硬件， 另一个团队开发软件。汉密尔顿领导的团队负责 开发主板飞行软件，运用于命令舱和登月舱。她为这项下了大赌注的工作 取了一个名字，叫做“软件工程”。由于人命关天， 所以每个程序必须能够完美执行。玛格丽特的软件需要 快速检测到未预期的错误，并且即时修复它们。但是这种随机应变的软件 是非常难开发的，因为早期软件的修复只能 依照事先设置的顺序执行。为了解决这个问题，玛格丽特将她的程序设计成“非同步”，意思是这个软件会打断相对 不重要的工作，先执行重要的工作。她的团队针对每个任务 指定独一无二的优先权，以确保每个工作能依照正确顺序，在正确的时间点运行—— 无论发生什么意外。在实现这个突破性的进展后，玛格丽特意识到她的软件 同样可以帮助宇航员在非同步的环境下工作。她设计了优先级显示，将会打断宇航员按计划执行的任务，以此来警告他们发生的紧急情况。宇航员随后可以和任务控制中心沟通，以确定最佳的前进路线。这标志着飞行软件第一次直接与飞行员进行异步沟通。正是这些故障保险 在登月前触发了警告。巴兹·奥尔德林（Buzz Aldrin） 快速意识到了他的错误，他不小心碰到了会合点雷达开关。这个雷达在返程中十分重要，但此刻，它消耗了重要的计算资源。幸运的是，阿波罗制导计算机 有足够的装备来处理这个问题。在这次超负荷发生期间， 软件重启了程序，只处理最高优先级的工作——包括项目中必须执行的降落。这个优先级显示， 给了宇航员一个机会选择降落还是不降落。在还剩最后几分钟的紧要关头， 任务控制中心下达了命令。阿波罗 11 号的降落 在宇航员、任务控制中心、软件和硬件的协作下得以成功完成。肯尼迪总统的登月目标 鼓舞了工程师和科学家开展这项工作，而汉密尔顿对这次任务功不可没。她从事过的性命攸关的工作 不只体现在阿波罗 11 号上，所有阿波罗载人任务的飞行软件 都从未出现任何漏洞。在她完成阿波罗计划之后，汉密尔顿成立了一家公司， 使用其独特的通用系统语言来为多种系统和软件创造突破。2003 年，美国航空航天局 为表彰她的成就，授予了她最高金额的个人奖励。在她的软件首次引导 宇航员登月后的 47 年，汉密尔顿被授予总统自由勋章，理由是：她改变了我们对科技的思考。

**P829 2020-02-20 The Tower of Epiphany \_ Think Like A Coder, Ep 7**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=829)

Ethic and Hedge are on the ground floor of a massive tower. Barriers of energy separate them from their quest’s second goal: the Node of Creation. To reach it, Ethic must use three energy streams to climb the tower. As soon as she steps forward a timer will begin counting down from 60 seconds. At the back of the room there’s a basin made of invisible towers that can hold energy between them. After one minute, a torrent of energy will pour down from above, filling one unit at a time, with a force field preventing it from spilling out the front or back. During the 60 calm seconds, Ethic and Hedge must decide exactly how many units of energy will fall. For each of the three challenges, they must choose the amount that will fill the basin exactly. If they do so, the energy will propel them further upwards. But if they get the amount at all wrong, the energy lift will fail, dropping them. Diagrams on the walls illustrate some examples. This configuration will capture exactly 2 units of energy. This configuration will capture 4— 3 here, and 1 here. And this one will also capture 4, because any energy on the right would spill out. The energy will rain down in such a way that it’ll only overflow if there’s no space that could hold it. Hedge can make one tower of blocks visible at a time and count how tall it is, but he can’t look at the whole structure all at once. How does Ethic program Hedge to figure out exactly how much energy each basin can hold? Pause now to figure it out for yourself. Here’s one way of thinking about what’s happening: each unoccupied cell will hold energy if and only if there is a wall eventually to its left, and a wall eventually to its right. But it would take a long time for Hedge to check this for each individual cell. So what if he were to consider a whole column of blocks at a time? How many units of energy can this hold, for instance? Pause now to figure it out for yourself. Let’s analyze the problem by looking at our example. There are 5 columns of blocks here. The leftmost one can’t hold any energy, because there’s nothing higher than it. The 2nd stack can have 3 units above it, as they would be trapped between these two 4 block stacks. We get 3 units by taking the height where the energy would level off— 4, and subtracting the height of the stack— so that’s 4 minus 1. The 3rd stack is similar— 4 to the left, 4 to the right, and it’s 3 high, so it’ll hold 4 minus 3 equals 1 unit. The 4th stack and 5th stacks have nothing higher than them to the right, so they can’t hold any energy. We can adapt this idea into an algorithm. Considering one column at a time as the point of reference, Hedge can look to the left stack by stack to find the height of the tallest one, look to the right to find the height of the tallest one, and take the smaller of the two as the height the energy can fill up to. If the result is higher than the column in question, subtract the height of the original column, and the result will be the number of units that column can hold. If it's equal to or below the level of the column in question, the energy would spill off. Hedge can apply that to an entire basin with a loop that starts on the left-most column and moves right, one column at a time. For each column, he’ll run the same steps— look all the way left for the tallest, do the same to the right, take the lower height of the two, subtract the original column height, and increase the grand total if that number is positive. His loop will repeat as many times as there are columns. That will work, but it’ll take a long time for a large basin. At every step Hedge repeats the action of looking left and looking right. If there are N stacks, he’ll look at all N stacks N times. Is there a faster way? Here’s one time saver: before doing anything else, Hedge can start on the left, and keep a running tally of what the highest stack is. Here that would be 2, 2 again, since the first was higher, then 4, 4, 4. He can then find the highest right-most stacks by doing the same going right-to-left: 1, 3, 4, 4, 4. In the end he’ll have a table like this in his memory. Now, Hedge can take one more pass to calculate how much energy there will be above every stack with the same equation from before: take the smaller of the stored left and right values, and subtract the height of the current tower. Instead of looking at N stacks N times, he’ll look at N stacks just 3 times— which is what’s called linear time. There are ways to optimize the solution even further, but this is good enough for our heroes. Ethic and Hedge work as one. The first cascade is a breeze, and they rise up the tower. The second is a little tougher. The third is huge, with dozens of stacks of blocks. The timer ticks down towards zero, but Ethic’s program is fast. She gets the wheel in position just in time, and the energy lifts them to the Node of Creation. Like the first, it reveals a vision: memories of years gone by. The world machine changed everything, and Ethic, in her position as chief robotics engineer, grew troubled by what she saw. When the Bradbarrier went up to keep the people in, she knew something was seriously wrong. So she created three artifacts with the ability to restore people’s power, creativity, and memory, and smuggled them to three communities. Before she could tell people how to use them, the government discovered her efforts and sent bots to arrest her and the other programmers. The last thing Ethic used the world machine to create was a robot that would protect the ancient device from the forces of ignorance by enclosing it in a giant maze. She named her creation Hedge. Without warning, the energy lift flickers, then fizzles out.

**P829 2020-02-20 The Tower of Epiphany \_ Think Like A Coder, Ep 7**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=829)

翻译人员: Sylvie Han 校对人员: Yolanda ZhangEthic 和 Hedge 站在巨大塔楼的底层。能量屏障把他们与第二个目标隔开了：创造之结。为了拿到它， Ethic 要用三束能量流爬上塔楼。一旦她开始前进， 计时器就会启动 60 秒倒计时。在房间后部， 有个由隐形柱子组成的容器，可以储存能量。一分钟后，能量会从上方倾泻而下，一次填满一个单位，力场确保它不会向前或向后流动。在 60 秒的冷却时间里，Ethic 和 Hedge 必须确定 有多少能量会流下来。对于这三个挑战，他们必须使能量正好填满底座。如果他们做对了， 能量会助他们更进一步。但如果他们弄错了， 能量就会泄漏出来，落向他们。墙上的图是一个例子。这个结构能容纳 2 个单位的能量。这个可以容纳 4 个单位—— 左边 3 个，右边 1 个。这个结构也可以容纳 4 个单位的能量，因为如果右边有能量 ，就会泄漏。能量落下的方法让它只会在空间容纳量不够时泄漏。Hedge 每次能让一个能量柱现形 并数出它的高度，但他不能一次看全整个结构。Ethic 要怎样让 Hedge 计算出这个容器可以容纳多少能量呢？现在暂停来自己试试。有一种方法来思考这个问题：对于一个空的单元格， 当且仅当它左边有墙，右边也有墙时，才可以容纳能量。但 Hedge 一个个检查 这些单元格会耗费很多时间。如果他一次考虑一整个纵列呢？比如这个结构可以容纳多少能量？暂停来自己试试。我们可以通过这个例子 来分析一下问题。这里有 5 纵列单元格。最左边的不能容纳任何能量， 因为没有比它更高的了。第二列能容纳3个单元格的能量，这两个四格高的纵列 可以把能量夹在中间。我们得出 3 格的结论，因为能量 最终会等于最高纵列——4，再减去这列的高度 —— 就是 4 减 1。第三列同理——左边 4 格， 右边 4 格，这列高 3 格，所以 4 减 3 等于 1 个单位。第四、第五列右边没有更高的，所以它们无法容纳任何能量。我们可以把这个方法 转变成一种算法。每次选择一个纵列作为参考点，Hedge 由此向左一点点检查， 找到最高的纵列，再检查右边并找出最高的纵列，两个高度中较小的 就是最终能量可以填满的高度。如果这个结果高过某列原高度，那么减去这列的原有高度，就能得出这个纵列的容纳量。如果低于某列的原有高度，能量就会泄漏。Hedge 可以对整个底座 依次这样操作，从左到右，一次一列。对于每一纵列都重复同样的操作—— 向左找到最高的，右边也是， 取两个高度中较小的一个，减去原纵列原有的高度，如果得到正数就算进总容量里。这一流程的运行次数和纵列数相等。这样的确可行，但如果底座很大， 这样做会耗费很多时间。每一步，Hedge 都要反复地左看右看。如果有 N 个纵列， 他就需要把每个纵列都看 N 遍。有没有更快的方法呢？有个节省时间的方法：首先，Hedge 从左边开始，并连续记录最高纵列的高度。这样就是 2，然后还是 2， 因为第一个更高，然后是 4，4，4。然后他可以找到最高纵列的右端，只要同样从右到左再做一遍： 1，3，4，4，4。最终，他会记下这样一个表格。现在 Hedge 可以再扫描一次，按照之前的等式计算每个纵列 可以容纳多少能量：在存储的左右最高值中选较小的，再减去当前纵列的高度。与把 N 个纵列每个看 N 遍相比， 他只需把每个纵列看三遍——这就是我们所说的线性时间。还有很多更优解决方法，但这个已经够好了。Ethic 和 Hedge 配合默契。他们轻而易举地通过了 第一个瀑布，塔楼地板上升了。第二个难一些。第三个容器非常大， 每列有数十个单元格。计时器显示出 0， 但 Ethic 的动作很快。她在最后时刻找到了正确位置，能量让他们上升至创造之结。和第一次一样，它显现出了幻象： 多年前的记忆。世界机器改变了一切，Ethic 作为首席机器人工程师，对她目击到的现象感到不安。当 Brad 障碍升起并围住人群时，她知道大事不妙了。于是她造出了三个物品，它们拥有修复人们的力量、 创造力以及记忆的能力，并把它们偷运到了三个社区里。在她告诉人们如何使用之前，政府发现了她的成果， 并派出机器人抓捕她以及其他程序员。Ethic 用世界机器创造的 最后一件物品是个机器人，它可以把古老的装置围在大型迷宫中， 使它远离愚昧的力量。她给这个物品起名叫 Hedge。在没有任何警告的情况下， 能量电梯开始闪烁，然后消散了。

**P830 2020-02-21 What’s a squillo, and why do opera singers need it - Ming Luke**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=830)

Gripped with vengeful passion, The Queen of the Night tears across the stage. She begins to sing her titular aria, one of the most famous sections from Mozart’s beloved opera, "The Magic Flute." The orchestra fills the hall with music, but the queen’s voice soars above the instruments. Its melody rings out across thousands of patrons, reaching seats 40 meters away— all without any assistance from a microphone. How is it possible that this single voice can be heard so clearly, above the strains of dozens of instruments? The answer lies in the physics of the human voice, and the carefully honed technique of an expert opera singer. All the music in this opera house originates from the vibrations created by instruments— whether it’s the strings of a violin or the vocal folds of a performer. These vibrations send waves into the air, which our brains interpret as sound. The frequency of these vibrations–– specifically, the number of waves per second–– is how our brains determine the pitch of a single note. But in fact, every note we hear is actually a combination of multiple vibrations. Imagine a guitar string vibrating at its lowest frequency. This is called the fundamental, and this low pitch is what our ears mostly use to identify a note. But this lowest vibration triggers additional frequencies called overtones, which layer on top of the fundamental. These overtones break down into specific frequencies called harmonics, or partials— and manipulating them is how opera singers work their magic. Every note has a set of frequencies that comprise its harmonic series. The first partial vibrates at twice the frequency of the fundamental. The next partial is three times the fundamental’s frequency, and so on. Virtually all acoustic instruments produce harmonic series, but each instrument’s shape and material changes the balance of its harmonics. For example, a flute emphasizes the first few partials, but in a clarinet’s lowest register, the odd-numbered partials resonate most strongly. The strength of various partials is part of what gives each instrument its unique sonic signature. It also affects an instrument’s ability to stand out in a crowd, because our ears are more strongly attuned to some frequencies than others. This is the key to an opera singer’s power of projection. An operatic soprano— the highest of the four standard voice parts— can produce notes with fundamental frequencies ranging from 250 to 1,500 vibrations per second. Human ears are most sensitive to frequencies between 2,000 and 5,000 vibrations per second. So if the singer can bring out the partials in this range, she can target a sensory sweet spot where she’s most likely to be heard. Higher partials are also advantageous because there’s less competition from the orchestra, whose overtones are weaker at those frequencies. The result of emphasizing these partials is a distinctive ringing timbre called a singer’s squillo. Opera singers work for decades to create their squillo. They can produce higher frequencies by modifying the shape and tension in their vocal folds and vocal tract. And by shifting the position of their tongues and lips, they accentuate some overtones while dampening others. Singers also increase their range of partials with vibrato— a musical effect in which a note slightly oscillates in pitch. This creates a fuller sound that rings out over the instruments’ comparatively narrow vibratos. Once they have the right partials, they employ other techniques to boost their volume. Singers expand their lung capacity and perfect their posture for consistent, controlled airflow. The concert hall helps as well, with rigid surfaces that reflect sound waves towards the audience. All singers take advantage of these techniques, but different vocal signatures demand different physical preparation. A Wagnerian singer needs to build up stamina to power through the composer’s four-hour epics. While bel canto singers require versatile vocal folds to vault through acrobatic arias. Biology also sets some limits— not every technique is feasible for every set of muscles, and voices change as singers age. But whether in an opera hall or a shower stall, these techniques can turn un-amplified voices into thundering musical masterpieces.

**P830 2020-02-21 What’s a squillo, and why do opera singers need it - Ming Luke**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=830)

翻译人员: Lark Yu 校对人员: Wanting Zhong满怀复仇的激情，夜后狂奔着穿过舞台。她开始歌唱以她为名的咏叹调，这是莫扎特脍炙人口的歌剧《魔笛》中最著名的选段之一。管弦乐队的音乐回荡在大厅，但夜后的歌声凌驾于乐器的演奏之上。歌声的旋律在数千名听众中回响，甚至能传达到 远在四十米以外的座位——完全没有借助麦克风。在几十种乐器同时演奏的情况下，为何能如此清晰地 听到这一人的歌声呢？答案藏在人类声音的物理特性以及专业歌剧演唱家 精心锤炼的技巧中。歌剧院中的所有音乐都由乐器的振动产生——无论是小提琴的琴弦， 亦或是演唱者的声带。这些振动将声波传递至空气中， 而我们的大脑将其识别为声音。振动的频率——确切来说，每秒中的波数——就是大脑判定单个音符音高的依据。但实际上，我们听到的每个音符都是多个振动的组合。想象以最低频率振动的吉他弦。这叫做 “基音” ，我们的耳朵大多是用 这个低音来辨别音符的。但这个最低振动会触发 额外的振动频率，叫做 “泛音”，泛音会叠加在基音之上。这些泛音能分解成特定的频率，称为 “谐波” ，或 “分音” ——而操纵分音就是歌剧演唱家 施展魔法的手段。每个音符都有一个 “泛音列”， 由一组频率构成。第一分音的振动频率 是基音的两倍，第二分音的振动频率 是基音的三倍，以此类推。几乎所有的原声乐器 均会产生泛音列，但是每种乐器的形状和材质 会影响其泛音的平衡。比如说，长笛突出强调前几个分音，而在单簧管的最低音区，奇数的分音共振最强。不同分音的强度在一定程度上赋予了 每种乐器独特的音质，同时，还影响了乐器 在人群中脱颖而出的能力，因为人们的耳朵更加适应某些频率。这就是歌剧演唱者穿透力的关键。一位歌剧女高音——四部和声中最高的声部——能唱出音符的基音频率介于每秒 250 到 1500 次之间。人耳最敏感的频率介于每秒 2000 到 5000 次之间。因此，如果演唱者能 发出这个范围内的分音，她就能瞄准听觉的 “甜蜜区”， 也就是最有可能被听到的范围。更高的分音也很有优势，因为在这些频率区间， 乐器的泛音更弱，造成的干扰也更少。强调这些分音的结果是一种独特的嘹亮音色， 叫做歌唱者的 “共振峰”（squillo）。歌剧演唱者苦练数十载， 以打造出自己的 “共振峰” 。通过调整声带和声道的形状和张力，他们可以发出频率更高的声音。而通过改变舌头和嘴唇的位置，他们可以加强某些泛音， 同时弱化另一些泛音。歌唱者也可以用 “颤音” 来扩展分音的音域——这是一种音符在音高上 轻微振荡的音乐效果。颤音能打造出更加饱满的声音，比乐器相对狭窄的颤音更加响亮。一旦掌握了正确的分音后，歌唱家们使用其他的技术来增强音量。他们扩大肺活量，并完善自己的仪态，以获得持续、可控的气流。音乐厅本身也有所助益，刚性表面能把声波反射到观众中。所有的演唱者都会利用这些技术，但不同的声音特点 需要不同的体态准备。一位瓦格纳歌剧的歌唱家 需要锻炼耐力，才能坚持唱完瓦格纳 长达四小时的鸿篇巨著。而美声唱法歌唱家 则需要灵活多变的声带，来演绎难度高超的咏叹调。生理也会设置局限——并不是每项技巧 对每组肌肉都适用，随着年龄增加， 歌唱家的声音也有所变化。但无论是在歌剧院还是淋浴间，这些技巧能把未经放大的声音变成雷鸣般的音乐杰作。

**P831 2020-02-28 The tale of the doctor who defied Death - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=831)

In their ramshackle hut on the edge of the woods, a husband and wife were in despair. The woman had just given birth to their thirteenth child, and the growing family was quickly running out of food and money. The father walked into the woods to ponder their problem. After hours spent wandering through the trees, he encountered two shadowy silhouettes. The first figure appeared to be the man’s God, while the second resembled the Devil. Both figures offered to lighten the man’s burden, and act as Godfather to his most recent child. But the man refused their offer— he wouldn’t entrust his son to those who passed judgment on human life. He ventured deeper into the tangled thicket. Here in the darkest part of the woods, the father made out a third figure. Sunken eyes stared out of its gaunt face, which broke into a crooked smile. This was Death himself, come to offer his services as Godfather. He promised to return when the child came of age, to bring him happiness and prosperity. The father— knowing that all people are equal in the eyes of Death— accepted his offer. Years later, when the child had grown into an ambitious young man, his skeletal Godfather came for his promised visit. In his gnarled hand he held a flask containing the cure for all human ailments. Death had brought this flask for his Godson, promising to make him a successful doctor. But the powerful potion came with very strict rules. If his Godson encountered a sick person and Death was hovering at the top of their bed, the doctor could heal them with just a waft of the antidote’s fumes. But if Death lingered at the foot of the bed, he’d already claimed the patient as his own— and the doctor could do nothing for them. In time, the doctor’s potent potion and uncanny instincts became known throughout the land. He grew rich and famous, casting off the hardships of his early life. When the king fell ill, he summoned the famous physician to treat him. The doctor swept into the palace, ready to show off his skills. But when he entered the king’s chamber, he was dismayed to see Death settled at the foot of the bed. The doctor desperately wanted the glory of saving the king— even if it meant deceiving his Godfather. And so, he swiftly spun the bed around and reversed Death’s position, leaving the doctor free to administer the antidote. Death was livid. He warned his arrogant Godson that if he ever cheated Death again, he would pay for it with his life. Death and the doctor continued their travels. After some time, the king’s messengers came to collect the doctor yet again. The princess was gravely ill, and the king had promised incredible riches to anyone who could cure her. The doctor approached the princesses’ chamber with gold in his eyes. But upon seeing the sleeping princess, his greed fell away. He was so struck by her grace, that he failed to notice Death lurking by her feet. He swiftly healed the princess, but before she could even utter her thanks, Death had dragged his lovesick Godson away. In an instant, the palace dissolved around them. The doctor found himself in an immense cave lined with countless quivering candles, each representing the duration of a life. As punishment for his Godson’s foolish attempt to master mortality, Death whittled his candle down to its wick. Seeing his own dwindling light, the doctor felt the fear he’d often glimpsed in his patients’ eyes. Desperately, he begged Death to transfer his dying light onto a new candle. His Godfather considered the request— but the doctor’s betrayal was too great. He loosened his bony grip, and his Godson’s candle fell to the floor. Death stood motionless, his inscrutable face fixed on the sputtering flame— until all that was left of the doctor was a wisp of smoke.

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翻译人员: Isabella Lu 校对人员: Yanyan Hong在树林边有一个摇摇欲坠的小屋，屋中的夫妻俩深陷绝望。这位女子刚刚生下了 他们的第十三个孩子，这个越来越大的家庭 很快就会吃光食物，花光金钱。这位父亲走进森林， 思考如何摆脱这个处境。在树林里游荡了数小时之后，他遇到了两个阴暗的侧影。第一个似乎是他的神灵；然而第二个则像是魔鬼。他们都号称能帮助 男人减轻肩上的负担，并成为他的新生子的教父。但是，男人拒绝了他们的提议——他不会将自己的儿子托付给 那些为人类命运下判决的存在。他向树枝纠缠的灌木林更深处走去。在这最阴暗的丛林深处， 这位父亲见到了第三个身影。它憔悴面容上深陷的眼窝向外凝视， 突然露出一个悚然的笑容。这就是死神本尊， 来提出要当孩子的教父。他允诺在孩子成年之时返回，来带给他幸福和成功。这位父亲明白，在死亡之前人人平等，于是他接受了死神的提议。多年后，当这个孩子已经 长成一个胸怀大志的青年，他那枯骨般的教父信守承诺来造访。他粗糙的手中握着一个细颈瓶，里面是能治愈一切人类疾病的解药。死亡为他的教子带来这个小瓶，承诺让他成为一位名医。但这个强大的药剂 有严格的使用条件。如果这位教子碰到一位病人，而死神盘旋于他的床榻之上，医生只需让患者轻嗅解药的气味， 疾病就能完全治愈。但是如果死神徘徊在他们的床脚，那么它已经夺走了 这位病人的性命——医生将无能为力。不久，这位医生神效药水 和令人惊异的直觉已经在全国闻名遐迩。他变得富有而出名， 走出了童年艰辛的阴影。国王生病时，他传唤了 这位著名的医生来治愈他。医生迫不及待地 赶去皇宫，准备大显身手。但当他步入国王的寝宫时，他沮丧地看到死神 已经静静地等在床尾。医生不顾一切地想拥有 拯救国王的无上荣光——尽管这意味着他要欺骗教父。因此，他迅速地把床转向， 改变了死神的位置，那么这样他就可以使用解药。死神非常生气，他警告这位自大的教子， 如果他胆敢再一次愚弄死神，代价会是他自己的性命。死神和医生继续着他们的旅程。一段时间之后， 国王的信使又来请医生前往。公主身患重病，国王答应会让任何 能治愈她的人变得非常富有。医生两眼放金光地进入了公主的寝宫。但在他看到睡梦中公主时， 他对金钱的欲望消失了，公主的美貌彻底击中了他，以至于他未能注意到 死神正在她脚边徘徊。他很快治愈了公主，但她还没来及传达自己的谢意，死神就带走了他那深陷相思的教子。一瞬间，宫殿在他们的面前消失了，医生发现自己身处于 一个巨大的洞穴中，排满了无数颤动着火焰的蜡烛， 每个都代表着一个生命的长短。作为对教子愚蠢地 想要控制生死的惩罚，死亡削短了他的蜡烛，直至灯芯。目视着自己逐渐微弱的烛光，医生感受到了他时常 在自己的病人眼中瞥见的恐惧。他拼命地恳求死神将他即将 熄灭的微光转移至一个新的蜡烛。他的教父考虑了他的请求—— 但是医生的背叛越过了底线。他松开了自己骷髅般的双手， 让他教子的烛火落在了地上。死神一动不动地站着，他难以捉摸的面庞紧盯着 苟延残喘的火苗——直到医生化为一缕青烟。

**P832 2020-03-05 The meaning of life according to Simone de Beauvoir - Iseult Gillespi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=832)

At the age of 21, Simone de Beauvoir became the youngest person to take the philosophy exams at France’s most esteemed university. She passed with flying colors. But as soon as she mastered the rules of philosophy, she wanted to break them. She’d been schooled on Plato’s Theory of Forms, which dismissed the physical world as a flawed reflection of higher truths and unchanging ideals. But for de Beauvoir, earthly life was enthralling, sensual, and anything but static. Her desire to explore the physical world to its fullest would shape her life, and eventually, inspire a radical new philosophy. Endlessly debating with her romantic and intellectual partner Jean Paul Sartre, de Beauvoir explored free will, desire, rights and responsibilities, and the value of personal experience. In the years following WWII, these ideas would converge into the school of thought most closely associated with their work: existentialism. Where Judeo-Christian traditions taught that humans are born with preordained purpose, de Beauvoir and Sartre proposed a revolutionary alternative. They argued that humans are born free, and thrown into existence without a divine plan. As de Beauvoir acknowledged, this freedom is both a blessing and a burden. In "The Ethics of Ambiguity" she argued that our greatest ethical imperative is to create our own life’s meaning, while protecting the freedom of others to do the same. As de Beauvoir wrote, “A freedom which is interested only in denying freedom must be denied.” This philosophy challenged its students to navigate the ambiguities and conflicts our desires produce, both internally and externally. And as de Beauvoir sought to find her own purpose, she began to question: if everyone deserves to freely pursue meaning, why was she restricted by society’s ideals of womanhood? Despite her prolific writing, teaching and activism, de Beauvoir struggled to be taken seriously by her male peers. She’d rejected her Catholic upbringing and marital expectations to study at university, and write memoirs, fiction and philosophy. But the risks she was taking by embracing this lifestyle were lost on many of her male counterparts, who took these freedoms for granted. They had no intellectual interest in de Beauvoir’s work, which explored women’s inner lives, as well the author’s open relationship and bisexuality. To convey the importance of her perspective, de Beauvoir embarked on her most challenging book yet. Just as she’d created the foundations of existentialism, she’d now redefine the limits of gender. Published in 1949, "The Second Sex" argues that, like our life’s meaning, gender is not predestined. As de Beauvoir famously wrote, “one is not born, but rather becomes, woman.” And to “become” a woman, she argued, was to become the Other. De Beauvoir defined Othering as the process of labeling women as less than the men who’d historically defined, and been defined as, the ideal human subjects. As the Other, she argued that women were considered second to men, and therefore systematically restricted from pursuing freedom. "The Second Sex" became an essential feminist treatise, offering a detailed history of women’s oppression and a wealth of anecdotal testimony. "The Second Sex"’s combination of personal experience and philosophical intervention provided a new language to discuss feminist theory. Today, those conversations are still informed by de Beauvoir’s insistence that in the pursuit of equality, “there is no divorce between philosophy and life.” Of course, like any foundational work, the ideas in "The Second Sex" have been expanded upon since its publication. Many modern thinkers have explored additional ways people are Othered that de Beauvoir doesn’t acknowledge. These include racial and economic identities, as well as the broader spectrum of gender and sexual identities we understand today. De Beauvoir’s legacy is further complicated by accusations of sexual misconduct by two of her university students. In the face of these accusations, she had her teaching license revoked for abusing her position. In this aspect and others, de Beauvoir’s life remains controversial— and her work represents a contentious moment in the emergence of early feminism. She participated in those conversations for the rest of her life; writing fiction, philosophy, and memoirs until her death in 1986. Today, her work offers a philosophical language to be reimagined, revisited and rebelled against— a response this revolutionary thinker might have welcomed.

**P832 2020-03-05 The meaning of life according to Simone de Beauvoir - Iseult Gillespi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=832)

翻译人员: Ying Lu 校对人员: Yanyan Hong在 21 岁时，西蒙娜 · 德 · 波伏娃 （Simone de Beauvoir）成为法国最权威大学的 哲学考试中最年轻的考生。她出色地通过了考试。但是随着她逐步掌握哲学的原则，她想要打破他们。她一直被灌输着柏拉图的理型论，它忽视了物质世界 实为非理型的反映，展示着更高的真理和不变的理念。但是对于波伏娃而言， 世俗生活是迷人、感性等，但是波澜不惊。她对现实世界探索的渴望 影响了她的生活，最终，激发出革命性的新哲学观。在与她的亲密爱人， 同时也是聪慧的伴侣让 · 保罗 · 萨特（Jean Paul Sartre） 无止尽的辩论中，德·波伏娃探索着 自由意志、渴望、权利和责任，以及个人经验的价值。在接下来的二战期间， 这些想法融合成为与他们的作品关系最密切的思想流派：存在主义。犹太教和基督教的传统都宣扬人类天生带有命中注定的目的，德 · 波伏娃和萨特提出 另一个革命性的观点。他们认为人类生而自由，并不是为了实现神圣计划而存在。正如德·波伏娃所承认， 这种自由既是福赐也是负担。在《模糊性的道德》一书中， 她认为我们最大的道德使命在于创造我们自己生命的意义，同时也要守护他人如此做的自由。正如德·波伏娃所写，“仅仅为了否定自由 本身的自由必须被摈弃。”这种哲学挑战了学生探究欲望所产生内外部的模糊性和冲突。正如德 · 波伏娃探索她自己的目的，她开始质疑：如果人人都有权自由追求人生的意义，那为什么她受到社会 对女性理想的束缚呢？尽管她在写作、教学 和行动主义上都很活跃，德 · 波伏娃仍然很难 被同业男性的认真对待。她背离了天主教家庭的束缚 以及他人对她婚姻的期待，进入大学学习，开始写 自传、小说和哲学论文。但这样的生活方式也让她失去了很多男性同行，他们视这些自由为理所当然。在学术上，他们对于 德·波伏娃的作品毫无兴趣因为这些作品探索的是 女性的内心活动，以及作者的开放式关系和双性恋。为了表明她观点的重要性，德·波伏娃在她最具 挑战性的著作里做了阐释。正如她曾创造了存在主义的基石，现在她要重新定义性别的边界。1949 年出版的《第二性》认为， 正如生命的意义，性别也不是事先决定的。正如德·波伏娃名言，“女人不是天生的，而是后天形成的。”关于“后天形成”的女性， 她论证为，是成为“她者”。德·波伏娃定义“她者”是 女性标签化的过程，将女性标识为不如男性，而在历史上一直由男性自己 来把男性定义为理想的人类。身为 “她者” ，她认为 女性被认为次于男性，因此在追求自由时， 便会受到体制上的限制。《第二性》成为了 女权主义里程碑式的著作，提供了关于女性受压迫的详细历史，和大量的传闻证实。《第二性》融合了个人经历和哲学思想产生了谈论女权主义理论的全新语言。今天，这些谈话仍然深受德·波伏娃对追求平等的坚持，“哲学和生活息息相关。”当然，如任何基础原理著作，《第二性》的观点自从出版后， 就开始被拓展开来。许多当代思想家都探究了 德·波伏娃尚未认知到的人类被区别对待的其他形式。这些包括种族和经济的认同感，以及我们如今 对性别和性有更广泛认知。德·波伏娃对后世的影响也是褒贬不一，她被所执教大学的两个学生 以不当性行为所指控。面对这些指控，她因滥用职权被吊销了教师证。或多或少， 德·波伏娃的一生是富有争议的她的作品也代表了 富有争议的早期女权主义。她一生都处于这些争论之中，写小说，哲学著作和自传 直到 1986 年与世长辞。如今，她的著作 提供了一种哲学表达方式，让大家可以重新想象， 重新审视，以及反对驳斥——这位革命性的思想者若尚在世， 或许会很欢迎这样的反应。

**P833 2020-03-11 How one scientist took on the chemical industry - Mark Lytle**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=833)

In 1958, Rachel Carson received a letter describing songbirds suddenly dropping from tree branches. The writer blamed their deaths on a pesticide called DDT that exterminators had sprayed on a nearby marsh. The letter was the push Carson needed to investigate DDT. She had already heard from scientists and conservationists who were worried that rampant use of the pesticide posed a threat to fish, birds, and possibly humans. She began to make inquiries through government contacts from her years working in the United States Bureau of Fisheries. She asked: “what has already silenced the voices of spring?” In 1962, Carson published her findings in "Silent Spring." Her book documented the misuse of chemicals and their toll on nature and human health. "Silent Spring" immediately drew both applause and impassioned dissent— along with vicious personal attacks on the author. How did this mild-mannered biologist and writer ignite such controversy? Carson began her career as a hardworking graduate student, balancing her studies in biology at John Hopkins University with part time jobs. Still, she had to leave school before completing her doctorate to provide for her ailing father and sister. Carson found part time work with the Bureau of Fisheries writing for a radio program on marine biology. Her ability to write materials that could hold the general public’s attention impressed her superiors, and in 1936, she became the second woman to be hired at the Bureau full time. In 1941, she published the first of three books on the ocean, combining science with lyrical meditations on underwater worlds. These explorations resonated with a wide audience. In "Silent Spring," Carson turned her attention to the ways human actions threaten the balance of nature. DDT was originally used during World War II to shield crops from insects and protect soldiers from insect-borne diseases. After the war, it was routinely sprayed in wide swaths to fight pests, often with unforeseen results. One attempt to eradicate fire ants in the southern U.S. killed wildlife indiscriminately, but did little to eliminate the ants. In spite of this and other mishaps, the US Department of Agriculture and chemical companies extolled the benefits of DDT. There was little regulation or public awareness about its potential harm. But Carson showed how the overuse of chemicals led to the evolution of resistant species— which, in turn, encouraged the development of deadlier chemicals. Since DDT does not dissolve in water, she asserted that over time it would accumulate in the environment, the bodies of insects, the tissues of animals who consume those insects, and eventually humans. She suggested that exposure to DDT might alter the structure of genes, with unknown consequences for future generations. The response to "Silent Spring" was explosive. For many people the book was a call to regulate substances capable of catastrophic harm. Others objected that Carson hadn’t mentioned DDT’s role controlling the threat insects posed to human health. Former Secretary of Agriculture Ezra Taft Benson demanded to know “why a spinster with no children was so concerned about genetics?” and dismissed Carson as “probably a Communist.” A lawyer for a pesticide manufacturer alluded to Carson and her supporters as “sinister influences” aiming to paint businesses as “immoral.” In reality, Carson had focused on the dangers of chemicals because they weren’t widely understood, while the merits were well publicized. She rejected the prevailing belief that humans should and could control nature. Instead, she challenged people to cultivate “maturity and mastery, not of nature, but of ourselves.” Carson died of cancer in 1964, only two years after the publication of "Silent Spring." Her work galvanized a generation of environmental activists. In 1969, under pressure from environmentalists, Congress passed the National Environmental Policy Act that required federal agencies to evaluate environmental impacts of their actions. To enforce the act, President Richard Nixon created the Environmental Protection Agency. And in 1972, the EPA issued a partial ban on the use of DDT. Long after her death, Rachel Carson continued to advocate for nature through the lingering impact of her writing.

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翻译人员: Meng Ren 校对人员: Wanting Zhong1958 年，蕾切尔 · 卡森 收到了一封来信，信里描述了一群鸣鸟 突然从树枝上跌落的情形 。写信人认为鸟儿的死因与 一种叫滴滴涕（DDT）的杀虫剂有关，灭虫员将这种药 喷洒在了附近的沼泽里。正是这封信促使卡森 展开了对滴滴涕的调查。她已经听闻，有科学家 和环保主义者们担心滥用杀虫剂已经 对鱼类、鸟类造成了伤害，还可能对人类健康造成威胁。她开始通过数年来 在美国渔业局工作时所累积的政府人脉 进行询查。她很好奇：“究竟是什么东西使得 春天之声沉寂下来了呢？”1962 年，卡森将她的发现 出版在了《寂静的春天》中。该书记载了 化学物质的误用对自然界和人类健康 造成的致命危害。《寂静的春天》一经面世便好评如潮， 但同时也伴随着激烈的批判——包括对作者的 恶毒人身攻击。一位温和的生物学家兼作家 为何激起了如此大的争议？卡森的事业要从 她勤恳的研究生时期说起。当时她一边在约翰 · 霍普金斯大学 修读生物学，一边做着兼职。即便如此，她还是不得不 在完成博士学业之前就辍学，去照顾生病的父亲和姐姐。卡森在渔业局找了一份兼职，负责为海洋生物广播节目撰稿。她的稿子深受大众欢迎，业务能力也因此受到了 上级的赏识，于是在 1936 年，她成为了渔业局招聘的 第二名女性全职员工。1941 年，她出版了 海洋三部曲中的第一本，书中结合科学与抒情沉思， 描绘出了海底的世界。她的探索引来了广泛的回响。（书名：《海风之下》 《我们周围的海》《海的边缘》）在《寂静的春天》中，卡森着重讨论了 人类的行为对自然界平衡的威胁。二战期间，滴滴涕原本 被用于保护庄稼不受虫害，并防止士兵患上虫媒传染病。战争结束后，人们日常将它 喷洒在大片土地上灭虫，但往往会招致意外的后果。一次，人们试图用它 消灭美国南部的火蚁，结果收效甚微， 还误杀了大量野生动物。尽管发生了一次又一次的意外， 美国农业部和化工企业仍然不懈地鼓吹着 滴滴涕的优势。面对缺乏针对其潜在危害的管制措施， 公众意识也相对薄弱的现状，卡森揭示了化学物质的过量使用将导致物种产生抗药性——从而反过来促使企业 研发更具杀伤力的杀虫剂。由于滴滴涕不溶于水，卡森断言，随着时间推移， 化学物质将在环境中、虫子的尸体中、 以死虫为食的动物体内，最后，甚至在人体内 不断地累积。她还推断滴滴涕 可能改变基因结构，对生物体的后代造成 无法预测的后果。《寂静的春天》引发了 爆炸性的社会反响。许多人认为这本书 呼吁政府加强管制可能导致灾难性破坏的物质。其他人则批判卡森对滴滴涕避免人体遭受虫害的功效闭口不言。前农业部部长 埃兹拉 · 塔夫脱 · 本森则傲慢发问：“为何一个没有孩子的老处女 对基因问题如此关切？”他反驳卡森，称她 “可能是个共产主义者。”一名杀虫剂制造商的代理律师 暗指卡森和她的支持者们“用心险恶”， 意图抹黑商业是“不道德的”。事实上，卡森着重强调了 化学物质的危害，因为其好处已经广为人知， 其弊端却鲜有人了解。她反对社会上 所流行的一种思想，即人类应该也有能力 控制自然界。相反，她建议大众“完善及掌控自我，而非大自然。”1964 年，距《寂静的春天》出版 仅仅过去两年，卡森不幸罹患癌症逝世。她的工作激励了 一代环保活动家。1969 年， 在环保主义者的施压下，国会通过了 《国家环境政策法案》，要求联邦机构评估 其行为对环境的影响。为了确保法案的执行，理查德·尼克松总统成立了 美国国家环境保护局。1972 年，环保局宣布 对滴滴涕有条件的禁用。尽管已逝世许久， 蕾切尔 · 卡森仍继续通过其作品延绵不绝的影响力， 为大自然保护发声。

**P834 2020-03-12 How can we solve the antibiotic resistance crisis - Gerry Wright**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=834)

Antibiotics: behind the scenes, they enable much of modern medicine. We use them to cure infectious diseases, but also to safely facilitate everything from surgery to chemotherapy to organ transplants. Without antibiotics, even routine medical procedures can lead to life-threatening infections. And we’re at risk of losing them. Antibiotics are chemicals that prevent the growth of bacteria. Unfortunately, some bacteria have become resistant to all currently available antibiotics. At the same time, we’ve stopped discovering new ones. Still, there’s hope that we can get ahead of the problem. But first, how did we get into this situation? The first widely used antibiotic was penicillin, discovered in 1928 by Alexander Fleming. In his 1945 Nobel Prize acceptance speech, Fleming warned that bacterial resistance had the potential to ruin the miracle of antibiotics. He was right: in the 1940s and 50s, resistant bacteria already began to appear. From then until the 1980s, pharmaceutical companies countered the problem of resistance by discovering many new antibiotics. At first this was a highly successful— and highly profitable— enterprise. Over time, a couple things changed. Newly discovered antibiotics were often only effective for a narrow spectrum of infections, whereas the first ones had been broadly applicable. This isn’t a problem in itself, but it does mean that fewer doses of these drugs could be sold— making them less profitable. In the early days, antibiotics were heavily overprescribed, including for viral infections they had no effect on. Scrutiny around prescriptions increased, which is good, but also lowered sales. At the same time, companies began to develop more drugs that are taken over a patient’s lifetime, like blood pressure and cholesterol medications, and later anti-depressants and anti-anxiety medications. Because they are taken indefinitely, these drugs more profitable. By the mid-1980s, no new chemical classes of antibiotics were discovered. But bacteria continued to acquire resistance and pass it along by sharing genetic information between individual bacteria and even across species. Now bacteria that are resistant to many antibiotics are common, and increasingly some strains are resistant to all our current drugs. So, what can we do about this? We need to control the use of existing antibiotics, create new ones, combat resistance to new and existing drugs, and find new ways to fight bacterial infections. The largest consumer of antibiotics is agriculture, which uses antibiotics not only to treat infections but to promote the growth of food animals. Using large volumes of antibiotics increases the bacteria’s exposure to the antibiotics and therefore their opportunity to develop resistance. Many bacteria that are common in animals, like salmonella, can also infect humans, and drug-resistant versions can pass to us through the food chain and spread through international trade and travel networks. In terms of finding new antibiotics, nature offers the most promising new compounds. Organisms like other microbes and fungi have evolved over millions of years to live in competitive environments— meaning they often contain antibiotic compounds to give them a survival advantage over certain bacteria. We can also package antibiotics with molecules that inhibit resistance. One way bacteria develop resistance is through proteins of their own that degrade the drug. By packaging the antibiotic with molecules that block the degraders, the antibiotic can do its job. Phages, viruses that attack bacteria but don’t affect humans, are one promising new avenue to combat bacterial infections. Developing vaccines for common infections, meanwhile, can help prevent disease in the first place. The biggest challenge to all these approaches is funding, which is woefully inadequate across the globe. Antibiotics are so unprofitable that many large pharmaceutical companies have stopped trying to develop them. Meanwhile, smaller companies that successfully bring new antibiotics to market often still go bankrupt, like the American start up Achaogen. New therapeutic techniques like phages and vaccines face the same fundamental problem as traditional antibiotics: if they’re working well, they’re used just once, which makes it difficult to make money. And to successfully counteract resistance in the long term, we’ll need to use new antibiotics sparingly— lowering the profits for their creators even further. One possible solution is to shift profits away from the volume of antibiotics sold. For example, the United Kingdom is testing a model where healthcare providers purchase antibiotic subscriptions. While governments are looking for ways to incentivize antibiotic development, these programs are still in the early stages. Countries around the world will need to do much more— but with enough investment in antibiotic development and controlled use of our current drugs, we can still get ahead of resistance.

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翻译人员: Meng Ren 校对人员: Yifei Liu抗生素：现代医学的幕后英雄。我们不仅用它们 治疗感染性疾病，还用它们保障医疗安全—— 从外科手术到化疗，再到器官移植。若没有抗生素，常规的医疗程序 也会引起致命的感染。而人类正面临着 失去它们的风险。抗生素是一些能抑制 细菌生长的化学物质。不幸的是，一些细菌 已经对当下所有的抗生素产生了抗药性。与此同时，我们又停止了 对新型抗生素的研发。尽管如此，人类仍有望克服这一困境。但首先，我们是如何陷入这一困境的？青霉素是第一种 被广泛使用的抗生素，它于 1928 年 被亚历山大 · 弗莱明发现。在他 1945 年 诺贝尔奖的获奖感言里，弗莱明警告了世人 细菌的抗药性可能摧毁抗生素创造的奇迹。他说得没错：20 世纪中叶，抗药性细菌已经开始产生。到了 20 世纪 80 年代，制药企业通过研发新的抗生素解决了抗药性问题。一开始，这是一项非常成功 ——也非常赚钱——的生意。渐渐地，事情发生了变化。新研发出的抗生素通常只对少数几类感染有用。相比之下， 第一代抗生素的适用范围非常广。这本身不是问题，但它确实意味着 每种药物的销量会下降——利润也随之缩水。早期，抗生素处方严重过量，甚至被用在毫无疗效的病毒感染上。对于处方的审查力度加大是件好事， 但也导致了销量进一步下滑。同时，公司开始研发更多患者需要长期服用的药物，例如血压和胆固醇药物，之后是抗抑郁药物和抗焦虑药物。由于患者需要一直服用， 生产这些药的利润更大。截止到 1980 年代中期， 已经没有新的抗生素化学类别被发现。但细菌的抗药性与日俱增，基因信息也开始在细菌个体甚至跨种类的细菌之间传播。今天，一种细菌对多种抗生素 产生抗药性很常见，而且越来越多的菌株 对所有药物都产生了抗药性。那么，我们能做些什么呢？我们需要控制现有抗生素的使用， 研发新的抗生素，抑制对新老抗生素的抗药性，并探究治疗细菌感染的新办法。抗生素的最大消费领域是农业，人们不仅用抗生素治疗感染，还用它来促进家畜生长。大量使用抗生素增加了细菌和抗生素的接触，从而增加了产生抗药性的可能。一些在动物体内常见的细菌， 如沙门氏菌，也能感染人类，有抗药性的变种也能 通过食物链传给我们，并通过国际贸易和旅游网络传播。说到研发新抗生素，大自然贡献了 最具前景的新化合物。像细菌、真菌这样的微生物 已经进化了数百万年才在残酷的自然界中生存下来——意味着其体内通常 含有抗生素化合物，使其对某种特定细菌 更具生存优势。我们也能用抑制抗药性的分子 包裹抗生素。细菌产生抗药性的方式之一 是用自身蛋白降解药物。将抗生素包裹在 抑制降解物质的分子中，抗生素就能发挥作用。噬菌体，一种能攻击细菌 但不感染人体的病毒，是一个很有前景的 对抗细菌感染的新途径。同时，研发针对常见感染的疫苗，能在第一时间防御疾病。以上所有手段 面临的最大挑战是资金，全世界都面临着 资金严重短缺的问题。抗生素的利润太低， 以至于很多大型制药公司都停止了研发。其间，成功推出过 新抗生素的小公司往往还是会破产倒闭， 比如美国创业公司 Achaogen。像噬菌体和疫苗 这样的新治疗技术面临着和传统抗生素一样的困境：如果它们有效， 那么使用一次就够了，制药公司因此难以盈利。而且，为了避免 以后产生抗药性，人们需要更慎重地 使用新抗生素——这又进一步降低了 生产者的利润。一个可能的对策是 拆解利润和销量之间的关系。例如，英国正在测试一种新模式，推动医疗机构定期购买抗生素。尽管政府正在千方百计地 鼓励研发抗生素，这些计划仍在初级阶段。世界各国的努力 还远远不够——但是，若能为抗生素 研发投入足够的资金，并管控现有药物的使用，我们仍然有望战胜细菌的抗药性。

**P835 2020-03-13 The imaginary king who changed the real world - Matteo Salvadore**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=835)

In 1165, copies of a strange letter began to circulate throughout Western Europe. It spoke of a fantastical realm, containing the Tower of Babel and the Fountain of Youth— all ruled over by the letter’s mysterious author: Prester John. Today, we know that this extraordinary king never existed. But the legend of this mythical kingdom and its powerful ruler would impact the decisions of European leaders for the next 400 years. Prester John’s myth would propel the age of exploration, inspire intercontinental diplomacy, and indirectly begin a civil war. When Prester John’s letter appeared, Europe was embroiled in the Crusades. In this series of religious wars, Europeans campaigned to seize what they regarded as the Christian Holy Land. The Church vilified any faith outside of Christianity, including that of the Jewish and Muslim communities populating the region. Crusaders were eager to find Christian kingdoms to serve as allies in their war. And they were particularly interested in rumors of a powerful Christian king who had defeated an enormous Muslim army in the Far East. In fact, it was a Mongol horde including converted Christian tribes that had routed the army. But news of this victory traveled unreliably. Merchants and emissaries filled gaps in the story with epic poems and Biblical fragments. By the time the story reached Europe, the Mongol horde had been replaced with a great Christian army, commanded by a king who shared the Crusader’s vision of marching on Jerusalem. And when a letter allegedly written by this so-called “Prester John” appeared, European rulers were thrilled. While the letter’s actual author remains unknown, its stereotypes about the East and alignment with European goals indicate it was a Western forgery. But despite the letter’s obvious origins as European propaganda, the appeal of Prester John’s myth was too great for the Crusaders to ignore. Before long, European mapmakers were guessing the location of his mythical kingdom. In the 13th and 14th centuries, European missionaries went East, along the newly revived Silk Road. They weren’t searching for the letter’s author, who would have been over a century old; but rather, for his descendants. The title of Prester John was briefly identified with several Central Asian rulers, but it soon became clear that the Mongols were largely non-Christian. And as their Empire began to decline, Europeans began pursuing alternate routes to the Far East, and new clues to Prester John’s location. At the same time these explorers went south, Ethiopian pilgrims began traveling north. In Rome, these visitors quickly attracted the interest of European scholars and cartographers. Since Ethiopia had been converted to Christianity in the 4th century, the stories of their African homeland fit perfectly into Prester John’s legend. Portuguese explorers scoured Africa for the kingdom, until a mix of confusion and diplomacy finally turned myth into reality. The Ethiopians graciously received their European guests, who were eager to do business with the ruler they believed to be Prester John. Though the Ethiopians were initially confused by the Portuguese’s unusual name for their Emperor, they were savvy enough to recognize the diplomatic capital it afforded them. The Ethiopian diplomats played the part of Prester John’s subjects, and the Portuguese triumphantly announced an alliance with the fabled sovereign— over 350 years after the European letter had begun the search. But this long-awaited partnership was quickly tested. A decade later, the Sultanate of Adal, a regional power supported by the Ottoman Empire, invaded Ethiopia. The Portuguese sent troops that helped Ethiopians win this conflict. But by this time, it was clear that Ethiopia was not the powerful ally Europe had hoped. Worse still, the increasingly intolerant Roman Catholic Church now deemed the Ethiopian sect of Christianity heretical. Their subsequent attempts to convert the people they once revered as ideal Christians would eventually spark a civil war, and in the 1630s, Ethiopia cut ties with Europe. Over the next two centuries, the legend of Prester John slowly faded into oblivion— ending the reign of a king who made history despite having never existed.

**P835 2020-03-13 The imaginary king who changed the real world - Matteo Salvadore**

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翻译人员: Lipeng Chen 校对人员: Yolanda Zhang在 1165 年，一封奇怪信件的副本 开始在整个西欧散播。它谈及了一个梦幻般的国度，其中包含通天塔和青春之泉，所有这些都在这封信的神秘作者， 祭司王约翰（Prester John）的统治之下。今天，我们知道， 这位非凡的国王从未存在。但是，这个神话般王国的传说 及其强大的统治者将在未来 400 年影响 欧洲领导人的决定。祭司王约翰的神话 将推动探索时代的到来，激发洲际外交，并间接引发内战。当祭司王约翰的信出现时， 欧洲卷入了十字军东征。在这一系列的宗教战争中，欧洲人发起了夺取他们认为 是基督教圣地的运动。教会谴责基督教以外的任何信仰，包括居住在该地区的 犹太人和穆斯林社区的信仰。十字军渴望找到基督教王国 作为战争中的盟友。他们对传闻中一位 在远东打败了庞大穆斯林军队的强大基督教国王尤其感兴趣。然而事实上，击溃穆斯林军队的是一个包含皈依基督的部落的蒙古部落。但是接下来，这一胜利消息的传播 演变成了以讹传讹。商人和使者用史诗和圣经片段填补了故事中的空白。当故事传到欧洲时，蒙古部落已由一支伟大 的基督教军队所取代，由一个国王率领，他与十字军一样，拥有进军耶路撒冷的愿景。当据说出自这位所谓的“祭司王约翰” 手笔的一封信出现时，欧洲统治者都感到非常兴奋。尽管这封信的实际作者仍然无从可考，但它对东方的刻板印象 和与欧洲目标的一致表明，这只是西方人伪造的文书。然而尽管这封信 显然起源于欧洲的宣传，但由于祭司王约翰神话的吸引力太大， 十字军对此始终深信不疑。不久之后，欧洲地图制作者就在猜测 他那神话般的王国的位置。在 13 和 14 世纪，欧洲传教士 沿着新复兴的丝绸之路朝着东方进发。他们不是在寻找那封信的作者，他应该有一百多岁了； 他们是为了寻找他的后代。几个中亚统治者曾被短暂认为是祭司王约翰，但是很快人们就发现， 蒙古人大部分并不是基督教徒。随着蒙古帝国的衰落，欧洲人开始寻求 通往远东的替代路线，以及有关祭司王约翰位置的新线索。在这些探险者向南进发的同时，埃塞俄比亚朝圣者开始向北旅行。在罗马，这些访客迅速吸引了欧洲学者和地图绘师的兴趣。自公元 4 世纪埃塞俄比亚 皈依基督教以来，他们非洲故乡的故事 就完美地融入了祭司王约翰的传奇。葡萄牙探险家在非洲搜寻该国，直到困惑与外交的交织 最终使神话变成了现实。埃塞俄比亚人热情地 接待了他们的欧洲客人，欧洲人渴望与他们认为是祭司王约翰的统治者做生意。尽管埃塞俄比亚人最初对葡萄牙皇帝异乎寻常的名字感到困惑，但他们足够机智的认识到 这个名字能给他们带来外交资本。于是埃塞俄比亚外交官扮演了 祭司王约翰臣民的角色，而葡萄牙人胜利地宣布 与传说中的国家结盟——这已是欧洲信件导致 一系列搜索的 350 年后。但是，这种期待已久的伙伴关系 很快就面临了考验。十年后，奥斯曼帝国支持的地方势力阿达尔苏丹国入侵埃塞俄比亚。葡萄牙派遣部队帮助 埃塞俄比亚人赢得了这场冲突。但是到了这个时候，很明显埃塞俄比亚 并不是欧洲所希望的强大盟友。更糟糕的是， 罗马天主教会的忍耐度日益下降，开始把埃塞俄比亚基督教 当作异教派。后来，他们试图让曾经被他们尊崇为理想基督徒的人改变信仰，而这最终将会引发一场内战。1630 年，埃塞俄比亚与欧洲断绝联系。在接下来的两个世纪中，祭司王约翰的传奇被逐渐淡忘了——从而结束了一位国王的统治， 尽管他从未存在过，但仍创造了历史。

**P836 2020-03-17 Who was the world's first author - Soraya Field Fiorio**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=836)

4,300 years ago in ancient Sumer, the most powerful person in the city of Ur was banished to wander the vast desert. Her name was Enheduanna. She was the high priestess of the moon god and history’s first known author. By the time of her exile, she had written 42 hymns and three epic poems— and Sumer hadn’t heard the last of her. Enheduanna lived 1,700 years before Sappho, 1,500 years before Homer, and about 500 years before the biblical patriarch Abraham. She was born in Mesopotamia, the land between the Tigris and Euphrates rivers, and the birthplace of the first cities and high cultures. Her father was King Sargon the Great, history’s first empire builder, who conquered the independent city-states of Mesopotamia under a unified banner. Sargon was a northern Semite who spoke Akkadian, and the older Sumerian cities in the south viewed him as a foreign invader. They frequently revolted to regain their independence, fracturing his new dynasty. To bridge the gap between cultures, Sargon appointed his only daughter, Enheduanna, as high priestess in the empire’s most important temple. Female royalty traditionally served religious roles, and she was educated to read and write in both Sumerian and Akkadian, and make mathematical calculations. The world's first writing started in Sumer as a system of accounting, allowing merchants to communicate over long distances with traders abroad. Their pictogram system of record keeping developed into a script about 300 years before Enheduanna’s birth. This early writing style, called cuneiform, was written with a reed stylus pressed into soft clay to make wedge-shaped marks. But until Enheduanna, this writing mostly took the form of record keeping and transcription, rather than original works attributable to individual writers. Enheduanna’s Ur was a city of 34,000 people with narrow streets, multi-storied brick homes, granaries, and irrigation. As high priestess, Enheduanna managed grain storage for the city, oversaw hundreds of temple workers, interpreted sacred dreams, and presided over the monthly new moon festival and rituals celebrating the equinoxes. Enheduanna set about unifying the older Sumerian culture with the newer Akkadian civilization. To accomplish this, she wrote 42 religious hymns that combined both mythologies. Each Mesopotamian city was ruled by a patron deity, so her hymns were dedicated to the ruling god of each major city. She praised the city’s temple, glorified the god’s attributes, and explained the god’s relationship to other deities within the pantheon. In her writing, she humanized the once aloof gods— now they suffered, fought, loved, and responded to human pleading. Enheduanna’s most valuable literary contribution was the poetry she wrote to Inanna, goddess of war and desire, the divinely chaotic energy that gives spark to the universe. Inanna delighted in all forms of sexual expression and was considered so powerful that she transcended gender boundaries, as did her earthly attendants, who could be prostitutes, eunuchs or cross-dressers. Enheduanna placed Inanna at the top of the pantheon as the most powerful deity. Her odes to Inanna mark the first time an author writes using the pronoun “I,” and the first time writing is used to explore deep, private emotions. After the death of Enheduanna’s father, King Sargon, a general took advantage of the power vacuum and staged a coup. As a powerful member of the ruling family, Enheduanna was a target, and the general exiled her from Ur. Her nephew, the legendary Sumerian king Naram-Sin, ultimately crushed the uprising and restored his aunt as high priestess. In total, Enheduanna served as high priestess for 40 years. After her death, she became a minor deity, and her poetry was copied, studied, and performed throughout the empire for over 500 years. Her poems influenced the Hebrew Old Testament, the epics of Homer, and Christian hymns. Today, Enheduanna’s legacy still exists, on clay tablets that have stood the test of time.

**P836 2020-03-17 Who was the world's first author - Soraya Field Fiorio**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=836)

翻译人员: Pooi Ling Ng 校对人员: Yanyan Hong4,300 年前，在古老的苏美尔，乌尔市最有权势的人 被放逐到浩瀚的沙漠中流浪。她的名字叫恩赫杜安娜 （Enheduanna）。她是月神的大祭司， 也是历史上第一位知名作家。在她流亡之时，她已经写了 四十二首赞美诗和三首叙事诗——而苏美尔和她的缘分未尽。恩赫杜安娜生活的年代 比萨福（Sappho）早了 1,700 年，比荷马（Homer）早了 1,500 年，在圣经中的先祖亚伯拉罕 （Abraham）早了约 500 年。她出生于底格里斯河和幼发拉底河之间的 美索不达米亚平原，也是第一批城市 和高级文化的发源地。她的父亲是萨尔贡大帝 (King Sargon the Great) ，也是历史上第一位帝国建造者。他征服了美索不达米亚的独立城邦， 为它们挂上了统一的旗帜，萨尔贡是讲阿卡德语的北方塞米特人，而南部旧城的苏美尔人 则把他视为外国入侵者。他们经常起义以恢复独立 和破坏他的新王朝。为了弥合文化之间的鸿沟，萨尔贡任命了他的独生女, 恩赫杜安娜——作为帝国最重要的圣殿中的高级女祭司。女皇族传统上是担任宗教角色，她受过苏美尔语和阿卡德语的 读写教育，还懂得数学计算。世界上最早的文字是在 苏美尔开始的会计系统。它使商户可以与国外 贸易商进行长途交流。他们的象形文字记录 保存系统——在恩赫德安娜出生前 大约 300 年已发展成手写稿。这种早期的书写风格称为楔形文字。它是用一根芦苇笔针压入 软黏土中制成楔形标记。但是在恩赫德安娜之前，这本书主要采取记录 保存和转录的形式，而不是归因于个别作家的原创作品。恩赫德安娜的乌尔市是 一个拥有三万四千人的城市，街道狭窄，有多层楼的 破房，粮仓，和灌溉。作为高级女祭司，恩赫德安娜 管理着该市的粮食储存，监督了数百名庙宇工人， 诠释了神圣的梦，并主持每月的新月节和庆祝春分的仪式。恩胡杜安娜着手将古老的苏美尔 文化与新的阿卡德文明相统一。为了实现这一目标，她写了42 篇将这两种神话 结合在一起的宗教赞美诗。美索不达米亚的每个城市 都由一个守护神统治，因此她的赞美诗献给了 每个主要城市的统治神。她称赞了这座城市的神殿， 荣耀归功于神灵，并解释了神与万神殿内其他神灵的关系。在她的著作中，她使曾经 超然的众神变得更像人——他们会受苦，斗争，爱， 并回应人类的请愿。恩赫杜安娜最有价值的文学贡献——是她写给战争和欲望女神 伊安娜（Inanna）的诗歌，伊安娜也是带给宇宙火花 的一股神圣的混乱能量。伊安娜喜爱各种形式的性表达，一般认为她强大到 可以超越性别界限，她在尘世的侍者也一样，这些人包括妓女，太监， 或是喜爱奇装异服的人。恩赫杜安娜将伊安娜 放在万神殿的最顶端，并称之为最强大的神灵。她对伊安娜的颂歌是史上首次 有作家用 “我” 这个代名词，也是第一次通过写作来 探索深刻、私人的情感。在恩赫杜安娜的父亲， 萨尔贡国王去世后，一位将军在权力空虚之际， 乘虚而入，发动了政变。作为统治家族的有力成员， 恩赫德安娜被当作针对目标，将军将她从乌尔市驱逐出境。她的侄子，传说中的苏美尔国王， 纳拉姆-辛（Naram-Sin），最终镇压了起义， 并恢复了他的姑姑为大祭司的身份。总体而言，恩赫杜安娜 担任大祭司已有 40 年。她在去世后成为了一个小神灵，她的诗歌在整个帝国中不断被复制、研究和表演了 500 多年。她的诗影响了《希伯来旧约》，《荷马史诗》和《基督教赞美诗》。如今，恩赫杜安娜的遗著仍然留存在经受了时间考验的泥板上。

**P837 2020-03-18 What is schizophrenia - Anees Bahji**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=837)

Schizophrenia was first identified more than a century ago, but we still don’t know its exact causes. It remains one of the most misunderstood and stigmatized illnesses today. So, let’s walk through what we do know— from symptoms to causes and treatments. Schizophrenia is considered a syndrome, which means it may encompass a number of related disorders that have similar symptoms but varying causes. Every person with schizophrenia has slightly different symptoms, and the first signs can be easy to miss— subtle personality changes, irritability, or a gradual encroachment of unusual thoughts. Patients are usually diagnosed after the onset of psychosis, which typically occurs in the late teens or early twenties for men and the late twenties or early thirties for women. A first psychotic episode can feature delusions, hallucinations, and disordered speech and behavior. These are called positive symptoms, meaning they occur in people with schizophrenia but not in the general population. It’s a common misperception that people with schizophrenia have multiple personalities, but these symptoms indicate a disruption of thought processes, rather than the manifestation of another personality. Schizophrenia also has negative symptoms, these are qualities that are reduced in people with schizophrenia, such as motivation, expression of emotion, or speech. There are cognitive symptoms as well, like difficulty concentrating, remembering information, and making decisions. So what causes the onset of psychosis? There likely isn’t one single cause, but a combination of genetic and environmental risk factors that contribute. Schizophrenia has some of the strongest genetic links of any psychiatric illness. Though about 1% of people have schizophrenia, children or siblings of people with schizophrenia are ten times likelier to develop the disease, and an identical twin of someone with schizophrenia has a 40% chance of being affected. Often, immediate relatives of people with schizophrenia exhibit milder versions of traits associated with the disorder— but not to an extent that requires treatment. Multiple genes almost certainly play a role, but we don’t know how many, or which ones. Environmental factors like exposure to certain viruses in early infancy might increase the chance that someone will develop schizophrenia, and use of some drugs, including marijuana, may trigger the onset of psychosis in highly susceptible individuals. These factors don’t affect everyone the same way. For those with very low genetic risk, no amount of exposure to environmental risk factors will lead them to develop schizophrenia; for those with very high risk, moderate additional risk might tip the balance. The antipsychotic drugs used to treat schizophrenia have helped researchers work backwards to trace signatures of the disorder in the brain. Traditional antipsychotics block dopamine receptors. They can be very effective in reducing positive symptoms, which are linked to an excess of dopamine in particular brain pathways. But the same drugs can make negative symptoms worse, and we’ve found that negative symptoms of schizophrenia may be tied to too little dopamine in other brain areas. Some people with schizophrenia show a loss of neural tissue, and it’s unclear whether this atrophy is a result of the disease itself or drug-induced suppression of signaling. Fortunately, newer generations of antipsychotics aim to address some of these issues by targeting multiple neurotransmitters, like serotonin in addition to dopamine. It’s clear that no one transmitter system is responsible for all symptoms, and because these drugs affect signaling throughout the brain and body, they can have other side effects like weight gain. In spite of these complications, antipsychotics can be very effective, especially when combined with other interventions like cognitive-behavioral therapy. Electroconvulsive therapy, though it provides relatively short-lived relief, is also re-emerging as an effective treatment, especially when other options have failed. Early intervention is also extremely important. After months or years of untreated psychosis, certain psychoses can become embedded in someone’s personality. And yet, the dehumanizing stigma attached to this diagnosis can prevent people from seeking help. People with schizophrenia are often perceived as dangerous, but are actually much more likely to be the victims of violence than the perpetrators. And proper treatment may help reduce the likelihood of violence associated with schizophrenia. That’s why education— for patients, their families, and their communities— helps erode the stigma and improves access to treatment.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=837)

翻译人员: Elena Wu 校对人员: Yolanda Zhang精神分裂症第一次被发现， 是一个多世纪以前的事，但我们至今仍不知道其确切的病因。如今，它仍是被误解 和污名化最严重的疾病之一。那么，让我们来谈一谈我们知道的事情 ——从症状到病因及治疗。精神分裂症是一种综合症，这说明它可能包含多种相关的病症，这些病症有相似的症状， 却有着不同的病因。精神分裂症患者的症状都略有不同，且最初的迹象很容易被忽视—— 人格的微变、易怒，或思维逐渐被不寻常的想法侵占。病人通常在病发后才被确诊，男性通常在二十岁左右发病，而女性一般在三十岁左右发病。精神病首次发作可能 表现为妄想、幻觉，以及错乱的言行举止。这些被称为阳性症状——只有精神分裂症患者才会出现，一般人不会有。一个常见的误解是精神分裂症患者都有多重人格，实际上，上述症状只表明 患者的思考过程被打乱，并非另一个人格的形成与出现。精神分裂症也有阴性症状，这些是精神分裂症患者 会缺少的一些特质，例如行动力、情绪表达能力或言语能力。认知方面的症状也会显现出来， 比如难以集中注意、记住信息，以及做出决定。那么究竟是什么原因 导致了精神分裂症发作？病因应该不止一个，而是基因与环境风险因子 结合所导致的。精神分裂症与基因的连结 在所有的精神疾病中最强。虽然只有 1% 的人患有精神分裂症，精神分裂症患者的 孩子或亲人的发病率比其他人高十倍。如果同卵双胞胎中 有一人患有精神分裂症，另外一人会有四成的几率被影响。通常，患者的直系亲人也会呈现与该病症 相关的轻微特性——但没有严重到需要治疗的程度。我们几乎可以确定精神分裂症 与多个基因相关，但我们并不知道 这些基因的具体个数和类型。环境因子，比如婴儿期 初期接触到某些病毒，可能会增加患上精神分裂症的机会。服用某些药物，包括大麻，也可能促使高风险者发病。这些因子对不同个体的影响存在差异。对那些基因风险很低的人来说，不论多少环境因子都不会使他们患上精神分裂症；而对于患病风险非常高的人，中等的 额外风险也可能会破坏这种平衡。治疗精神分裂症的药物 能协助研究者追踪这种病症在大脑中呈现的特征。传统的抗精神疾病药物 会阻隔多巴胺受体，对于减轻阳性症状效果显著，因为这些症状和大脑中 特定通路的多巴胺含量过高有关。但是，同样的药物也可能 恶化阴性症状，研究发现， 精神分裂症的阴性症状与大脑其他区域的 多巴胺含量太低有关。个别患者会出现 神经组织萎缩的状况，我们还不清楚这种萎缩 是由于疾病本身，还是由药物导致讯号传输 被压制的结果。幸运的是，近代的抗精神病药物致力于通过针对多种神经传递介质 来解决这些问题，比如血清素加上多巴胺。可以确定的是：所有的症状 并不是由单一传递介质系统造成的，而且，因为这些药物会影响 大脑和身体各处的信号传递，服用药物可能引起 其他副作用，比如体重增加。虽然存在病发症的风险， 抗精神病药物仍然有着积极的作用，尤其是与其他医疗方式结合时，比如认知行为治疗。电痉挛疗法尽管只能短暂的缓解症状，但已经作为一种有效的方法 被越来越多人采纳，尤其是在缺乏更有效的疗法时。早期介入治疗也非常重要。如果患上精神病后的 数月或数年没有接受治疗，有些精神异常可能 转变成患者人格的一部分。然而，精神病的诊断 会使人背上非人化的污名，患者会因此选择不去求助。精神分裂症患者 一般被认为很危险。实际上，他们更可能是暴力的受害者，而非加害者。适当的治疗也许可以帮助降低患者实施暴力行为的可能性。这就是为什么对病人、 家属以及社会的教育能帮助消除污名， 并让更多人及时获得治疗。

**P838 2020-03-20 Can you solve the sea monster riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=838)

According to legend, once every thousand years a host of sea monsters emerges from the depths to demand tribute from the floating city of Atlantartica. As the ruler of the city, you’d always dismissed the stories… until today, when 7 Leviathan Lords rose out of the roiling waters and surrounded your city. Each commands 10 giant kraken, and each kraken is accompanied by 12 mermites. Your city’s puny army is hopelessly outmatched. You think back to the legends. In the stories, the ruler of the city saved his people by feeding the creatures a ransom of pearls. The pearls would be split equally between the leviathans lords. Each leviathan would then divide its share into 11 equal piles, keeping one, and giving the other 10 to their kraken commanders. Each kraken would then divide its share into 13 equal piles, keeping one, and distributing the other twelve to their mermite minions. If any one of these divisions left an unequal pile or leftover pearl, the monsters would pull everyone to the bottom of the sea. Such was the fate of your fabled sister city. You rush to the ancient treasure room and find five chests, each containing a precisely counted number of pearls prepared by your ancestors for exactly this purpose. Each of the chests bears a number telling how many pearls it contains. Unfortunately, the symbols they used to write digits 1,000 years ago have changed with time, and you don’t know how to read the ancient numbers. With hundreds of thousands of pearls in each chest, there’s no time to recount. One of these chests will save your city and the rest will lead to its certain doom. Which do you choose? Pause the video to figure it out yourself. Answer in 3 Answer in 2 Answer in 1 There isn’t enough information to decode the ancient Atlantartican numeral system. But all hope is not lost, because there’s another piece of information those symbols contain: patterns. If we can find a matching pattern in arabic numerals, we can still pick the right chest. Let’s take stock of what we know. A quantity of pearls that can appease the sea monsters must be divisible by 7, 11, and 13. Rather than trying out numbers at random, let’s examine ones that have this property and see if there are any patterns that unite them. Being divisible by 7, 11, and 13 means that our number must be a multiple of 7, 11, and 13. Those three numbers are all prime, so multiplying them together will give us their least common multiple: 1001. That’s a useful starting place because we now know that any viable offering to the sea monsters must be a multiple of 1001. Let’s try multiplying it by a three digit number, just to get a feel for what we might get. If we try 861 times 1001, we get 861,861, and we see something similar with other examples. It’s a peculiar pattern. Why would multiplying a three-digit number by 1001 end up giving you two copies of that number, written one after the other? Breaking down the multiplication problem can give us the answer. 1001 times any number x is equal to 1000x + x. For example, 725 times 1000 is 725,000, and 725 x 1 is 725. So 725 x 1001 will be the sum of those two numbers: 725,725. And there’s nothing special about 725. Pick any three-digit number, and your final product will have that many thousands, plus one more. Even though you don’t know how to read the numbers on the chests, you can read which pattern of digits represents a number divisible by 1001. As with many problems, trying concrete examples can give you an intuition for behavior that may at first look abstract and mysterious. The monsters accept your ransom and swim back down to the depths for another thousand years. With the proper planning, that should give you plenty of time to prepare for their inevitable return.

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翻译人员: Meng Ren 校对人员: Yanyan Hong传说，每过一千年，一群海怪就会从海底深处浮出水面，向漂浮之城阿特兰蒂卡索要上贡。作为全城的统治者， 你对传说总是不以为然……直至今日，七条利维坦神兽 从滚滚的海浪里翻涌而出包围了你的城邦。每条神兽指挥着十只北海巨怪，每只北海巨怪带领着十二只魔蟹。而你城里的兵力远远不及。你回想起那个传说。故事中提到， 城邦的统治者为了拯救子民，向怪物们上贡珍珠作为赎金。珍珠必须能被 所有利维坦神兽均分。而每条神兽将它所得的 分为十一等份，自留一份，其余的分给十只北海巨怪。每只北海巨怪又将 它的所得分为十三等份，自留一份， 其余的分给十二只蟹卒。若是任意一次分配不能被均分 或最后珍珠有剩余，海怪们就会将整个城邦拖入海底。传说中你的邻城就惨遭其毒手。你赶紧跑去藏宝阁， 找到了五只大宝箱，每个箱子里装有特定数额的珍珠，这正是祖先们为今天准备的。每个藏宝箱的铭牌上都刻着数字， 代表所装的珍珠数量。但不巧的是，祖先的数字 是一千年前的古文字，如今时过境迁，而你不认得这些古老的数字。箱子里的珍珠成百上千， 根本没有再次清点的时间。它们其中一只将会拯救你的城邦，而其余的则无力回天。你要如何选择呢？[ 若要自己找到答案，就暂停一下视频 ][ 答案 3 秒后揭晓 ][ 答案 2 秒后揭晓 ][ 答案 1 秒后揭晓 ]虽然没有足够的信息去揭秘 古阿特兰蒂卡的计数系统。但还是有一线希望，因为那些符号包含着另一类信息：规律。如果我们能找到 相对应阿拉伯数字的规律，就能选出正确的箱子。我们先来总结一下已知的信息。能平息海怪的珍珠数量必须能被 7、11、和 13 整除。与其随机地试不同的数字，不如来研究一下 这些数字的特性，并找到它们共有的模式。能被 7、11、和 13 整除，说明这个数字必须 同时是 7、11、和 13 的倍数，这三个数字均为质数， 所以将它们相乘就得到了最小公倍数：1001。这个信息非常重要，现在我们知道任何一个 能满足海怪们要求的数字必须是 1001 的倍数。让我们来试一试 用它乘以一个三位数，看看能得到怎样的结果。用 861 乘以 1001， 我们得到了 861861，我们找到了所有数组 共有的规律。它们都有一个特定模式。为什么用任意一个三位数乘以 1001，得到的结果从左到右读就是该三位数重复了两次？分解这个乘式就能找到答案。1001 乘以未知数 X 等于 1000 X + X 。例如，725 乘 1000 是 725000 ， 725 乘 1 是 725，所以，725 乘 1001 就是 两个数字总和：725725。我们可以把 725 换成任意一个三位数。随机选择一个三位数，你得到的结果将会是 它的一千倍与它的一倍的和。因此，即使你看不懂 宝箱上的古数字，你仍然能找出符合 1001 整除规律的那一组。许多问题是同一个道理。 面对抽象而神秘的表象时，套入一个具体的例子， 能帮助我们洞察事物背后的规律。最后，海怪们接受了赎金， 潜回了海底深处，等待下一个千年轮回。经过周全地计划，你将会有充裕的准备时间 迎接海怪们下一次不可避免的回归。

**P839 2020-03-20 History vs. Sigmund Freud - Todd Dufresne**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=839)

Working in Vienna at the turn of the 20th century, he began his career as a neurologist before pioneering the discipline of psychoanalysis. He proposed that people are motivated by unconscious desires and repressed memories, and their problems can be addressed by making those motivations conscious through talk therapy. His influence towers above that of all other psychologists in the public eye. But was Sigmund Freud right about human nature? And were his methods scientific? Order, order. Today on the stand we have… Dad? Ahem, no, your honor. This is Doctor Sigmund Freud, one of the most innovative thinkers in the history of psychology. An egomaniac who propagated pseudoscientific theories. Well, which is it? He tackled issues medicine refused to address. Freud’s private practice treated women who suffered from what was called hysteria at the time, and their complaints hadn’t been taken seriously at all. From the women with depression he treated initially to World War I veterans with PTSD, Freud’s talking cure worked, and the visibility he gave his patients forced the medical establishment to acknowledge their psychological disorders were real. He certainly didn’t help all his patients. Freud was convinced that our behavior is shaped by unconscious urges and repressed memories. He invented baseless unconscious or irrational drivers behind the behavior of trauma survivors— and caused real harm. How’s that? He misrepresented some of his most famous case studies, claiming his treatment had cured patients when in fact they had gotten worse. Later therapists influenced by his theories coaxed their patients into "recovering" supposedly repressed memories of childhood abuse that never happened. Lives and families were torn apart. You can’t blame Freud for later misapplications of his work— that would be projecting. Plenty of his ideas were harmful without any misapplication. He viewed homosexuality as a developmental glitch. He coined the term penis envy— meaning women are haunted for life by their lack of penises. Freud was a product of his era. Yes, some of the specifics were flawed, but he created a new space for future scientists to explore, investigate, and build upon. Modern therapy techniques that millions of people rely on came out of the work he started with psychoanalysis. And today everyone knows there’s an unconscious— that idea was popularized Freud. Psychologists today only believe in a “cognitive unconscious,” the fact that you aren’t aware of everything going on at a given moment. Freud took this idea way too far, ascribing deep meaning to everything. He built his theories on scientific ideas that were outdated even in his own time, not just by today’s standards— for example, he thought individual psychology is derived from the biological inheritance of events in ancient history. And I mean ancient— like the Ice Age or the killing of Moses. Freud and his closest allies actually believed these prehistorical traumas had ongoing impacts on human psychology. He thought that the phase of cold indifference to sexuality during pubescence was literally an echo of the Ice Age. With fantastical beliefs like these, how can we take him seriously? Any renowned thinker from centuries past has ideas that seem fantastical by today’s standards, but we can’t discount their influence on this basis. Freud was an innovator linking ideas across many fields. His concepts have become everyday terms that shape how we understand and talk about our own experiences. The Oedipus complex? Ego and id? Defense mechanisms? Death wishes? All Freud. But Freud didn’t present himself as a social theorist— he insisted that his work was scientific. Are you saying he… repressed inconvenient facts? Freud’s theories were unfalsifiable. Wait, so you’re saying he was right? No, his ideas were framed so that there’s no way to empirically verify them. Freud didn’t even necessarily believe in the psychoanalysis he was peddling. He was pessimistic about the impact of therapy. What! I think I need to lie down! Many of Sigmund Freud’s ideas don’t hold up to modern science, and his clinical practices don’t meet today’s ethical standards. At the same time, he sparked a revolution in psychology and society, and created a vocabulary for discussing emotion. Freud made his share of mistakes. But is a thinker responsible for how subsequent generations put their ideas to use? Do they deserve the blame, credit, or redemption when we put history on trial?

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翻译人员: Meng Ren 校对人员: Carol Wang在 20 世纪初的维也纳，他掀开了作为神经学家的职业生涯，后来成为了心理分析领域的先锋人物。他提出，人们被无意识的欲望和受到压抑的记忆所驱使，通过谈话治疗来认识那些内驱力，可以解决他们的心理问题。在大众心目中， 他的影响力远超同僚。但是，西格蒙德 · 弗洛伊德 对人性的认识真的正确吗？他所使用的方法真的科学吗？肃静，肃静。 今天出庭作证的是···父亲？咳咳，不是的，法官大人。这是西格蒙德 · 弗洛伊德博士，心理学史上最具开创性的学者之一。一个鼓吹伪科学理论的自大狂。到底，是好是坏？他解决了医学无法解决的问题。弗洛伊德的私人诊所接诊了当时身患歇斯底里症，但得不到严肃对待的女性。从最初深陷抑郁的女性，到一战结束后得了 创伤后应激障碍的退伍老兵，弗洛伊德的谈话疗法 使他们的症状都得到了改善，而且这种改善迫使医学界权威们承认， 精神障碍并非凭空捏造的疾病。当然，他并非帮到了所有病人。弗洛伊德确信，无意识欲望和被压抑的记忆 塑造了我们的行为，他无中生有地为创伤幸存者捏造了 无意识或非理性的动机 ——这种行为造成了真正的伤害。怎么回事？他歪曲了自己的一些 最广为人知的案例研究，声称他的疗法治愈了病人， 而事实上病人的病情恶化了。受其理论影响，后来的治疗师们诱使病人们“回忆”那些未曾发生过的 被压抑的童年受虐记忆，无数的生命和家庭因此分崩离析。你不能把后人们的过错 怪罪在弗洛伊德头上——那是过度推测。他的许多思想即使未被误用， 也是有害无益的。他将同性恋视为发育偏差。他还提出了“阴茎羡嫉”的概念——意指女性由于没有阴茎 而终生感到自卑难过。弗洛伊德是时代的产物，是的，虽然有一些细节上的漏洞，但是他开创了一个全新的领域 供未来的科学家们探索、研究和建设。数百万计的人们 所依赖的现代治疗技术脱胎于他所开创的精神分析。如今，人人都知晓无意识的存在 ——一个弗洛伊德普及的想法。当代心理学家仅认同 “认知无意识”，即一个人无法在某个特定时刻 对周遭的全部事物产生意识。弗洛伊德对这一概念过度依赖， 将所有事物都赋予了深层意义。他将自己的理论建立在 彼时已经落后的科学理念上，更别提以今天的标准来看了——比如，他认为个体的心理是由古代重大事件 造成的生物遗传衍变而来。我指的“远古”是 像冰河时期或摩西杀戮那么遥远。弗洛伊德和他最忠实的拥趸们相信，这些史前的创伤事件 持续地影响着人类的心理。他认为一个人在青春期 表现出的性冷漠也是源于冰河时期的影响。我们如何能严肃地看待 提出如此荒诞设想之人？数世纪前的著名思想家都会提出在今天的标准下 看来荒诞不经的猜想，然而我们不能 就此否定他们的影响力。弗洛伊德是能把多个学科的思想 串联起来的创新者。他所提出的概念已经应用到了 生活的方方面面，塑造了人们理解和谈论 个人体验的方式。恋母情结？自我与本我？ 防御机制？死亡驱力？这些都是弗洛伊德提出的。但是弗洛伊德并不认为 自己是社会理论家——他坚称自己的理论是科学的。你是说他······避开了 不利于自己的事实？弗洛伊德理论具有不可证伪性。等等，你是说他没错?不，他的设想无法用实验证实。弗洛伊德甚至都不一定相信 自己所兜售的精神分析理论。他对谈话治疗的效果 也持悲观态度。什么？ 我想我得躺一会儿！弗洛伊德的许多想法 与现代科学相悖，他的治疗实践 也不符合今天的道德标准。但与此同时，他驱动了 心理学和社会的变革，建立了一套 用于谈论情绪的词汇。弗洛伊德的确犯了许多错误。但是一个思考者应该对后人如何 实践他们的想法负责吗？当我们审视历史时，他们应该受到批判、 嘉奖，还是救赎呢？

**P840 2020-03-20 Why isn’t the Netherlands underwater - Stefan Al**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=840)

In January of 1953, a tidal surge shook the North Sea. The titanic waves flooded the Dutch coastline, killing almost 2,000 people. 54 years later, a similar storm threatened the region. But this time, the Netherlands were ready. As the water swelled, state-of-the-art computer sensors activated emergency protocols. Over the next 30 minutes, a pair of 240-meter steel arms swung shut, protecting the channel ahead. Using 680-tonne ball joints, the barrier moved in rhythm with the shifting wind and waves. By morning, the storm had passed with minimal flooding. The first field activation of the Maeslantkering had been a resounding success. As one of the planet’s largest mobile structures, this storm surge barrier is a marvel of human engineering. But the Maeslantkering is just one part of a massive, interlocking system of water controls known as the Delta Works— the most sophisticated flood prevention project in the world. The Netherlands has a long history with water management. The country lies along the delta of three major European rivers, and nearly a quarter of its territory is below sea level. This geography makes the region extremely prone to flooding. So much so, that some of the earliest Dutch governing bodies were informal “water boards” that coordinated flood protection projects. But after the storms of 1953, the Dutch government took more official measures. They established the Delta Commission, and tasked them with protecting the entire southwestern region. Focusing on densely populated cities, their aim was to reduce the annual odds of flooding below 1 in 10,000— about 100 times as safe as the average coastal city. Accomplishing this lofty goal required various infrastructure projects along the southwestern coast. The first line of defense was to dam the region’s flood-prone estuaries. These large inlets fed many of the country’s rivers into the North Sea, and during storms they allowed flood water to surge inland. Using a series of dams, the Delta Commission transformed these estuaries into expansive lakes that serve as nature preserves and community parks. However, this solution wouldn’t work for the Nieuwe Waterweg. As the lifeblood of the local shipping industry, this passage had to be kept open in safe conditions, and barricaded during storm surges. In 1998, the completed Maeslantkering provided the flexible protection necessary. Alongside additional barriers, like grassy dikes and concrete seawalls, these fortifications made up the bulk of the Delta Works project, which was primarily focused on holding back ocean storms. But in the following decades, the Dutch pursued additional plans to complement the Delta Works and protect against floods further inland. Under the "Room for the River" plan, farms and dikes were relocated away from the shore. This left more space for water to collect in low-lying floodplains, creating reservoirs and habitats for local wildlife. This strategic retreat not only decreased flood risk, but allowed for the redeveloped settlements to be built more densely and sustainably. Perhaps no city embodies the Netherlands' multi-pronged approach to water management as much as Rotterdam, a thriving city almost entirely below sea level. When a storm threatens, densely populated older districts are protected by traditional dikes. Meanwhile, newer districts have been artificially elevated, often sporting green roofs that store rainwater. Numerous structures around the city transform into water storage facilities, including parking garages and plazas which normally serve as theaters and sports arenas. Meanwhile in the harbor, floating pavilions rise with the water level. These are the first of several planned amphibious structures, some of which house water purification systems and solar collectors. These strategies are just some of the technologies and policies that have put the Netherlands at the cutting edge of water management. The country continues to find new ways to make cities more resilient to natural disasters. And as the rising sea levels caused by climate change threaten low-lying cities across the world, the Netherlands offers an exceptional example of how to go with the flow.

**P840 2020-03-20 Why isn’t the Netherlands underwater - Stefan Al**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=840)

翻译人员: Vincent Ni 校对人员: Kim MinSeo在 1953 年的一月， 一场风暴潮震动了北海。巨浪淹没了 荷兰的海岸线，将近 2000 人丧命。54 年后，一场类似的暴雨 又威胁了这片区域。但这次，荷兰做好了准备。当水位涨起来，先进的电脑感应器 开启了紧急应对措施。在接下的 30 分钟，一双 240 米的钢臂合拢了起来，保护着前方的海峡。利用 680 吨的球形接头，这道屏障自然的 在风浪中运行。在早晨，暴雨已过， 但并没有发生大规模的洪水。马仕朗大坝（Maeslantkering）的 第一次实地运行是一次巨大的成功。作为全球最大的 活动建筑之一，这道风暴潮屏障 是人类工程上的一个奇迹。但是马仕朗大坝只是 一个被称为“三角洲工程”的庞大、连锁的 水控制系统的一部分。“三角洲工程”是世界上 最复杂的防洪工程。荷兰的水资源管理 有着悠久的历史。这个国家位于欧洲 三大河流交汇处的三角洲，荷兰近四分之一的领土位于水下。这样的地形使得 荷兰很容易被洪水淹没。鉴于这样的情况，荷兰 最早的一些政治团体曾经是组织防洪项目的 非正式的“水资源管理委员会”。但在 1953 年的暴雨之后， 荷兰政府采取了更多官方应对措施。他们成立了三角洲委员会，负责帮助整个西南部地区 抵御洪水侵害。以人口密集的城市为工作重心，他们的目标是把每年洪水发生的几率 减少至低于万分之一——相当于一个普通海岸城市 安全程度的一百倍。为了实现这个巨大的目标， 西南沿海地区需要进行各种基础设施建设。第一道防线，是在该地区 易受洪水侵袭的河口筑坝。这些大水湾会将 荷兰境内的河流引入北海，而在风暴潮发生时， 洪水会沿河涌入而淹没大陆。利用一系列的水坝，三角洲委员会 得以将这些河口改造成广阔的湖泊， 作为自然保护区和社区公园。然而，这个方法不能用在 新水道（Nieuwe Waterweg）上。作为当地航运业的命脉，这条水道必须在 安全的情况下保持畅通，并在风暴潮期间设置屏障。在 1998 年，完工的马仕朗大坝为海岸提供了必要且可变通的保护。还有一些额外的屏障， 比如长满草的堤坝和混凝土海堤，这些防御措施 构成了“三角洲工程”的核心，主要为了阻挡大洋上的暴风。但在之后的几十年， 荷兰人又制定了更多的计划，以补充“三角洲工程”， 并防范内陆地区的洪水。在”河流空间“方案下，农场和堤坝被迁移到了 远离海岸的地方。这样就为低洼的洪泛区 留出了更多的空间，创造了水库，也为当地的 野生动物提供了栖息地。这一战略性撤退方案 不仅降低了洪水发生的风险，而且能够让重新开发的定居点更加密集和可持续。最能体现荷兰多管齐下的 水资源管理方式的就是鹿特丹，一座几乎完全 位于海平面之下的繁华都市。当一场暴雨逼近，人口密集的旧区域会 被传统的堤坝保护。与此同时，新城区被人为抬高，并且常常使用绿化屋顶来储存雨水。城市周围的许多建筑 都变成了蓄水设施，比如停车场和广场，这些地方平常被用作 剧场和体育场。与此同时，在港口，浮动的亭台建筑 会随着水位的上升而上升。这些是早期规划中的 水陆两用建筑，其中一些安装了净水系统 和太阳能收集器。这些策略只是让荷兰身处水资源管理前沿的 一部分技术和政策。荷兰也在不停地发掘 新的方法，以提高城市抵御自然灾害的能力。随着由气候变化导致的海平面上升威胁到了世界各地 低海拔的城市，荷兰则是顺应 生态趋势方面的一个典范。

**P841 2020-03-25 How the world's longest underwater tunnel was built - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=841)

Flanked by two powerful European nations, the English Channel has long been one of the world’s most important maritime passages. Yet for most of its history, the channel’s rocky shores and stormy weather made crossing a dangerous prospect. Engineers of the early 1800's proposed numerous plans for spanning the 33 kilometer gap. Their designs included artificial islands linked by bridges, submerged tubes suspended from floating platforms, and an underwater passage more than twice the length of any existing tunnel. By the end of the century, this last proposal had captured European imagination. The invention of the tunnel boring machine and the discovery of a stable layer of chalk marl below the seabed made this fantastic tunnel more feasible. But the project’s most urgent obstacles were ones no engineer could solve. At the time, Britons viewed their geographic isolation as a strategic advantage, and fears about French invasion shut down plans for the tunnel. The rise of aerial warfare rendered these worries obsolete, but new economic concerns arose to replace them. Finally, 100 years after the initial excavation, the two countries reached an agreement— the tunnel would proceed with private funding. In 1985, a group of French and British companies invested the modern equivalent of 14 billion pounds, making the tunnel the most expensive infrastructure project to date. The design called for three separate tunnels— one for trains to France, one for trains to England, and one service tunnel between them. Alongside crossover chambers, emergency passages, and air ducts, this amounted to over 200 kilometers of tunnels. In 1988, workers began excavating from both sides, planning to meet in the middle. Early surveys of the French coast revealed the site was full of fault lines. These small cracks let water seep into the rock, so engineers had to develop waterproof boring machines. The British anticipated drier conditions, and forged ahead with regular borers. But only months into the work, water flooded in through undetected fissures. To drill in this wet chalk, the British had to use grout to seal the cracks created in the borer’s wake, and even work ahead of the main borer to reinforce the chalk about to be drilled. With these obstacles behind them, both teams began drilling at full speed. Boring machines weighing up to 1,300 tons drilled at nearly 3.5 meters per hour. As they dug, they installed lining rings to stabilize the tunnel behind them, making way for support wagons following each machine. Even at top speed, work had to proceed carefully. The chalk layer followed a winding path between unstable rock and clay, punctured by over 100 boring holes made by previous surveyors. Furthermore, both teams had to constantly check their coordinates to ensure they were on track to meet within 2 centimeters of each other. To maintain this delicate trajectory, the borers employed satellite positioning systems, as well as paleontologists who used excavated fossils to confirm they were at the right depth. During construction, the project employed over 13,000 people and cost the lives of ten workers. But after two and a half years of tunneling, the two sides finally made contact. British worker Graham Fagg emerged on the French side, becoming the first human to cross the channel by land since the Ice Age. There was still work to be done— from installing crossover chambers and pumping stations, to laying over a hundred miles of tracks, cables, and sensors. But on May 6, 1994, an opening ceremony marked the tunnel’s completion. Full public service began 16 months later, with trains for passengers and rail shuttles for cars and trucks. Today, the Channel Tunnel services over 20 million passengers a year, transporting riders across the channel in just 35 minutes. Unfortunately, not everyone has the privilege of making this trip legally. Thousands of refugees have tried to enter Britain through the tunnel in sometimes fatal attempts. These tragedies have transformed the tunnel’s southern entrance into an ongoing site of conflict. Hopefully, the structure’s history can serve as a reminder that humanity is at their best when breaking down barriers.

**P841 2020-03-25 How the world's longest underwater tunnel was built - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=841)

翻译人员: Xiaoli JIANG 校对人员: Yanyan Hong英吉利海峡位于 欧洲两大强国之间，一直是世界的航运要道之一。然而，在它大部分的历史中，因两岸陡峭、天气恶劣，使穿越海峡极具危险性。19 世纪初期的工程师 设计了无数方案试图连接起这 33 公里的裂口。他们的设计 包括用人工岛衔接桥梁，用浸在水中的管道来悬挂漂浮平台，以及建造一条长度超过 任何已有隧道两倍的海底通道。在十九世纪末，最后这个方案成了欧洲人的遐想。隧道掘进机的发明，以及在海床底下 发现稳定的白垩岩层，让这个奇想中的隧道更有可能实现。然而，这个计划最迫切的障碍， 却没有一个工程师能够解决。当时的英国人认为地理的隔离是他们的战略优势，他们惧怕法国会入侵， 因而停止了隧道的计划。空战出现后，这种担忧不复存在，取而代之的是经济上的顾虑。直到初次动工的 100 年之后，两国才达成协议——即，隧道建设由私人资金承担。1985 年，一些法国和英国的公司投资了相当于现在的 140 亿英镑，使这个项目成为了当时 最昂贵的基建项目。方案包含三条独立隧道，一条供列车驶向法国， 一条供列车驶向英国，中间还有一条辅助隧道。再加上连接通道、 紧急疏散通道和通风管道，整个隧道的长度 加起来超过 200 公里。1988 年，工人们从两端开凿隧道，计划在中间相遇。在法国海岸的前期探测显示 这片区域充满了断层线，水会通过这些缝隙渗入到岩石中，工程师们不得不 开发了防水隧道掘进机。英国那边的岩石被认为更干燥， 所以采用的是普通隧道掘进机。然而开工不过数月， 水就从不明裂隙中涌入。为了在潮湿的白垩岩中继续钻洞， 英国人不得不在隧道掘进机作业后注浆以封闭可能的渗水，有时甚至要在隧道掘进主机到达前，预先固结掘进前方的白垩。这些问题解决后，双方全速开工。自重可达 1300 吨的隧道掘进机， 每小时能向前推进约 3.5 米，隧道掘进机向前掘进的同时 会在已挖掘的隧道中安装衬砌环，为隧道掘进机后部的配套台车开路。即便全速前进，工作也必须细致。白垩地层位于不稳定的 岩石和黏土之间，蜿蜒曲折，当中分布着 100 多个 前期勘探留下的钻探孔。另外，双方队伍必须 不断测量他们的坐标以确保隧道贯通时误差小于两厘米。为了保障轨道的精准性，隧道掘进机内设置有卫星定位系统，同时，擅于挖掘化石的 古生物学家也帮助施工队确保他们处在正确的深度。共有一万三千多人 参与到隧道建设中，其中十人因工程丧生。挖掘了两年半后，双方终于碰面了。英国工人格雷厄姆·法格 出现在了隧道的法国段，他是冰河世纪以来从陆地上 跨越英吉利海峡的第一人。工程还没有结束——还需要设置连接通道、抽水站，铺设一百多英里长的 轨道、电缆和传感器等。1994 年 5 月 6 日， 隧道的开幕式标志着正式完工。16 个月后，隧道面向公众投入使用，火车运送乘客， 区间火车摆渡汽车卡车。如今，英法海底隧道每年服务的 旅客数量超过两千万人次，只需 35 分钟便可跨越英吉利海峡。可惜并非所有人 都能合法地跨越海峡。曾经有成千上万的难民尝试 通过隧道进入英国，有时甚至因此丧命。这些悲剧使得隧道南边的入口变成持续发生冲突的地方。希望隧道的历史可以提醒人们，消除隔阂对于人性来说才是最好的。

**P842 2020-04-01 How does alcohol make you drunk - Judy Grisel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=842)

Ethanol: this molecule, made of little more than a few carbon atoms, is responsible for drunkenness. Often simply referred to as alcohol, ethanol is the active ingredient in alcoholic beverages. Its simplicity helps it sneak across membranes and nestle into a many different nooks, producing a wide range of effects compared to other, clunkier molecules. So how exactly does it cause drunkenness, and why does it have dramatically different effects on different people? To answer these questions, we’ll need to follow alcohol on its journey through the body. Alcohol lands in the stomach and is absorbed into the blood through the digestive tract, especially the small intestine. The contents of the stomach impact alcohol’s ability to get into the blood because after eating, the pyloric sphincter, which separates the stomach from the small intestine, closes. So the level of alcohol that reaches the blood after a big meal might only be a quarter that from the same drink on an empty stomach. From the blood, alcohol goes to the organs, especially those that get the most blood flow: the liver and the brain. It hits the liver first, and enzymes in the liver break down the alcohol molecule in two steps. First, an enzyme called ADH turns alcohol into acetaldehyde, which is toxic. Then, an enzyme called ALDH converts the toxic acetaldehyde to non-toxic acetate. As the blood circulates, the liver eliminates alcohol continuously— but this first pass of elimination determines how much alcohol reaches the brain and other organs. Brain sensitivity is responsible for the emotional, cognitive, and behavioral effects of alcohol— otherwise known as drunkenness. Alcohol turns up the brain’s primary brake, the neurotransmitter GABA, and turns down its primary gas, the neurotransmitter glutamate. This makes neurons much less communicative, and users feel relaxed at moderate doses, fall asleep at higher doses, and can impede the brain activity necessary for survival at toxic doses. Alcohol also stimulates a small group of neurons that extends from the midbrain to the nucleus accumbens, a region important for motivation. Like all addictive drugs, it prompts a squirt of dopamine in the nucleus accumbens which gives users a surge of pleasure. Alcohol also causes some neurons to synthesize and release endorphins. Endorphins help us to calm down in response to stress or danger. Elevated levels of endorphins contribute to the euphoria and relaxation associated with alcohol consumption. Finally, as the liver’s breakdown of alcohol outpaces the brain’s absorption, drunkenness fades away. Individual differences at any point in this journey can cause people to act more or less drunk. For example, a man and a woman who weigh the same and drink the same amount during an identical meal will still have different blood alcohol concentrations, or BACs. This is because women tend to have less blood— women generally have a higher percentage of fat, which requires less blood than muscle. A smaller blood volume, carrying the same amount of alcohol, means the concentration will be higher for women. Genetic differences in the liver’s alcohol processing enzymes also influence BAC. And regular drinking can increase production of these enzymes, contributing to tolerance. On the other hand, those who drink excessively for a long time may develop liver damage, which has the opposite effect. Meanwhile, genetic differences in dopamine, GABA, and endorphin transmission may contribute to risk for developing an alcohol use disorder. Those with naturally low endorphin or dopamine levels may self-medicate through drinking. Some people have a higher risk for excessive drinking due to a sensitive endorphin response that increases the pleasurable effects of alcohol. Others have a variation in GABA transmission that makes them especially sensitive to the sedative effects of alcohol, which decreases their risk of developing disordered drinking. Meanwhile, the brain adapts to chronic alcohol consumption by reducing GABA, dopamine, and endorphin transmission, and enhancing glutamate activity. This means regular drinkers tend to be anxious, have trouble sleeping, and experience less pleasure. These structural and functional changes can lead to disordered use when drinking feels normal, but not drinking is uncomfortable, establishing a vicious cycle. So both genetics and previous experience impact how a person experiences alcohol— which means that some people are more prone to certain patterns of drinking than others, and a history of consumption leads to neural and behavioral changes.

**P842 2020-04-01 How does alcohol make you drunk - Judy Grisel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=842)

翻译人员: Huihong Bai 校对人员: Yanyan Hong乙醇：其分子是由碳原子组成，能够让人产生醉意。乙醇通常被简称为酒精，是含酒精饮料中的活性成分。简单的分子结构使它能透过细胞膜，并停留在许多不同位置，从而比其他较重的分子 产生更多的影响。那么乙醇是怎样让人产生醉意的？为什么它对不同人的影响 会有天壤之别？要回答这些问题，我们就要跟着酒精 去看看它在人体内的旅程。酒精首先进入胃部，通过消化道，尤其是小肠，被血液吸收。胃里的东西会影响 酒精进入血液的能力，因为进食之后幽门括约肌闭合，而幽门括约肌是分隔 胃部和小肠的部分。所以在一顿大餐过后， 酒精进入血液的能力可能只有空腹时的四分之一。酒精从血液进入身体器官，尤其是血液流动较多的器官：肝脏和大脑。酒精首先到达肝脏，肝脏中的酶类物质分两步分解酒精。首先，乙醇脱氢酶 (ADH) 将酒精转化为有毒的乙醛。接着，乙醛脱氢酶(ALDH) 将有毒的乙醛转化为无毒的醋酸盐。随着血液的循环，肝脏持续分解酒精，而分解乙醇的第一步决定了有多少酒精 会到达大脑和其他器官。酒精对情绪、 认知和行为的影响——也就是我们常说的醉态—— 都是由大脑敏感程度决定。酒精会给大脑踩刹车， 即提升氨基丁酸水平，使大脑更镇静；同时给大脑松油门， 即降低谷氨酸水平，减弱兴奋度。这会让神经细胞活跃度降低。适量摄入酒精使人感觉放松， 大量摄入则会陷入睡眠，而过量摄入可能抑制 大脑生存所必须的活动。酒精也会对一小部分 神经细胞有激活效果，并从中脑持续到伏隔核区域，而伏隔核在奖赏和快乐等 感官体验中具有重要作用。和所有成瘾性药物一样，酒精可以提升伏隔核中的多巴胺含量，使饮用者产生愉悦感。酒精还能使部分 神经细胞合成并释放内啡肽。内啡肽可以帮助我们在 面对压力和危险时保持镇定。摄入酒精后的愉悦与放松感正是由于内啡肽水平的上升。最后，当肝脏分解酒精的速度 超过了大脑吸收的速度，醉意就逐渐散去了。整个过程中不同个体间的任何差异都会造成每个人醉酒程度的不同。比如，体重相同的一男一女在进食情况相同的情况下 摄入等量酒精，最终血液中的酒精浓度 (BAC) 仍然会有差异。这是因为女性体内血液含量较少——一般而言女性脂肪含量高于男性，而脂肪所需血液少于肌肉。等量的酒精和较少的血液，意味着女性血液中的酒精浓度会更高。肝脏中分解酒精的酶类与遗传有关， 这也会影响血液酒精浓度。定期饮酒可以提高这类酶的产生水平，对分解能力有所帮助。另外，长期过度饮酒的人，肝脏可能会受损， 从而产生反效果。同时，多巴胺、氨基丁酸、 内啡肽传导的遗传性差异可能会增加酗酒的风险。先天内啡肽或多巴胺水平较低的人，可以通过饮酒进行自我治疗。也有人可能由于 对内啡肽的敏感度较高，提升了酒精带来的愉悦感，从而导致过量饮酒的风险升高。还有人会因为氨基丁酸传导的变异，导致对酒精的镇静作用非常灵敏，而这会降低他们酗酒的可能性。同时，大脑为了适应长期的酒精摄入，会降低氨基丁酸、多巴胺及内啡肽的 传递水平，同时提升谷氨酸盐的活动。这意味着经常喝酒会让人 变得焦虑、产生睡眠障碍，且较难产生愉悦感。当喝酒感觉很正常， 不喝酒反而不舒服时，这种结构性和功能性的变化 可能导致酒精滥用，因此陷入恶性循环。总而言之，遗传因素和过往经验 都会影响个体对酒精的反应——也就是说有一些人在喝酒后会比其他人有更明显的反应，而长期酒精摄入会导致 神经系统和行为发生变化。

**P843 2020-04-03 How the Monkey King escaped the underworld - Shunan Teng**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=843)

In the depths of their underwater kingdom, the mighty Dragon Lords quaked with fear. Before them pranced Sun Wukong, the Monkey King. The legendary troublemaker been hatched from a stone, schooled in divine magic, and was currently brandishing the Dragon Lord’s most treasured weapon. This magical staff, originally large enough to measure the depth of a great flood, now obeyed the Monkey King’s will and shrank at his touch. Terrified of this bewildering power, the Dragons graciously allowed Sun Wukong to keep the staff. The Monkey King stowed the weapon away, and gleefully sped back to his kingdom to show this treasure to his tribe of warrior monkeys. After a lavish celebration, Sun Wukong fell into a deep sleep. But just as he began to dream, the Monkey King quickly realized two things. The first was that this was no ordinary slumber. The second was that he wasn’t alone. Suddenly, he found himself caught in the clutches of two grisly figures. At first the Monkey King didn’t know who his captors were. But as they dragged him toward their city’s gates, Sun Wukong realized his deathly predicament. These were soul collectors tasked with transporting mortals to the Realm of the Dead. This was the domain of the Death Lords, who mercilessly sorted souls and designed gruesome punishments. From here, the kingdom of death was laid out before him. He could see the Death Lord’s palaces, and the fabled bridge across the river Nai He. Manning the bridge was an old woman who offered worthy souls a bowl of soup. After drinking, the spirits forgot their previous life, and were sent back to the world of the living in a new form. Further below were the souls not worthy of reincarnation. In this twisting maze of chambers, unfortunate spirits endured endless rooms of punishment— from mountains spiked with sharp blades, to pools of blood and vats of boiling oil. But Sun Wukong was not about to accept torture or reincarnation. As the soul collectors attempted to drag him through the gates, the Monkey King whipped out his staff and swung himself out of their clutches. His battle cries and the clang of weapons echoed throughout the underworld. Sensing a disturbance, the ten Death Lords swooped upon him. But they had never met such resistance from a mortal soul. What was this unusual creature? And was he a mortal, a god— or something else? The Lords consulted the Book of Death and Life— a tome which showed the time of every living soul’s death. Not knowing what category this strange being was under, the Death Lords struggled to find Sun Wukong at first; but the Monkey King knew just where to look. Unfortunately, the records confirmed the Death Lord’s claim— Sun Wukong was scheduled to die this very night. But the Monkey King was not afraid. This was far from the first time he’d defied destiny in his quest for wisdom and power. His past rebellions had earned him the power to transfigure his body, ride clouds at dizzying speeds, and govern his tribe with magic and martial arts. In this crisis, he saw yet another opportunity. With a flash of his nimble fingers, the Monkey King struck his own name from the Book. Before the Death Lords could respond, he found the names of his monkey tribe and swept them away as well. Liberated from the bonds of death, Sun Wukong began to battle his way out of the underworld. He deftly defeated endless swarms of angry spirits— before tripping on his way out of the kingdom. Just before he hit the ground, Sun Wukong suddenly awoke in his bed. At first he thought the journey might have been a dream, but the Monkey King felt his new immortality surging from the top of his head to the tip of his tail. With a cry of triumph, he woke his warriors to share his latest adventure— and commence another round of celebration.

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翻译人员: Ethan Huang 校对人员: Lipeng Chen在水底龙宫的深处，法力强大的龙王们害怕地颤抖着。美猴王孙悟空在他们面前 趾高气昂地走着。这个从石头中孕育并学会了 神仙法术的传奇惹祸精现在正挥舞着龙王最珍视的兵器。这根金箍棒，最开始大到足够可以衡量大禹治水时 大洪水的深度，现在遵从于美猴王的意愿而 在触碰之后缩小了。惊恐于这意想不到的力量，龙王们只能客气地允许孙悟空 保留着这根金箍棒。美猴王收起了这件武器，然后兴高采烈地快速回到了他的 地盘去向他的猴子勇士们展示他的宝贝。在一场盛大的庆祝以后， 孙悟空陷入深睡之中。但是就在他开始做梦时，美猴王很快意识到了两件事情。第一件事是这不仅仅是普通的睡眠。第二件事情是在他梦中的， 不仅仅是他一个。突然，他发现现自己被两个 瘆人的身影紧紧抓住。一开始，美猴王并不知道 这些抓他的人是谁。当他们把他抓到他们的城市大门时，孙悟空意识到了他的致命处境。他们是黑白无常负责把凡人送往冥间。这里就是阎王的领地它无情地把灵魂进行分类 并且制定了可怕的惩罚。在这里，死者之地就在他的面前呈现了。他可以看到阎王的宫殿，还有传说中在奈何河之上的桥。守护着这座桥的是一位老妇人，她会为 合格的灵魂提供一碗汤。在喝下这碗汤以后，灵魂 会忘记他的前生，然后他会被送回人间重新开始新的生活。在这之下是不能合格转生的灵魂。在这些扭曲的迷宫般的房间中，不幸的灵魂忍受着无尽的惩罚——从上刀山到下血池和油锅。但是孙悟空不准备接受惩罚或者转生。当黑白无常试着拖拽他通过大门时，美猴王挥出了他的武器并且 脱离了他们的束缚。他的战斗声和武器的敲击声 回响在亡者世界。感知到了动乱，十阎王对他 发起来猛然袭击。但是他们从来没有从凡人的灵魂身上 遇到过如此的抵抗。这个不寻常的生物是什么？他是凡人、神仙——还是其他什么？阎王们查询着生死簿——这本巨著可以展示所有生灵的死亡时间。不知道这个奇怪生物是在那个种类之下，阎王们刚开始很难找到孙悟空的名字；但是美猴王知道在哪里可以找到。不幸的是，记录证实了阎王们所说的——孙悟空就是被设定在今晚死去。但是美猴王不害怕这一点。这离他第一次反抗他的命运去 寻求智慧和力量的时候已经过去了很久。他过去的反叛让他获取了法力诸如 变换身形，腾云急行，以及用法力 和武术管理他的部族。在这次危机当中，他发现了另外一个机遇。用他灵活的手指一划，美猴王便把他的名字从生死簿上删去。在阎王们反应过来之前，他找到了他部落中猴子的名字然后把 这些名字也清除干净。从死亡的束缚中解脱开来，孙悟空开始打出一条离开亡者世界的路。他灵活地击败了无数群愤怒的灵魂——在开启离开冥间的旅程之前。就在他刚要触及地面时，孙悟空 突然从床上惊醒。刚开始他认为这趟旅途可能是一场梦，但是美猴王从头至尾地感受到了他新获得的不死之力。在胜利的叫喊中，他唤醒了他的勇士们 并且分享了最近的这次冒险——然后开始了另一轮的庆祝。

**P845 2020-04-09 The Gauntlet \_ Think Like A Coder, Ep 8**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=845)

Their fall from the tower sends Ethic and Hedge spinning into the rapids of a river of pure energy. This torrent flows from the Bradbarrier all the way to Huxenborg. There an entire city’s worth of factories build the robots and house the Node of Memory, the last of the three powerful artifacts Ethic needs to collect. After a long day and a longer night they find themselves in a canyon of brick and steel. Just when they’re about to reach the end of the line, a rope catches them. Their savior, Lemma, has been waiting for them. When Ethic claimed the Node of Creation from the forest tower, radios all across the land came back to life. Adila, the resistance leader, immediately started contacting her allies, none more important than Lemma, a brilliant scientist working from within Huxenborg to bring down the machines. Unfortunately, the radios also tipped off the robots. So they’ve taken defensive measures to protect the final artifact in its home in the very heart of the city. There’s only one way to get there: the gauntlet of forking paths. It’s a deadly series of luminous conveyors that wind underneath Huxenborg. Starting from the current position, each section runs for a distance, then splits in two. Every branch does the same thing, again and again. There are thousands of branches. Only one path leads to the artifact; all the others to destruction. Fortunately, the Node of Creation has granted Hedge a strange power: he can produce slightly smaller versions of himself. Each version can do only two things: radio information back to its parent, and produce slightly smaller versions of itself… which can do the same two things, as can their children, for as many generations as needed. A patrol is closing in on their position, so Ethic’s time is limited. What instructions should she give Hedge to find the one safe path? Pause the video to figure it out yourself. Hint in 3 Hint in 2 Hint in 1 Programmers have an elegant tool in their arsenal called recursion. Recursion is when you have a set of instructions that refers back to itself. It’s like using a word in its own definition, except where that’s frowned upon, this is incredibly effective. Recursion involves repetition, but in a different way than loops. Where a loop takes one action and repeats it again and again, recursion will start an action, and before it’s finished, use it again, and before that’s finished, use it again, and so on. It keeps doing this until some end state is reached. It then passes the information back up, layer after layer, until it reaches the top and ends the cycle. Recursion is ideal for problems that involve self-similarity, where each part resembles the larger whole. Like, for example, a deadly defense system designed to end any person or thing who dares tread upon it. Pause the video to figure it out yourself. Solution in 3 Solution in 2 Solution in 1 Ethic’s conundrum seems sprawling on the surface, but there’s a remarkably simple solution to it using recursion. In order to find it, let’s first look at the simplest version of this puzzle: what if the entire maze were just two paths? If Hedge copies himself, the copy that goes the wrong way will be destroyed. So the other one, which will reach the artifact, can radio back the path it took, and then no matter which way is correct, that’s the answer Hedge will receive. This is called the "base case" of the recursion. Now, suppose the maze branches twice from the starting point, and at every intersection, Hedge’s copies— let’s call them Twig 1 and Twig 2— make more copies— let’s call them Leaves 1 through 4. Three Leaves will be destroyed. The one that reaches the artifact will radio back the right answer, but only to its parent. So if Twig 1 or 2 is waiting at an intersection and hears something over the radio, that’s the right way to go to the artifact from where it is. To tell Hedge the right answer from his perspective, the Twig should say which way it went, and then the route it just heard over the radio. This same process will work no matter how many times the maze branches. Any answer a copy hears on the radio must be the way to the control room from its location, and if it then adds the branch it took, it can tell its parent how to get there as well. We can sum up the instructions in an action called Pathfinder that every version of Hedge will follow: 1. If you’ve reached the artifact, radio to your parent whether you got there by going left or right. 2. When you reach an intersection, move off the conveyor and send new copies down the left and right paths. Have them each run Pathfinder. This is where recursion comes in, and this may happen many times before the last instruction triggers, which is: 3. If you hear anything over the radio, you should radio to your parent whether you got to your spot by going left or right, then repeat everything you just heard. Pathfinder is an example of what programmers call functions, subroutines, or procedures. No matter the terminology, the idea is the same— it’s a set of instructions given a label so that it can be easily reused— perhaps even by itself. And in our case that’ll work perfectly— an entire network of paths mapped using just three instructions. So here's what happens. By the time the patrol rounds the corner, Ethic and Lemma have improvised disguises. They try to confuse the bots long enough to buy Hedge time. Finally, Hedge’s radio crackles to life with a series of directions. The three dive onto the conveyor and flee for their lives, with a squadron of enforcer bots in hot pursuit.

**P845 2020-04-09 The Gauntlet \_ Think Like A Coder, Ep 8**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=845)

翻译人员: Yolanda Zhang 校对人员: Carol WangEthic 和 Hedge 从高塔坠落，翻滚着掉进了纯能量激流中，这条来自 Bradbarrier 的激流 通向 Huxenborg。那里整个城市的工厂 都在制造机器人，也是记忆节点的存放地点。三件强力神器中，记忆节点 是 Ethic 需要收集的最后一件。度过了漫长的一天 和更漫长的夜晚后，他们发现自己正身处 由砖块和钢铁构成的峡谷中。正当他们快到达激流的尽头时，一条绳索套住了他们，他们的救世主 Lemma 已等候多时。当 Ethic 从森林高塔取得创造节点后，陆地上所有的无线装置 都恢复了正常运作。反抗军领袖 Adila 立即开始联系盟友，首推在 Huxenborg 工作的 杰出科学家 Lemma，由她从内部协助打败机器人。不料，无线电波也惊动了守卫。守卫因此采取了防御措施，来保护位于城市中心 关键区域的最后神器。要到达那里，只有一种办法： 战胜分叉路径的严酷挑战。这是一系列致命的发光传送带， 在 Huxenborg 地下蜿蜒而行。从当前位置开始，每条路延伸一段后就分为两条；每个分支不断重复此过程，从而产生了成千上万的分支。通往神器的路只有一条； 其他的路径只会通向毁灭。幸运的是，创造节点 赋予了 Hedge 一种神秘力量：能生成比自身略小的两个复制体。每个复制体只能做两件事：通过无线电向父级传回信息， 并复制两个更小的自己 ... ...这些复制体与其子级复制体 也会做同样的这两件事，不断复制直至满足数量。一支巡逻队正在接近他们， Ethic 的时间很有限。为了找到安全路径， 她该给 Hedge 下达什么指令？[ 可暂停视频，自行解题 ][ 答案揭晓：3 ][ 答案揭晓：2 ][ 答案揭晓：1 ]程序员的装备库中 有一件强大的工具叫递归，它是一组不断进行自引用的指令，就像用一个词本身来定义这个词，除了让人觉得怪异之外， 这种方式本身非常有效。递归涉及重复，但与循环不同。循环在执行一次操作后， 会重复执行这个过程，而递归在开始执行一次操作后 ， 会在完成之前再次执行操作，完成前再次执行同样动作， 以此类推下去 ... ...一直重复此操作， 直到满足某种条件，然后将信息一层层传递回去，直到传回起点，最后结束循环。递归非常适合解决 涉及自相似性的问题，其中每个部分都与整体高度相似。例如，一个致命的防御系统，设计用来终结任何大胆的闯入者。[ 可暂停视频，自行解题 ][ 答案揭晓：3 ][ 答案揭晓：2 ][ 答案揭晓：1 ]Ethic 的难题表面看起来很难，但使用递归就特别简单了。为了找到这个方法， 先来看看谜题的最简版本：如果整个迷宫只有两条路呢？如果 Hedge 复制两个自己， 走入错路的复制体将被毁灭。另一个复制体会抵达神器，并用无线电发回其路径信息， 不需要考虑其他路径，那就是 Hedge 接收到的答案。这就是 “递归的基本情况”。现在，假设迷宫由起点分为两支，在每个分支的节点 Hedge 进行自我复制 ——我们称为 分支 1 和 分支 2——它们继续进行复制， 得到 叶片 1 至叶片 4，三条分支会被摧毁。到达神器的那条路径 将传回正确答案，但只回传给父级。如果分支 1 或 2 在节点等待并从无线电收到回传信息，即从其所在位置 通往神器的正确道路。要从分支的角度 告诉 Hedge 正确答案，分支会报告自己走过的路径，以及刚从无线电收到的路径信息。不管迷宫分支多少次， 同样的过程都会奏效，复制体在无线电上接收到的答案必然是从它的位置到控制室的路径，然后，如果加上它走的分支，也就能告诉父级 如何从它的位置到控制室。在这次名为“探路者”的行动中，我们总结出 Hedge 的每个复制体 需要遵循的指令如下：1. 如果到达神器地点，通过无线电告知父级 选左边或右边的路径。2. 到达节点后，离开传送带，并向左右两条路发送复制体。让它们各自运行“探路者”，这就是递归的过程，在最终指令触发前，这个过程 可能会发生很多次。最终指令是：3. 如果无线接收到任何信息， 都应当传递回父级——不管你走左边还是右边的路 到达你所在位置，然后重复刚接收到的一切信息。”探路者“是程序员调用函数、子程序或过程的一个例子。不管用什么术语来形容， 其本质都是一样的——这只是一组带有标签的指令， 可以方便地重复使用——甚至可以被其自身调用。在我们的案例中， 这一方法将非常有效——仅仅使用三条指令 就能映射出整个路径网络。这就是接下来所发生的事情：在巡逻队正要经过拐角时， Ethic 和 Lemma 及时伪装了自己。她们试图迷惑机器人， 以便为 Hedge 争取时间，终于，Hedge 的无线电响起， 收到了正确路径信息。他们三个跳上了传送带，逃离了紧追不舍的一队机械守卫。

**P846 2020-04-13 The bug that poops candy - George Zaidan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=846)

This is Mabel. Mabel is an aphid, a small insect in the same order as cicadas, stink bugs, and bed bugs. All these bugs pierce their prey and suck out vital fluids. Aphids’ prey are plants. And what aphids are after is buried within the plant, flowing in tubes made from single cells strung end-to-end. These are called sieve tubes and together they form the plumbing system for a plant’s most valuable resource: sap. Sap is mostly water and sugar. Some species’ sap has as much sugar per liter as a can of soda. Photosynthesis is constantly producing sugar. You can think of it as a chemical “pump” which generates incredibly high pressure— up to 9 times that of a car tire— in the sieve tubes. To feed, Mabel uses her stylet, which is a long, flexible needle. She slowly worms it into the tissue, between the plant’s cells, until she pierces one of those sieve tubes. Because the sap is under so much pressure, Mabel doesn’t even have to suck it out of the plant. She just opens a valve in her head and lets the pressure push the sap through her digestive system. We’ll come back to what comes out of her butt, but for now, you should know that plants don’t want to be punctured and sipped. So they try to defend themselves. One defense is the sap itself. To see how that works, let’s hypothetically hook up some other insect’s digestive tract to a steady stream of sap. When that sap touches the insect’s cells, its high sugar content encourages the water in the cells to come out by osmosis… exactly like salt encourages water to come out of a slug. The more sap that passes through the insect, the more water it loses. Eventually, it shrivels up and dies. Mabel’s gut, however, is packed with an enzyme called sucrase, which takes two molecules of sucrose and converts them into one molecule of fructose and one of… this three-unit sugar. Mabel burns the fructose for energy, leaving the three-unit-sugar behind. Now, how does that help her? The more molecules of sugar that are dissolved in the sap, the more water it can suck out of Mabel’s cells. By reducing the number of molecules of sugar in the sap, Mabel reduces its ability to suck water out of her cells. Plant sap neutralized. Now that means Mabel can feed for days, getting all the energy she needs to reproduce. Some aphid species have an incredible life cycle. For example, the green peach aphid. During the fall, males and females mate, and the females lay eggs. But in the spring, when the eggs hatch, all the nymphs that emerge are female. When those females reach maturity, they don’t lay eggs. Instead, they give birth to live young… that are clones of themselves… and already pregnant… with their own clones. So, these female aphids have two generations of baby aphid clones forming inside themselves at the same time. Scientists call this telescopic development. That means that aphids can make more of themselves fast— there can be 20 generations within a single season— and that means lots of aphid poop. Mabel can poop her entire body weight every two hours, making her one of the most prolific poopers on the planet. Some aphid populations can produce hundreds of kilograms of poop per acre. Now, aphid poop is not like your poop. Chemically, it’s not all that different from sap; it’s a clear and colorless sweet, syrupy liquid. You might already know it by a different name: honeydew. Other species love honeydew. Some species of ants love it so much they sort of herd and defend entire aphid colonies. In return, the ants get a steady supply of sweet honeydew, which they can drink directly from the aphids’ butts. Bottom’s up! Humans love honeydew, too. Several Native American tribes used to harvest it from tall reeds and make it into cake. And some species of bee make honey from honeydew, which humans then harvest and eat. So plants make the sap, which is eaten and pooped out by aphids, regurgitated by bees, harvested by humans, and dolloped into a cup of Earl Grey tea.

**P846 2020-04-13 The bug that poops candy - George Zaidan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=846)

翻译人员: Harry SONG 校对人员: Meng Ren这是 Mabel。Mabel 是一种蚜虫， 它是一种小型昆虫，与蝉、椿象，和床虱 同属于半翅目。它们都会刺破猎物 并吸取对其十分重要的汁液。蚜虫的猎物是植物。它们吸食的物质存在于植物内部，这些物质在串联的 单细胞管道内来回流动。这些管道被称为筛管， 它们共同构成了植物的管道系统，运输植物中最重要的资源：树液。树液主要包含水和糖分。有些种类的树液每升的含糖量 堪比一罐可乐。光合作用会一直产生糖分。你可以把它看成一个化学“泵”， 会产生难以置信的高压——筛管中的压力最高可达 汽车胎压的 9 倍。Mabel 用它长长的、柔韧的 针管状口器来进食。它慢慢地将口器探进 植物细胞间的组织中去，直到它刺穿一个筛管。因为树液有很高的液压，Mabel 甚至不需要费劲地吮吸树液。它只需要打开头部的阀门， 然后液压会把树液推入消化系统。我们待会儿再说它从屁股里 排出了什么，但是现在，你应该知道植物并不想被刺破 然后被吸食树液。所以它们会尝试保护自己。一种保护方式是利用树液本身。要想了解其工作原理， 我们先假设性地让树液稳定地流过 别的昆虫的消化道。当树液接触到昆虫的细胞时， 它的高糖成分会促使水分通过渗透作用 从细胞中流失......就像盐促使水分从蛞蝓中流失一样。越多的树液流过昆虫的身体， 昆虫就会损失越多的水分。最终，它会脱水而死。然而，Mabel 的肠子里 充满了蔗糖酶。它会把两个蔗糖分子 转化为一个果糖分子和一个三分子糖。Mabel 把果糖作为能量消耗掉， 留下这个三分子糖。那么，这是怎么帮助蚜虫的呢？越多的糖分子溶解在树液中，越多的水分就会 从 Mabel 的细胞中被吸出。通过减少树液中的糖分子数，Mabel 就减轻了树液 吸取自身水分的能力。植物的树液失效了。这意味着 Mabel 可以连续进食多日，得到繁殖所需要的所有能量。一些蚜虫有着难以置信的生命周期。比如，桃蚜。秋天，雌雄交合，雌性产卵。到了春天，当卵被孵化， 所有生出来的若虫都是雌性。当这些雌虫成熟后， 它们不会产卵，而是直接克隆自己产生后代......而这些克隆的后代也是 已经怀孕的.......怀着自己的克隆体。所以，这些雌性蚜虫的体内同时孕育着两代蚜虫克隆体。科学家称之为重代。它意味着蚜虫能更快地繁殖后代——一个季节可以有 20 代蚜虫出生——而这也意味着大量的蚜虫粪便。Mabel 每两个小时可以排出 相当于自身重量的粪便，是这个星球上排便最多的生物之一。一些种群的排便量甚至高达 每英亩几百公斤。不过，蚜虫的粪便可不像你的粪便。从化学组成上说， 它和树液也差不多。它是纯净的无色糖浆。你可能已经知晓 它的另一个名字：蜜露。有些生物很爱蜜露。一些蚂蚁是如此地喜爱蜜露，它们甚至会在某种程度上 聚集并捍卫整个蚜虫群。作为回报，蚂蚁得到了 稳定的蜜露供应，它们可以直接从蚜虫屁股里喝蜜露。喝光！人类也爱蜜露。一些美洲原始部落 从高高的芦苇上采集蜜露，然后做成蛋糕。一些种类的蜜蜂采集蜜露 来酿造蜂蜜，然后人类采集蜂蜜并吃掉。所以植物产生树液， 蚜虫吸食树液，排出蜜露，蜜蜂采集蜜露，酿成蜂蜜 人类采集蜂蜜，挖出一勺，调入了一杯伯爵茶。

**P847 2020-04-16 What’s the point(e) of ballet - Ming Luke**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=847)

A baby cursed at birth. A fierce battle of good and evil. A true love awoken with a kiss. Sleeping Beauty is one of the world’s favorite folktales. But one of its most famous renditions tells the story without a single word. Since premiering in 1890, "The Sleeping Beauty" has become one of the most frequently staged ballets in history. So what makes this piece so beloved? And what exactly does ballet bring to this— or any other story? At the heart of ballet are dozens of gestures that dancers painstakingly perfect over thousands of hours of practice. This unique set of gestures has been used for centuries, each movement rich with meaning and history. But you don’t need to study them to understand ballet, any more than you need to study music to be moved by a song. And just as composers combine notes and phrases to form pieces of music, choreographers string these gestures together with new movements to form expressive combinations. Working alongside the orchestra’s live score, ballerinas precisely perform these combinations to convey narrative, emotion, and character. In "The Sleeping Beauty’s" opening scene, a flurry of techniques depicts the fairy court bestowing gifts on baby Princess Aurora. The Fairy of Generosity delicately walks “en pointe”— meaning on the tips of her toes— in step with the light plucking of violins. The ballerina moves in perfect harmony with the music, even mimicing the violins’ trill with an elegant bourrée. The Fairy of Temperance, bestowing the gift of strong will on Aurora, is choreographed as if shooting bolts of electricity from her fingers. She bounds across the stage, spinning with quick chaînés before decisively jetéing. Some movements are even more literal than this. The evil fairy Carabosse curses the princess with a lethal “X,” and the benevolent Lilac Fairy counters that curse. Of course, the relationship between music and movement isn’t always this straightforward. While classical ballet gestures often respond to musical elements, the degree to which the dancers and orchestra align is another choreographic tool. Some characters and scenes move in sync to create rhythmic clarity, while others deliberately diverge from the orchestra. Dancers and musicians maintain this delicate balance throughout each performance, engaging in a live negotiation of speed and rhythm. But prior to the performance, a ballet’s most important relationship is between the choreographer and the music. Choreographer Marius Petipa and composer Piotr Ilyich Tchaikovsky worked together on every second of "The Sleeping Beauty." This is particularly noticeable in Princess Aurora’s exuberant entrance on her 16th birthday. Tchaikovsky’s enthusiastic music tumbles forward in fits and starts, even cutting short some musical phrases to capture her impatience. Petipa choreographs Aurora bouncing back and forth with “pas de chat”— French for "cat steps"— as she waits for her party to begin. Once the celebration starts, it’s up to the dancers to deliver on the physical spectacle of performing these gestures with grace. Aurora has the hardest part of all: her famous Rose Adagio. As four suitors vie for her hand, the Princess performs a dizzying array of balances, all en pointe. She briefly takes each suitor’s hand, but then balances unassisted— a breath-taking display of physical strength and skill. However, it’s not just technique that carries meaning, but also style and personality. Like an actor delivering their lines, ballerinas can execute their movements to convey a wide range of emotion. Aurora can be elegant and restrained, throwing her arms in independence from her suitors. Or she can be coy and flirtatious, descending from en pointe with grace and knowing confidence. "The Sleeping Beauty" offers a showcase for so much of what ballet can do. Its graceful spectacle, dramatic physical vocabulary, and enchanting coordination of music and movement perfectly reflect the themes of this fantastical romance. But ballet isn’t just for epic fairytales. Ballets can be non-narrative emotional journeys, experimental deconstructions of form, or pure demonstrations of skill. The artform is always experimenting with a centuries old set of rules, making it the perfect medium for stories old and new.

**P847 2020-04-16 What’s the point(e) of ballet - Ming Luke**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=847)

翻译人员: Yuwei Duan 校对人员: Yanyan Hong出生时受到诅咒的婴儿。善恶之间的激烈战争，一段被吻唤醒的真爱。《睡美人》是世界上 最受欢迎的民间故事之一。然而，它有一种最著名的呈现方式， 无需语言就能讲述这个故事。自 1890 年首演以来，《睡美人》就成了历史上 最常被出演的芭蕾舞剧之一。这个作品为何如此受人欢迎？以及芭蕾舞究竟赋予了这个作品，或任何其他故事什么不同的东西？芭蕾舞的灵魂是数十种姿势，舞者通常要刻苦练习 数千个小时才能完美呈现。数世纪以来一直沿用 这组独特的姿势，每个姿势背后都有丰富的含义和历史，但是你不需要研究它们， 也能看懂芭蕾，正如你不用精通音乐 也一样可以被歌曲感动。作曲家将音符和乐句结合， 打造出音乐作品，编舞家将基本姿势和新动作串联起来形成意味深长的组合。与现场交响乐团搭配演出，芭蕾舞者精准地跳出这些动作组合来演绎故事、传达情感、演绎角色。在《睡美人》的开场中，一连串的技巧舞蹈描绘了宫廷仙女 为奥罗拉公主出生献礼的场景。慷慨仙子优雅地 走着 “en pointe” 步法——也意味着用她的足尖踮地——精准地踩在小提琴拨弦的节拍上，芭蕾舞者与音乐完美配合，甚至用优雅的布雷舞步 （bourrée）模仿小提琴的颤音。节制仙子赐予奥罗拉的是坚强的意志。她的编舞仿佛从指尖射出的闪电，她的大跳跨越整个舞台，快速的追赶步 (chaînés) 旋转之后 紧接着精准的大跳 (jetéing)，有些动作甚至更加跃然纸上。邪恶仙子卡拉波斯 用致命的 “X” 姿势诅咒了公主，而仁慈的丁香仙子反击了诅咒。当然，音乐和动作之间的关系并非总是这么直白。古典芭蕾的姿势 通常都与音乐元素呼应，而舞者和交响乐队的整齐程度，则是另一个编舞者的工具。某些角色和场景会完全同步 以创造出鲜明的节奏感，而其他角色会有意与乐团不同。整场表演中，通过把握速度和节奏的配合，舞蹈和音乐得以 维持着这种精美的平衡。但是在表演之前，最重要的是编舞家和音乐之间的关系。编舞家莫里斯 · 珀蒂帕 和作曲家彼得 · 伊里奇 · 柴可夫斯基在《睡美人》的每一秒 都保持着紧密的合作最明显可以看到这种合作之处，是奥罗拉公主在十六岁生日时 热情洋溢的出场。柴可夫斯基的音乐同样充满热情 一阵一阵地涌上前来，他甚至将某些乐句缩短 来捕捉她的急性子。珀蒂帕为奥萝拉 在等候派对开始时所编的舞步名为 “pas de chat”—— 也就是法语的“猫步”。当庆典开始时，就完全交给舞者用优美绝伦的舞姿讲述故事。奥罗拉最难表演的部分是 著名的 “玫瑰慢板 (Rose Adagio)”。四个追求者相互竞争 只为获得和她牵手共舞的机会公主保持足尖姿势 表演出令人瞠目结舌的平衡动作，她短暂地牵过每位追求者的手，却不依靠对方而保持平衡，这是一个叹为观止的 身体力量和技巧。然而这段足尖舞 并不仅仅是为了展现技巧还体现了角色的风格和个性。就像演员念台词一样，芭蕾舞者通过完成自己的 动作来传达广泛的情感。通过伸展手臂 而摆脱追求者这一动作，显得奥罗拉公主优雅而内敛；优美且自信地用足尖姿势落回地面，则会让她显得腼腆中带着点轻佻。《睡美人》向世人展示了 芭蕾舞能发挥到什么程度。它的优雅场面和戏剧性的身体语言，以及音乐与动作之间的相辅相成，完美地表达了这段梦幻的爱情故事。但芭蕾舞不仅仅局限于 表达史诗般的的童话，芭蕾舞也可以是 非叙事性的情绪之旅，也可以是实验性的解构，或者是纯粹的技巧展示。这种艺术一直在用数世纪 沿用的规则做实验，无论故事是新是旧， 都能通过芭蕾这一形式完美呈现。

**P848 2020-04-20 The dark history of IQ tests - Stefan C. Dombrowski**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=848)

In 1905, psychologists Alfred Binet and Théodore Simon designed a test for children who were struggling in school in France. Designed to determine which children required individualized attention, their method formed the basis of the IQ test. Beginning in the late 19th century, researchers hypothesized that cognitive abilities like verbal reasoning, working memory, and visual-spatial skills reflected an underlying general intelligence, or g factor. Simon and Binet designed a battery of tests to measure each of these abilities and combine the results into a single score. Questions were adjusted for each age group, and a child’s score reflected how they performed relative to others their age. Dividing someone’s score by their age and multiplying the result by 100 yielded the intelligence quotient, or IQ. Today, a score of 100 represents the average of a sample population, with 68% of the population scoring within 15 points of 100. Simon and Binet thought the skills their test assessed would reflect general intelligence. But both then and now, there’s no single agreed upon definition of general intelligence. And that left the door open for people to use the test in service of their own preconceived assumptions about intelligence. What started as a way to identify those who needed academic help quickly became used to sort people in other ways, often in service of deeply flawed ideologies. One of the first large-scale implementations occurred in the United States during WWI, when the military used an IQ test to sort recruits and screen them for officer training. At that time, many people believed in eugenics, the idea that desirable and undesirable genetic traits could and should be controlled in humans through selective breeding. There were many problems with this line of thinking, among them the idea that intelligence was not only fixed and inherited, but also linked to a person’s race. Under the influence of eugenics, scientists used the results of the military initiative to make erroneous claims that certain racial groups were intellectually superior to others. Without taking into account that many of the recruits tested were new immigrants to the United States who lacked formal education or English language exposure, they created an erroneous intelligence hierarchy of ethnic groups. The intersection of eugenics and IQ testing influenced not only science, but policy as well. In 1924, the state of Virginia created policy allowing for the forced sterilization of people with low IQ scores— a decision the United States Supreme Court upheld. In Nazi Germany, the government authorized the murder of children based on low IQ. Following the Holocaust and the Civil Rights Movement, the discriminatory uses of IQ tests were challenged on both moral and scientific grounds. Scientists began to gather evidence of environmental impacts on IQ. For example, as IQ tests were periodically recalibrated over the 20th century, new generations scored consistently higher on old tests than each previous generation. This phenomenon, known as the Flynn Effect, happened much too fast to be caused by inherited evolutionary traits. Instead, the cause was likely environmental— improved education, better healthcare, and better nutrition. In the mid-twentieth century, psychologists also attempted to use IQ tests to evaluate things other than general intelligence, particularly schizophrenia, depression, and other psychiatric conditions. These diagnoses relied in part on the clinical judgment of the evaluators, and used a subset of the tests used to determine IQ— a practice later research found does not yield clinically useful information. Today, IQ tests employ many similar design elements and types of questions as the early tests, though we have better techniques for identifying potential bias in the test. They’re no longer used to diagnose psychiatric conditions. But a similarly problematic practice using subtest scores is still sometimes used to diagnose learning disabilities, against the advice of many experts. Psychologists around the world still use IQ tests to identify intellectual disability, and the results can be used to determine appropriate educational support, job training, and assisted living. IQ test results have been used to justify horrific policies and scientifically baseless ideologies. That doesn’t mean the test itself is worthless— in fact, it does a good job of measuring the reasoning and problem-solving skills it sets out to. But that isn’t the same thing as measuring a person’s potential. Though there are many complicated political, historical, scientific, and cultural issues wrapped up in IQ testing, more and more researchers agree on this point, and reject the notion that individuals can be categorized by a single numerical score.

**P848 2020-04-20 The dark history of IQ tests - Stefan C. Dombrowski**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=848)

翻译人员: Ivy Jin 校对人员: Yanyan Hong1905 年，心理学家 阿尔弗雷德 · 比内特 (Alfred Binet)和西奥多 · 西蒙 (Théodore Simon)在法国为学校里 表现不佳的孩子们设计了一款测试。这款测试可以帮助判断 哪些孩子更需要特别关注，后来成为了 智商 （IQ）测试的基础。从 19 世纪后期开始， 研究人员假设认知能力，如表述推理、工作记忆、视觉空间技能等能力反映了潜在的智力， 或一般智力因素 (g 因素）。西蒙和比内特设计了一组考试， 用于测试不同方面的能力，然后将结果合并为一个分数。题目会根据不同年龄段做调整，孩子的分数反映了相对于 他们所处年龄段的表现情况。把受测者的分数除以他们的年龄， 再将结果乘以 100，就可以得出智商 （intelligence quotient），或 IQ。如今，100 分代表样本人口的平均值，68％ 的人得分在 85 分到 100 分之间，西蒙和比内特原本认为 他们的测试所评估的能力将反映出一般智力水平。但是无论曾经还是现在，人们从没在智力的定义上 达成过共识。这也默许了人们使用这种测试为自己对智力的认知所用。起初，这个方法是为了 找出哪些人在学习上需要帮助，却很快变成了 对人们进行分类的方法，并且常常被一些根深蒂固、 有缺陷的意识形态所利用。该方法最早的大规模应用之一是在一战时期的美国， 军队使用智商测试来筛选新兵，并且为军官训练做测试。当时，很多人都相信 优生学（eugenics），形容理想和不理想的遗传性状可以且应该通过选择性育种来控制。这种想法存在许多的问题，包括智力不仅是固定且遗传的，而且还跟一个人的种族有关系的想法。在优生学的影响下，科学家们利用军事倡议的结果，提出了一种错误的主张：某些种族的人们 在智力上优于其他种族。没有考虑到许多接受测试的新兵都是刚到达美国的新移民，并且缺失正式的教育 和对英语环境的充分接触，他们依据不同种族创造了 一种错误的智力阶级制。优生学和智商测试之间 形成的关联不仅影响了科学，也影响了政策。1924 年，费吉尼亚州制定了强制让低智商人群绝育的政策——美国的最高法院也维持原判。在纳粹德国，政府允许 在基于低智商的情况下谋杀儿童。大屠杀和民权运动后，智力测试的使用受到了道德和科学的挑战。科学家们开始收集 环境对智商产生影响的证据。例如，由于智力测试 在 20 世纪是被定期校准的，新一代的人一直在旧的考试中比旧一代获得更好的成绩。这个现象叫做 费林效应（Flynn Effect），它发生得太快，不可能是 通过先天进化特征实现的。原因应该很大几率 来源于环境的变化——更好的教育体系， 更好的医疗体系，和更好的营养。在二十世纪中期，心理学家也尝试过用智力测试评估除智力外的其他东西，尤其是精神分裂症、 抑郁症和其他精神疾病。这些诊断部分取决于 评估者的临床判断，并使用了测试的一部分 来判断智商——在后来的研究中发现，这种做法 无法产生对临床诊断有用的信息。如今，智商测试采用了和早期测试相似的问题类型和元素，不过我们有更好的技术， 可以识别测试中的潜在偏见。智商测试不再被用于诊断精神疾病。但使用测验分数的做法依然被用于诊断学习障碍，违反了许多专家的建议。世界各地的心理学家 仍然使用智商测试来诊断智力残疾，结果则被用来决定适当的教育支持、 在职培训和日常看护。智商测试的结果曾被用来 为骇人的政策和无科学依据的意识形态进行辩护。这并不意味着测试本身是无用的——事实上，它可以衡量推理和解决问题的能力。但这跟衡量一个人的潜力不是一回事。虽然智商测试存在许多 与复杂的政治、历史、科学和文化相关的问题，越来越多的研究人员 已经在这一点上达成了共识，并拒绝使用一个单一的数字或分数来衡量每一个独立的个体。

**P849 2020-04-20 What happens if you cut down all of a city's trees - Stefan Al**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=849)

This is the tale of two ancient cities and the trees that determined their destinies. In 3,000 BC Uruk was more densely populated than modern day New York City. This crowded capital had to continually expand their irrigation system to feed its growing population. 2,500 years later in Sri Lanka, the city of Anuradhapura had a similar problem. They were also growing constantly, and like Uruk, their city relied heavily on an elaborate irrigation system. As Uruk grew, its farmers began chopping down trees to make space for more crops. In Anuradhapura, however, trees were sacred. Their city housed an offshoot of the Bodhi tree under which Buddha himself was said to have attained enlightenment. Religious reverence slowed farmer’s axes and even led the city to plant additional trees in urban parks. Initially, Uruk’s expansion worked well. But without trees to filter their water supply, Uruk’s irrigation system became contaminated. Evaporating water left mineral deposits, which rendered the soil too salty for agriculture. Conversely, Anuradhapura’s irrigation system was designed to work in concert with the surrounding forest. Their city eventually grew to more than twice Uruk’s population, and today, Anuradhapura still cares for a tree planted over 2,000 years ago. We may think of nature as being unconnected to our urban spaces, but trees have always been an essential part of successful cities. Trees act like a natural sponge, absorbing storm water runoff before releasing it back into the atmosphere. The webs of their roots protect against mudslides while allowing soil to retain water and filter out toxins. Roots help prevent floods, while reducing the need for storm drains and water treatment plants. Their porous leaves purify the air by trapping carbon and other pollutants, making them essential in the fight against climate change. Humanity has been uncovering these arboreal benefits for centuries. But trees aren’t just crucial to the health of a city’s infrastructure; they play a vital role in the health of its citizens as well. In the 1870’s, Manhattan had few trees outside the island’s parks. Without trees to provide shade, buildings absorbed up to nine times more solar radiation during deadly summer heat waves. Combined with the period’s poor sanitation standards, the oppressive heat made the city a breeding ground for bacteria like cholera. In modern day Hong Kong, tall skyscrapers and underground infrastructure make it difficult for trees to grow. This contributes to the city’s dangerously poor air quality, which can cause bronchitis and diminished lung function. Trees affect our mental health as well. Research indicates that the presence of green foliage increases attention spans and decreases stress levels. It’s even been shown that hospital patients with views of brick walls recover more slowly than those with views of trees. Fortunately, many cities are full of views like this— and that’s no accident. As early as the 18th century, city planners began to embrace the importance of urban trees. In 1733, Colonel James Oglethorpe planned the city of Savannah, Georgia to ensure that no neighborhood was more than a 2-minute walk from a park. After World War II, Copenhagen directed all new development along five arteries— each sandwiched between a park. This layout increased the city’s resilience to pollution and natural disasters. And urban trees don’t just benefit people. Portland’s Forest Park preserves the region’s natural biodiversity, making the city home to various local plants, 112 bird species, and 62 species of mammals. No city is more committed to trees than Singapore. Since 1967, Singapore’s government has planted over 1.2 million trees, including those within 50-meter tall vertical gardens called supertrees. These structures sustain themselves and nearby conservatories with solar energy and collected rainwater. Trees and vegetation currently cover over 50% of Singapore’s landmass, reducing the need for air conditioning and encouraging low-pollution transportation. By 2050, it’s estimated that over 65% of the world will be living in cities. City planners can lay an eco-friendly foundation, but it’s up to the people who live in these urban forests to make them homes for more than humans.

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翻译人员: Pooi Ling Ng 校对人员: Yolanda Zhang这是两个古老城市的故事，而树木决定了它们的命运。在公元前 3000 年，乌鲁克的 人口密度已经超过了现代纽约市。拥挤的首都只能不断扩大灌溉系统，以养活其不断增长的人口。2500 年后， 斯里兰卡的阿努拉德普勒市 也遇到了类似的问题。这里的人口也在不断增加，就像乌鲁克一样，城市这座城市也 严重地依赖于精心设计的灌溉系统。随着乌鲁克的扩张，其农民开始砍伐 树木以腾出空间种植更多农作物。然而，在阿努拉德普勒， 树木是神圣的。他们的城市安置了 菩提树的一棵分支。据说，佛陀本人在 菩提树下得到了启迪。宗教敬虔放慢了农民挥动斧头的速度,甚至导致该城市在城市公园 种下了另外的树木。最初，乌鲁克的扩张运作良好。但是，由于没有树木来过滤供水，乌鲁克的灌溉系统受到了污染。蒸发的水留下了矿物质沉积，使土壤变得太咸，无法用于农业耕种。相反，阿努拉德普勒的灌溉系统旨在与周围的森林协调工作。他们的城市人口 最终达到了乌鲁克的两倍多，如今，阿努拉德普勒仍然在呵护 2000 年前种植的树木。我们可能会认为自然与 我们的城市空间无关，但是树木一直是成功城市 背后的重要组成部分。树木就像天然海绵一样， 吸收雨水径流，然后释放回大气中。其根部的网状结构可防止泥石流，同时使土壤保持水分并滤出毒素。根部有助于防止洪水泛滥，同时减少对雨水渠 和水处理厂的需求。它们那多孔的叶子可通过捕获 碳和其他污染物来净化空气，从而使其在应对气候变化时 起到了至关重要的作用。几个世纪以来，人类一直都在 不断发现这些树木的好处。但是，树木不仅对于城市 基础设施的健康至关重要，它们在公民的健康方面 也起着不可忽视的作用。在 1870 年代，曼哈顿岛 在公园以外的地方几乎没有树木。没有树木遮荫，建筑物在致命的夏季 热浪中吸收的太阳辐射比平时多了近 9 倍。加上该时期恶劣的卫生条件，酷热使这座城市成为 霍乱等细菌的温床。在当今的香港，高大的摩天大楼 和地下基础设施使得树木难以生长。这加剧了该城市本就恶劣的空气质量，还会导致支气管炎和肺功能下降。树木也会影响我们的心理健康。研究表明，绿叶的存在 增加了注意力跨度，并降低了压力水平。甚至有证据表明，在窗外只能看到 砖墙的医院，患者的康复速度要比在窗外有自然风景的 医院的患者康复得更慢。幸运的是，许多城市的窗外 都是这样的一番风景——这绝非偶然。早在 18 世纪，城市规划者就开始重视 城市树木的重要性。1733 年，詹姆斯 · 奥格索普（James Oglethorpe） 上校对佐治亚州萨凡纳市进行了规划，以确保每个社区距离公园的 步行路程不超过 2 分钟。第二次世界大战后，丹麦哥本哈根市将所有新的开发项目布局在五条 城市要道周边，彼此间有公园相隔。这种布局提高了城市抵御污染和自然灾害的能力。另外，城市树木不仅使人类受益。美国俄勒冈州波特兰市的 森林公园保留了该地区的自然生物多样性，使该市拥有各种当地植物，112 种鸟类和 62 种哺乳动物。没有哪个城市比新加坡 更致力于植树造林了。自 1967 年以来，新加坡政府 已种植了超过 120 万棵树，其中包括 50 米高， 被称为“超级树”的垂直花园。这些建筑物利用太阳能和收集的雨水来维持自身和附近温室的运转。目前，树木和植被覆盖了 新加坡 50％ 以上的陆地，减少了对空调的需求，并鼓励了低污染的交通运输方式。据估计，到 2050 年，全球将有 超过 65％ 的人居住在城市中。城市规划人员可以打下 生态友好的基础，但居住在这些城市森林中的人们 可以决定是否为人类以外的生物提供生存空间。

**P850 2020-04-21 The wildly complex anatomy of a sneaker - Angel Chang**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=850)

Australians call them “runners." The British know them as “trainers." Americans refer to them as “tennis shoes” or “sneakers." Whatever you call them, these rubber-soled, casual shoes are worn by billions of people around the world. Originally invented in the late 19th century, these simple canvas and rubber creations have changed a lot since they first hit the pavement. Today, sneaker consumption is at an all-time high. No country buys more sneakers than the United States, where people purchase 3 pairs a year on average. To meet this demand, roughly 23 billion shoes are produced each year, mostly in factories across China and Southeast Asia. But making shoes has become more complicated, more labor-intensive, and in some ways, more dangerous, for the workers involved and for our planet. Shoe manufacturing accounts for roughly one-fifth of the fashion industry’s carbon emissions. Sneakers alone generate 313 million metric tons of carbon dioxide every year, which is equivalent to the annual emissions of 66 million cars. To better understand your shoe’s carbon footprint, let’s dive into the anatomy of a sneaker. For starters, the heel, insole, midsole, and upper layer are usually made from synthetic textiles like polyester, nylon, latex, and polyurethane. Mining the fossil fuels that make up these materials emits tons of greenhouse gases. And processing those raw ingredients into synthetic textiles also uses a lot of energy, further compounding that pollution. Some sneaker tops are made from natural sources like leather, but tanning this material relies on chromium; a carcinogenic chemical that can damage freshwater ecosystems. The outer soles of most shoes are made of rubber that’s gone through a process called vulcanization. This technique adds sulfur to superheated raw rubber to create a material that’s both elastic and sturdy. Until recently, sneakers used natural rubber for this process. But today, most outer soles are made with a synthetic blend of natural rubber and byproducts from coal and oil. Producing these materials accounts for 20% of a sneaker’s carbon footprint. But more than two-thirds of the shoe’s carbon impact comes from the next step: manufacturing. A typical sneaker is comprised of 65 discrete parts, each of which is produced by specialized machinery. This means it’s cheaper for factories to mass-produce each piece separately rather than manufacturing every part under one roof. But the transportation required to ship these pieces to one assembly plant emits even more CO2. Once the components arrive at the assembly line, they undergo cutting, pouring, melting, baking, cooling, and gluing, before the final products can be stitched together. The assembly of a typical sneaker requires more than 360 steps, and accounts for the remaining 20% of a sneaker’s environmental impact. The dispersion of factories fuels another problem as well: labor abuse. Most brands don’t own or operate their factories, so the plants they work with are in countries with little to no worker protection laws. As a result, many laborers earn below the living wage, and are exposed to harmful chemicals, like toxic glue fumes. When manufacturing is complete, the shoes are packaged and transported to stores around the globe. For many, these shoes could last years. But for someone running 20 miles a week, a pair of running shoes will start wearing out after roughly 6 months. Since the shoes are made of so many different materials, they’re almost impossible to break down into recyclable components. 20% of these shoes are incinerated, while the rest are tossed into landfills where they can take up to 1,000 years to degrade. So, how can we balance our love of sneakers with the need for sustainability? First, designers should streamline design elements and focus on eco-friendly materials. Factories need to develop energy efficient manufacturing processes that consolidate steps and sneaker parts. And consumers should support companies using clean energy and ethical manufacturing processes. We can also buy fewer shoes, wear them for longer, and donate those we no longer need. So no matter what your style, we can all take steps towards a sustainable future.

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翻译人员: Ivy Jin 校对人员: Yanyan Hong澳洲人叫它们 “跑鞋 (runners)”， 英国人叫它们 “训练鞋 (trainers)”，美国人叫它们 “网球鞋 (tennis shoes)” 或 “球鞋 (sneakers)”。无论你怎么称呼它， 全世界有数十亿人穿着这些橡胶底的休闲鞋。自 19 世纪后期被发明出来，这些原本简单的帆布和橡胶鞋从最开始推出至今已经改变了很多。如今，运动鞋的消费量 达到了历史最高水平。没有其他国家像美国 消费这么多运动鞋。美国人每人年均购买三双鞋，为了满足这一需求， 全球每年大约需要生产 230 亿只鞋，大多是由遍布中国 和东南亚的工厂生产。但是制鞋已经成为 更复杂、劳动强度更大，并且在某些方面也更危险的工作；不光对工人，对地球环境 也有着负面影响。时尚产业的碳排放量，大约有五分之一来自制鞋业，每年仅生产运动鞋就会产生 3.13 亿公吨的二氧化碳，相当于 6600 万辆汽车的年均排放量。为了进一步了解你的鞋子 所产生的碳足迹，让我们来了解一下运动鞋的内部结构。首先，鞋跟、鞋垫、 鞋底夹层和鞋面通常由合成纺织品制成， 像聚酯、尼龙、乳胶和聚氨酯。开采用来合成这类原料的 化石燃料会排放大量的温室气体。将这些燃料加工成合成纺织品也会消耗很多能量， 进一步加剧了这种污染。有一些运动鞋的鞋面 是由皮革等自然资源制成的，但是需要依靠铬为材料进一步上色，而铬是一种能够破坏淡水 生态系统的致癌化学物质。大多数鞋子的外底由橡胶制成，这些橡胶度经过了“硫化”加工。该技术将硫添加到 过热的生橡胶中以创造出有弹性且结实的材料。很长时间以来，在这个过程中， 运动鞋的制作都是使用天然橡胶。但是如今，大多数 外底材料是由天然橡胶和煤及石油的副产品混合而成。生产这些物料贡献了 运动鞋碳足迹的 20％ 。但整个生产过程超过三分之二的 碳足迹实际上来自接下来的一步：制造。标准的运动鞋由 65 个离散部件组成，每个都要通过专用机械流程产生，这意味着，相比在同一个工厂中 制造所有的部件，不同的工厂分别批量生产 会降低各个工厂的成本。但是将这些部件运送到 同一个装配厂的过程中，会有更多的二氧化碳 被释放到空气中。各个部件到达装配厂后，它们将被切割、浇注、 熔化、烘烤、冷却和上胶，最后，所有部件被缝制在一起。标准运动鞋的组装过程 需要至少 360 个步骤，而其剩余 20％ 的环境影响 就来自于此。工厂分散导致的 另一个问题是：劳工滥用。大多数品牌自身并不 拥有或经营它们的工厂，所以跟他们合作的工厂都在一些几乎或完全 没有工人保护法的国家。许多劳工的收入低于生活费用，而他们还会暴露在有害的 化学物质中，如有毒的胶烟。制造完成后，鞋子将被包装并运送到 全球各地的商店。对于许多人来说， 这些鞋子可以穿好几年。但是对于那些一周 跑 20 英里的人来说，一双运动鞋大概 六个月后就会开始磨损。由于鞋子是由这么多 不同的材料制成的，它们几乎不可能被分解， 变成可回收的组件。20％ 的废弃鞋子将被焚化， 而其余的则被丢进垃圾填埋场，在那里，它们可能需要 花上一千年的时间才能分解。那么，我们要怎样才能 平衡我们对运动鞋的热爱和对可持续性的需求呢？首先，设计师们应该精简设计元素，并专注于使用环保材料。制鞋工厂要开发节能的制造过程，以合并制鞋步骤及各个部件。消费者应支持采用清洁能源和人性化制造流程的企业。我们也可以少买鞋，穿久一点，将那些不再穿的鞋捐出。这样一来，无论你穿哪种风格的鞋， 我们都能迈向一个可持续的未来。

**P851 2020-04-21 This sea creature breathes through its butt - Cella Wright**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=851)

Can you guess what you’re looking at? Is it a fuzzy sock? An overripe banana? A moldy tube of toothpaste? In fact, this is the humble sea cucumber, and while it might look odd, its daily toil paves the way for entire ecosystems to thrive. Sea cucumbers are members of the phylum Echinodermata, along with sea urchins, starfish and other radially symmetrical, “spiny-skinned” marine invertebrates. Some sea cucumbers have feathery tentacles flowing from their mouths, some are puffed like bloated balloons, and others simply look like Headless Chicken Monsters— the actual name given to a rare deep-sea species. But they are generally characterized by their long, cylindrical shape. A sea cucumber is essentially a brainless, fleshy form surrounding a digestive tract, bookended by a mouth and an anus. Adhesive tube feet run the length of their bodies and allow them to scoot along the seafloor. Specialized tube feet can be used for feeding and respiration, though many sea cucumbers actually breathe through their anuses. Rhythmically contracting and relaxing their muscles, they draw water in and out over an internal lung-like structure called a respiratory tree that extracts oxygen from seawater. Certain species of crabs and pearlfish take advantage of this rhythmic action and, once the sea cucumber’s anus is dilated, they shimmy in and take shelter. The rear end of a single sea cucumber can harbor up to fifteen pearlfish at a time. However, it seems that not all sea cucumbers put up with this intrusive behavior. Some species are equipped with five teeth around their anus, suggesting that they may have taken an evolutionary stand against unwanted guests. But even sea cucumbers that lack anal teeth are outfitted with tools to defend themselves. They evade threats and launch counter-attacks using their mutable collagenous tissue, or MCT. This gel-like tissue contains bundles of collagen, called “fibrils.” Proteins can interact with these fibrils to slide them together, stiffening the tissue, or apart, softening it. This versatile tissue has many advantages: it aids in efficient locomotion, enables sea cucumbers to fit into small spaces, and allows them to reproduce asexually by splitting apart. But MCT’s most explosive application is employed when a predator attacks. By loosening the attachments of internal tissues then quickly softening and contracting their muscles, many species are capable of shooting a wide range of organs out of their anuses. This act is called “evisceration” and it’s a surprisingly effective defense mechanism. In addition to startling and distracting predators, the innards of some sea cucumber species are sticky and toxic. Evisceration may seem drastic, but sea cucumbers are able to regenerate what they’ve lost to their gut reaction in just a few weeks’ time. Aside from the few species that have evolved to swim and those that feed without moving, many of these cumbersome creatures pass their time grazing the seabed. Sea cucumbers are found everywhere from shallow shores to abyssal trenches 6,000 meters below sea level. On the deep sea floor, they comprise the majority of animal biomass, reaching up to 95% in some areas. As these sausage-shaped wonders trudge along, they vacuum up sand, digest the organic matter it contains, and excrete the byproduct. In this process, sea cucumbers clean and oxygenate the seafloor by breaking down detritus and recycling nutrients. This creates the conditions for sea grass beds and shellfish to thrive. Sea cucumber excretions can also aid in coral formation and may play a role in buffering marine environments from ocean acidification. As the ocean’s vacuum cleaners, they are very good at their job: about half of the sandy seafloor is thought to have passed through the digestive tract of a sea cucumber. So next time you’re rejoicing in the feeling of sand crunching between your toes, consider this: those very grains of sand might have, at one point or another, been excreted by a pickle that breathes through its butt.

**P851 2020-04-21 This sea creature breathes through its butt - Cella Wright**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=851)

翻译人员: Jiasi Hao 校对人员: Gan Amanda你能猜到你眼前的是什么吗？一只毛茸袜子？一根熟透了的香蕉？ 还是一管发霉的牙膏？实际上，这是一种不起眼的海参， 尽管它可能看起来很奇怪，但是它每天都在为 整个生态系统的繁荣铺路。海参，和海胆、海星以及其它放射对称型刺皮类 海洋无脊椎生物一样，都属于棘皮类生物。一些海参嘴里能吐出羽毛状的触角，一些则肿胀得像是被吹足气的气球，还有一些则像是无头鸡怪——这实际上是该罕见深海物种的真实名字。但是它们的共有特征是 长圆筒状体形。海参本质上是一种围绕消化道并由嘴和肛门 固定着的无脑肉质结构。胶管一样的触角长满全身，这允许它们沿着海底匍匐前进。这种经过特殊分化的管足 可用于海参进食并呼吸，但是许多海参实际上 也能通过肛门呼吸。它们有节奏地收缩和放松肌肉，通过呼吸树这个内部 肺状结构进行吸水和吸水，从而从海水中获取氧气。特定种类的螃蟹和珍珠鱼会利用海参这种有节奏的动作，一旦海参的肛门放松扩张， 它们就会摇摆着躲藏进去。一头海参的尾部一次性 最多可容纳 15 条珍珠鱼。但是，似乎并不是所有海参都可以忍受这种入侵行为。有些种类的海参 肛门周围有五颗牙齿，这表明它们或许已进化到可以明确表达它们不欢迎不速之客的到来。但是，即使是肛门周围 没有长牙齿的海参也配备了可以用来保护自己的工具。它们使用具有可变性的 胶原组织（MCT），回避威胁并且发起反击。这种包含束状胶原蛋白的 凝胶状组织被称为“纤维”，蛋白质可与这些纤维进行相互作用， 可以纤维交织在一起，使组织变硬， 或分开纤维以软化组织。这种多功能的组织拥有很多优势：它帮助海参提升行动效率，使其适应狭小的空间，并允许它们通过分裂进行无性繁殖。但遇到捕食者袭击时， MCT 可以起到最具杀伤力的应用。通过放松内部组织，之后快速软化并收缩它们的肌肉，很多种类的海参都可以从肛门中向宽广区域范围射出器官。这种行为被称为 弃除内脏（evisceration），而这是一种非常有效的防御行为。除了可以分散掠食者的注意力，一些海参的内脏 是具有黏性与毒性的。弃除内脏看似过激，但是海参能够在短短几周内恢复因肠道反应而损失的器官。除了少数进化成不需要移动就可以觅食的浮游物种外，大多数这些笨重的生物 需要花费大量时间在海底进食。从浅滩到距离海面六千米深处，海参都随处可见。在深海的某些地区，海参数量可以占到 动物生物总量的 95% 。当这些香肠状的奇观们跋涉时， 它们会吸入沙粒，消化其中含有的有机物 并排出副产物。在这一过程中， 海参通过分解碎屑和回收营养，从而为海底进行清洁和充氧工作。这为海草以及贝类生物 创造了良好的生长环境。海参的排泄物不仅可以 促进珊瑚礁的形成，还起到了缓解海洋环境酸化的作用。作为海洋的吸尘清洁工， 它们非常擅长于自己的工作：大约一半的沙质海底被认为已经通过了海参的消化道。所以下次在你愉悦地享受 沙子在脚趾间沙沙作响的感觉时，思考一下：这些沙粒也许在某个时间点，曾被这些通过屁股呼吸的 “泡菜” 给排泄出来。

**P852 2020-04-24 The electrifying speeches of Sojourner Truth - Daina Ramey Berry**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=852)

In early 1828, Sojourner Truth approached the Grand Jury of Kingston, New York. She had no experience with the legal system, no money, and no power in the eyes of the court. Ignoring the jury’s scorn, Truth said she was there to fight for custody of her five-year-old son Peter, who’d been illegally sold to an enslaver in Alabama. As the trial played out over the next several months, Truth raised funds, strategized with lawyers, and held her faith. Finally in the spring of 1828, Peter was returned to her care— but Truth’s work was far from over. She would dedicate the rest of her life to pursuing justice and spiritual understanding. Truth was born into slavery as Isabella Baumfree in the late 18th century in Ulster County, New York. Although New York state had announced the abolition of slavery in 1799, the emancipation act was gradual. Those who were currently enslaved were forced to serve a period of indentured servitude until their mid-20s. Throughout this period, enslavers repeatedly sold Baumfree, tearing her from her loved ones. Often, she was explicitly prevented from pursuing new relationships. Eventually, she married an enslaved man named Thomas, with whom she had three children. She was desperate to keep her new family together— but the slow progress of abolition threatened this hope. Baumfree’s enslaver, John Dumont, had promised to free her by 1826. When he failed to keep his word, Baumfree fled for her safety. During the escape, she was only able to rescue her youngest daughter Sophia, while her other children remained in bondage. It would be two years before she regained custody of Peter. After that, she would wait another two years before she saw any of her other children. During this time, Baumfree found solace in her faith and became increasingly dedicated to religious reflection. After settling in Kingston, New York, she joined a Methodist community that shared her political views. She continued her practice of speaking aloud to God in private, and one night, her evening prayers took on even more sacred significance. Baumfree claimed to hear the voice of God, telling her to leave Kingston, and share her holy message with others. Though she never learned to read or write, Baumfree became known as an electrifying orator, whose speeches drew on Biblical references, spiritual ideals, and her experience of slavery. Her sermons denounced the oppression of African Americans and women in general, and became prominent in campaigns for both abolition and women’s rights. In 1843, she renamed herself Sojourner Truth and embarked on a legendary speaking tour. Truth saw her journey as a mission from God. Her faith often led her to the nation’s most hostile regions, where she spoke to bigoted audiences as the only Black woman in the crowd. Truth was confident God would protect her, but some crowds responded to her bravery with violence. During one of her sermons, a mob of white men threatened to set fire to the tent where she was speaking. In her memoir, Truth recalled steeling herself to confront them: “Have I not faith enough to go out and quell that mob… I felt as if I had three hearts! And that they were so large, my body could hardly hold them!” She placated the men with song and prayer, until they had no desire to harm her. Truth’s speeches impacted thousands of people in communities across the nation, but her activism went far beyond public speaking. During the Civil War, she became involved with the Union Army, recruiting soldiers and organizing supplies for Black troops. Her work was so well regarded that she was invited to meet President Lincoln. She took the occasion to argue that all formerly enslaved people should be granted land by the government. Truth continued to travel and speak well into her 80s. Until her death in 1883, she remained an outspoken critic who fought for her right to be heard in a hostile world. As Truth once said, “I feel safe even in the midst of my enemies; for the truth is powerful and will prevail."

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翻译人员: Hua Wang 校对人员: Yifei Liu1828 年初，索杰纳·特鲁斯 来到纽约州金斯顿陪审团。她对司法制度不甚了解，在法庭看来，她人微言轻。但她无视陪审团的蔑视，一心为夺回 被非法贩卖到阿拉巴马州，5 岁的儿子彼得的监护权而抗争。数月后庭审结束，期间特鲁斯自筹资金， 与律师制定策略，并且坚守信念。1828 年春天， 彼得终于回到了她的身边 ——但特鲁斯的使命远不止于此。她将用余生捍卫正义和宗教包容。在 18 世纪晚期的 纽约州阿尔斯特县，特鲁斯一出生就成为了奴隶， 原名伊莎贝拉·鲍姆弗里。尽管纽约州于 1799 年 已经宣布废除奴隶制，但废奴过程却进展缓慢。那些现有的奴隶们，仍需被迫执行奴役契约 直至 25 岁左右。在此期间， 奴隶主曾多次出售鲍姆弗利，强迫她与亲人分开。通常，她被明令禁止恋爱婚嫁。然而最后， 她嫁给了一个叫托马斯的奴隶，并养育了三个孩子。她不顾一切维系家庭的完整——但缓慢的废除进程 威胁着这一希望。鲍姆弗利的奴隶主，约翰·杜蒙， 承诺于 1826 年释放她。然而他却言而无信。 为了自己的安全，鲍姆弗利逃走了。逃亡期间，她只救出了 小女儿索菲亚，而她的其他孩子仍被奴役着。这是她获得彼得 监护权的两年前。之后，她还需要再等两年才能见到她其他的孩子。在此期间，鲍姆弗利 在信仰中找到了安慰并逐渐专注于宗教反思。定居纽约金斯顿后，她加入了与她有着 共同政治主张的卫理公会。她私下不停地练习 对上帝大声说话，一天晚上，她的祷告更具神圣的意义。鲍姆弗利声称听到了上帝的声音， 让她离开金斯顿，向人们昭示神的旨意。鲍姆弗利目不识丁，但她逐渐以一位慷慨激昂的 演说家的身份而名声大噪，她的演讲取材于圣经，精神理念和她的奴隶经历。她的布道通常谴责 对非裔美国人和妇女的压迫，在废奴和女权运动中 起到了重要作用。1843 年，她更名为 索杰纳·特鲁斯，并开启了她传奇的巡回演说之旅。特鲁斯视这次巡讲为上帝布道。她的信仰使她常去 全国最敌视她的地区，在那里，她是顽固保守的听众中 唯一的黑人女性。特鲁斯坚信上帝会保护她，但一些群众用暴力 回应了她的勇敢。在一次布道时，一群白人暴徒威胁 要放火烧掉她演讲的帐篷。在回忆录中， 特鲁斯回忆自己决心直面他们：“难道我没有足够的信心 出去镇压暴徒吗······我感觉我像是有三颗心！而且它们那么大， 身体几乎难以容纳！”她用歌声和祷告安抚暴徒， 直至他们不再想伤害她。特鲁斯的演讲 影响了全国成千上万的人，但她的行动远不止于公开演讲。内战期间， 她加入了联邦军队，从事招募士兵， 为黑人军队管理供给品的工作。她的工作广受好评， 甚至被邀请面见林肯总统。她借此良机提出 所有以前被奴役的人都应该被政府授予土地。直至 80 多岁， 特鲁斯仍坚持巡回演说。在 1883 年去世前， 她一直是一位直言不讳的批评家，在充满敌意的世界 为自己争取权力。正如特鲁斯所说， “即使我身处敌营，仍能随遇而安；因为真理攻无不克， 必将战无不胜。”

**P853 2020-04-28 What really happened during the Salem Witch Trials - Brian A. Pavlac**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=853)

You’ve been accused of a crime you did not commit. It’s impossible to prove your innocence. If you insist that you’re innocent anyway, you’ll likely be found guilty and executed. But if you confess, apologize, and implicate others for good measure, you’ll go free. Do you give a false confession— or risk a public hanging? This was the choice facing those accused of witchcraft in the village of Salem, Massachusetts between February 1692 and May 1693. They were the victims of paranoia about the supernatural, misdirected religious fervor— and a justice system that valued repentance over truth. Salem was settled in 1626 by Puritans, a group of English protestants. Life was strict and isolated for the people of Salem. Battles with their Native American neighbors and groups of French settlers were commonplace. People feared starvation and disease, and relations between villagers were strained. To make matters worse, 1692 brought one of the coldest winters on record. That winter, two cousins, 9 year old Betty Parris and 11 year old Abigail Williams started behaving very strangely. A physician found nothing physically wrong — but diagnosed the girls as under “an evil hand.” Puritans believed that the Devil wreaked havoc in the world through human agents, or witches, who blighted nature, conjured fiendish apparitions, and tormented children. As news swept through the village, the symptoms appeared to spread. Accounts describe 12 so-called “afflicted” girls contorting their bodies, having fits, and complaining of prickling skin. Four of the girls soon accused three local women of tormenting them. All three of the accused were considered outsiders in some way. On February 29th, the authorities arrested Sarah Good, a poor pregnant mother of a young daughter, Sarah Osbourne, who had long been absent from church and was suing the family of one of her accusers, and Tituba, an enslaved woman in Betty Parris’s home known by her first name only. Tituba denied harming the girls at first. But then she confessed to practicing witchcraft on the Devil’s orders, and charged Good and Osbourne with having forced her. Osbourne and Good both maintained their innocence. Osbourne died in prison, while Good’s husband turned against her in court, testifying that she "was a witch or would be one very quickly." Good’s 4 year old daughter was imprisoned and eventually gave testimony against her mother. Meanwhile, Good gave birth in jail. Her baby died, and she was convicted and hanged shortly thereafter. Tituba was held in custody until May, and then released. These three victims were just the beginning. As accusations multiplied, others, like Tituba, made false confession to save themselves. The authorities even reportedly told one accused witch that she would be hanged if she did not confess, and freed if she did. They were not particularly interested in thoroughly investigating the charges— in keeping with their Church’s teachings, they preferred that the accused confessed, asked for forgiveness, and promised not to engage in more witchcraft. The court accepted all kinds of dubious evidence, including so-called “spectral evidence” in which the girls began raving when supposedly touched by invisible ghosts. Complicating matters further, many of the jurors in the trials were relatives of the accusers, compromising their objectivity. Those who dared to speak out, such as Judge Nathanial Saltonstall, came under suspicion. By the spring of 1693, over a hundred people had been imprisoned, and 14 women and 6 men had been executed. By this time, accusations were starting to spread beyond Salem to neighboring communities, and even the most powerful figures were targets. When his own wife was accused, the governor of Massachusetts colony suspended the trials. Sentences were amended, prisoners released, and arrests stopped. Some have speculated that the girls were suffering from hallucinations caused by fungus; or a condition that caused swelling of the brain. But ultimately, the reason for their behavior is unknown. What we do know is that adults accepted wild accusations by children as hard evidence. Today, the Salem Witch Trials remain a cautionary tale of the dangers of groupthink and scapegoating, and the power of fear to manipulate human perception.

**P853 2020-04-28 What really happened during the Salem Witch Trials - Brian A. Pavlac**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=853)

翻译人员: Meng Ren 校对人员: Wanting Zhong你被指控犯下莫须有的罪名。你绝不可能证明自己的清白。如果你坚称自己是被冤枉的，就很可能被判有罪并被处决。但如果你认罪、道歉， 并转而指控他人，你就会被释放。你愿意假装认罪—— 还是被当众处以绞刑？这就是 1692 年 2 月 到 1693 年 5 月间，马萨诸塞湾省塞勒姆村被指控 巫术罪的人们所面临的抉择。他们是对超自然力量的迫害妄想的受害者，是被误导的宗教狂热的受害者，也是当时重视忏悔 甚于真相的司法系统的牺牲品。1626 年，一群来自英格兰的清教徒 （英国新教的一个派别）登陆塞勒姆。塞勒姆人民的生活 戒律严苛，与世隔绝。他们与印第安原住民和法国殖民者们矛盾不断。人们恐惧着饥饿与疾病，村民的关系剑拔弩张。雪上加霜的是，1692 年经历了 有史以来最寒冷的严冬。那年冬天，一对表姐妹，9 岁的贝蒂 · 帕里斯 和 11 岁的艾比盖儿 · 威廉姆斯突然开始变得行为怪异。医生找不出任何生理上的问题——却将女孩们诊断为 受到了“巫术的蛊惑”。清教徒们认为，恶魔通过附身 人类代理人，即女巫，在世间作恶，破坏自然， 唤出邪恶的幽灵，甚至折磨小孩。消息迅速在村子里传开了， 相似病状也开始在更多的村民身上蔓延。记录里描述道， 12 名所谓 “被侵扰的” 女孩扭曲着身体，被痉挛和刺痛的皮肤所折磨。其中四名女孩很快指控 当地三名女性对她们施加伤害。这三名女人都是 某种形式上的边缘人。2 月 29 日，这三人被当局逮捕， 她们分别是：萨娜 · 古德，一位怀着身孕 抚养幼女的贫困母亲，萨娜 · 奥斯本， 她长期缺席教会活动，而且正在和指控她的一家人打官司，以及提图芭， 她是贝蒂 · 帕里斯家的女奴，姓氏不详。一开始，提图芭否认 自己伤害了女孩。但随后承认自己 在恶魔的指令下施行了巫术，并且指控古德和奥斯本 逼迫她这么做。奥斯本和古德坚称自己是清白的。奥斯本在监狱中死去， 而古德的丈夫则在法庭上翻脸，作证说她 “即使不是女巫， 也快变成女巫了。”古德四岁的女儿被关进监狱，最终也出庭指控了自己的母亲。而古德在监狱里生产，但孩子早夭，她随后不久 就被宣告有罪并处以绞刑。提图芭被收押至 5 月， 之后被释放。这三个受害者 只不过是故事的开始。随着指控数量的增加， 其他人也不得不像提图芭一样昧着良心招供，以求逃过制裁。有报道称当局甚至告诉 一个被指控巫术罪的人，如果她认罪，就能被释放， 否则就会被绞死。官方对彻底核查事实真相 并不感兴趣——为了遵守教会的教义， 他们更在乎让被指控者认罪，请求宽恕， 并承诺绝不再使用巫术。法庭接受了所有模棱两可的证据，包括所谓的 “幽灵证据”：女孩儿们被看不见的幽灵 触摸时就会胡言乱语。让案情更为复杂的是， 许多陪审团成员都是指控者的亲戚， 他们无法做到客观公正。那些胆敢发声质疑的人， 比如法官纳撒尼尔 · 索顿斯托尔，反而遭到了怀疑。到了 1693 年春天， 上百人被关进了监狱，14 名女性和 6 名男性被处死。这时，指控开始向 塞勒姆周边的城镇蔓延，甚至一些最有权有势的大人物 也遭到了指控。当马萨诸塞省（当时麻省仍是英属殖民地） 省长的夫人被指控后，省长叫停了这些审判。判决被修正，囚犯被释放， 逮捕行动也停止了。有的人猜测女孩儿们被真菌感染，从而产生了幻觉；或是得了某种疾病， 导致大脑炎症。但我们终究无法得知 事情的真相。我们能确定的是：一群成年人把儿童发出的荒谬指控 当成了确凿的证据。如今，塞勒姆审巫案 已经成为一个警世故事，它时刻提醒着我们，团体盲思 和利用替罪羊何其危险，而恐惧对人类感知的操纵 又是何其强大。

**P854 2020-04-29 Which is better - Soap or hand sanitizer - Alex Rosenthal and Pall Th**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=854)

Your hands, up close, are anything but smooth. With peaks and valleys, folds and rifts, there are plenty of hiding places for a virus to stick. If you then touch your face, the virus can infect you. But there are two extraordinarily simple ways you can keep that from happening: soap and water, and hand sanitizer. So which is better? The coronavirus that causes COVID-19 is one of many viruses whose protective outer surface is made of a lipid bilayer. These lipids are pin shaped molecules whose heads are attracted to water, and tails are repulsed by it. So in water-rich environments, lipids naturally form a shell like this, with the heads outside and the tails inside. Their shared reaction to water makes the lipids stick loosely together— this is called the hydrophobic effect. This outer structure helps the molecular machinery of the virus break through cellular membranes and hijack our cells. But it has thousands upon thousands of weak points where the right molecules could pry it apart. And this is where soap comes in. A single drop of any brand of soap contains quadrillions of molecules called amphiphiles, which resemble biological lipids. Their tails, which are similarly repulsed by water, compete for space with the lipids that make up the virus’s shell. But they’re just different enough to break up the regularity of the virus’s membrane, making the whole thing come crashing down. Those amphiphiles then form bubbles of their own around particles including the virus’s RNA and proteins. Apply water, and you’ll wash that whole bubble away. Hand sanitizers work less like a crowbar, and more like an earthquake. When you surround a coronavirus with water, the hydrophobic effect gives the bonds within the membrane their strength. That same effect also holds the big proteins that form coronavirus’s spikes in place and in the shape that enables them to infect your cells. If you dry the virus out in air, it keeps its stability. But now surround it with a high concentration of an alcohol, like the ethanol or isopropanol found in most hand-sanitizers. This makes the hydrophobic effect disappear, and gives the molecules room to move around. The overall effect is like removing all of the nails and mortar from a house and then hitting it with an earthquake. The cell’s membrane collapses and those spike proteins crumble. In either method, the actual process of destroying the virus happens in just a second or two. But doctors recommend at least 20 seconds of hand-washing because of the intricate landscape that is your hand. Soap and sanitizer need to get everywhere, including your palms, fingertips, the outsides of your hands, and between your fingers, to protect you properly. And when it comes to a coronavirus outbreak, doctors recommend washing your hands with soap and water whenever possible. Even though both approaches are similarly effective at killing the virus, soap and water has two benefits: first it washes away any dirt which could otherwise hide virus particles. But more importantly, it’s simply easier to fully cover your hands with soap and water for 20 seconds. Of course, hand sanitizer is more convenient to use on the go. In the absence of a sink, use the sanitizer as thoroughly as possible and rub your hands together until they’re dry. Unfortunately, there are billions of people who don’t have access to clean drinking water, which is a huge problem at any time but especially during an outbreak. Researchers and aid groups are working to provide solutions for these communities. One example is a device that uses salt, water, and a car battery to make chlorinated water that kills harmful pathogens and is safe for hand-washing. So wherever possible, soap and water are recommended for a coronavirus, but does that mean it's best for every viral outbreak? Not necessarily. Many common colds are caused by rhinoviruses that have a geometric protein structure called a capsid instead of a lipid membrane. The capsid doesn't have nearly as many weak points where soap amphiphiles can pry it apart, so it takes longer for soap to be effective. However some of its surface proteins are still vulnerable to the destabilizing effect of hand sanitizer. In this and similar cases, hand sanitizer may be more effective, especially if you then wash your hands to remove residual particles. The best way to know which to use for any given outbreak is to do what's best for all things illness-related: follow the advice of accredited medical professionals.

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翻译人员: Grace Li 校对人员: Yolanda Zhang你的手近距离看并不光滑。手上高低交错的褶皱裂纹中，有许多能够让病毒附着的地方。如果此时用手触碰脸部， 就有可能被手上的病毒感染。但是用两种非常简单的方法 就可以避免上述情况的发生：用香皂和清水，或是免洗洗手液。那么，究竟哪一种更好呢？引起 COVID-19 的新型冠状病毒，其保护性的外表面 由脂质双分子层构成。这些脂质是呈大头针状的分子， 头部具有亲水性，尾部具有疏水性。因此在富含水的环境中， 脂质自然地形成了一个壳，壳外侧由头部构成， 内侧由尾部构成。头尾对水的反应 让脂质分子松散地附着在一起，这就是疏水效应。这种外部结构有助于病毒分子侵入细胞膜并劫持我们的细胞。但是外部结构 也有着成千上万的弱点，特定的分子可以将其撬开。这就是香皂的清洁原理。一小块任何品牌的香皂 都包含着千万亿叫做两亲化合物的分子，类似生物脂质。它们疏水的尾部会与构成病毒外壳的脂质争夺空间。尾部与病毒外壳脂质的差异 足以打破病毒表面的成膜规则，导致整个膜结构的破碎。然后这些两亲化合物就会在病毒 RNA 和蛋白质周围形成泡泡，只要用水就能将这些泡泡洗掉。比起撬棍，免洗洗手液的作用 更像一场地震。当你用水裹住新冠病毒时，它的疏水效应会让 膜内结构更坚不可摧。同样的效应也可固定构成新冠病毒尖端的蛋白质，此尖端的外形 让病毒得以侵入你的细胞。如果你将病毒吹干， 它依然会保持稳定状态。但是现在，我们用高浓度酒精，也就是多数免洗洗手液都含有的 乙醇或异丙醇裹住它。这会让疏水效应消失，并提供了让分子移动的空间。酒精带来的整体效果相当于 把一栋房子的所有钉子和灰泥都移除，然后用一场地震摧毁它。于是病毒的膜坍塌了， 突刺蛋白也随之破碎失活。不管用香皂还是免洗洗手液，消灭病毒的过程 在一两秒内便会完成。但医生建议洗手的时间 持续至少 20 秒，这是因为手上有着复杂的纹路。香皂和洗手液需要覆盖到 包括手掌，指尖，手背和手指间的任何位置才能更好的保护到你。在新冠病毒爆发的情况下，医生建议尽可能用香皂和清水去洗手。尽管香皂和洗手液 在消毒方面一样有效，香皂和清水有着两个好处：首先，它们会洗去手上 隐藏病毒分子的污垢。更重要的是，在 20 秒钟内， 它们可以轻松的覆盖到你手上的各个角落。当然，免洗洗手液使用起来更为便捷。当你不方便洗手时， 可以大量涂抹免洗洗手液，并将两手充分摩擦直到液体变干。不幸的是，有数十亿人没有条件得到干净的饮用水，这在任何时候都是个大难题， 尤其是病毒爆发期。研究者和援助组织都在努力 为这些人群提供解决方案。比如利用由盐、水和 汽车电池组成的设备制造可消灭病菌，也可用来洗手的氯化水。因此，只要条件允许， 最好使用香皂和清水来消灭新冠病毒，但这是否表示它们 针对所有病毒都最有效呢？未必。很多普通感冒是由鼻病毒引发的，它有一种称为“衣壳”的 几何蛋白结构,而不是脂质膜结构。衣壳并没有那么多能让香皂中两亲化合物撬开的破绽，因此香皂需要更长时间才能起作用。然而有些鼻病毒表面的蛋白质依然容易受到免洗洗手液的影响。因此在类似情况下， 免洗洗手液更加有效，尤其是当你随后 接着用香皂洗去手上的残留物。对于任何流行病，想要了解 如何选择最有效的清洁方式，只需要做 对所有病症都有效的事：遵循医疗专业人士的建议。

**P855 2020-05-05 A day in the life of an Aztec midwife - Kay Read**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=855)

Lord Sun dawns on the day called 7-Monkey, his fingers slowly spreading a rosy sheen that mixes softly with smoke rising from Tenochtitlan’s many hearth fires. The midwife, Xoquauhtli, has a difficult choice to make. A momentous shift from rainy season to dry season is underway. All summer, the gods have kept the people fed with corn, but the fertile summer months are disappearing. This day occurs during the festival that marks the shift between the summer season, when the gods feed the people, and the winter season, when the people feed the gods in return. Xoquauhtli owes a debt to her patron, Teteoinnan, the female warrior goddess at the center of this festival. Teteoinnan wages war both on women’s battlefields of birth and in men’s battles with Tenochtilan’s enemies. She must be kept happy or she will bring bad luck. The midwife should participate in the festival today, but one of her patients could go into labor any minute. Xoquauhtli decides to check on her patient first. The expecting mother hasn’t worked too hard, chewed gum, or lifted heavy things. Her family is taking good care of her. Surely Xoquauhtli can take a little time to honor her goddess. She leaves her apprentice in charge and heads to the center of the city. Along the way, she sees women sweeping the roads and hanging gourds in preparation for the festival. Finally, she reaches the Great Pyramid. On top are two temples: the north, where rituals honor the rain god in the summer, and the south one is where rituals honor the war god in the winter. On the equinox, the sun rises between the two sides. The ceremony begins with a mock battle between the midwives and the other physicians. Xoquauhtli’s team battles heartily, throwing nochtles, marigolds, and balls made of reed and moss. They joke, call their rivals names, and laugh. But then, a girl comes running with a message for Xoquauhtli. Her patient is in labor! She hurries back to the house. All the old women from the extended family have already gathered for the birth— their experience is very valuable if anything goes wrong. She readies herself with a prayer praising her most important tools, her fingers. Then she doses the patient with cihuapatli to help expel the baby, massages her in the sweathouse, and rubs her stomach with tobacco. Offering Teteoinnan a short prayer, she urges her patient to act like a warrior. A strong baby girl slips into her waiting hands and the old women shout triumphant cries. Xoquauhtli takes a few drops of water from a jade bowl, breaths on them, and places them on the baby’s tiny tongue. She calls her a precious greenstone, a little warrior, and tells her how the Lord and Lady of the Ninth Sky breathed life into her, sending her to this place of burden and torment. She then turns to the new mother, praising her, telling her she acted like an eagle warrior, a jaguar warrior. By the time they finish, it’s late, and the flames of the fire have died down. Xoquauhtli piles the remaining hot coals in the center of the hearth, stoking them to keep them going. She lays the baby in a woven basket, head facing the warming fire. This will warm her tonalli, an important “soul” center in the body central to health and well-being. It’s almost midnight— if Xoquauhtli hurries, she can get back to the temple for the culmination of the festival. She makes her way to the city center, where a priest carries a woman on his back to the top of the pyramid. To begin the new season and feed the gods, she will be beheaded, symbolizing how corn is cut in the fields. Afterward, she will be reborn as Lady Teteoinnan, and preside over the induction of new warriors.

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翻译人员: Lark Yu 校对人员: Yanyan Hong太阳神在七猴之日出现，从他指尖慢慢散播出红润的光辉，和特诺齐特兰的村庄人家 升起的袅袅炊烟慢慢融合。接生婆胥夸特莉， 要做一个艰难的决定。现在正值雨季过渡到 旱季的重大转换时期。整个夏天，众神们 都确保人们能吃上玉米，而丰饶的夏季月份即将过去。庆典季的今天标志着转变，从众神让人们饱餐的夏季转换到改由人民回馈众神的冬季。胥夸特莉亏欠她的守护神，特里欧娜，她是与这个庆典季 有重要关系的战斗女神。特里欧娜会发动女性的生育战争，以及男性与特诺齐特兰敌人的战争。一定要让她满心欢喜， 否则会带来厄运。接生婆要参加今天的庆典，但她有一个病人可能随时要分娩。胥夸特莉决定先去看看她的病人。准妈妈还没有进入 最后产程，嚼着口香糖，或拿重物。她的家人悉心地照顾着她。当然胥夸特莉可以抽出 片刻时间向她的女神祈祷。她留下助手照料现场， 只身前往市中心。一路上她看到妇女们 在清扫道路和悬挂水瓢为庆典做准备。终于，她到达大金字塔。顶上有两座神庙：北神殿，举行仪式祈求夏季雨神的地方，南边是举行仪式 祈福冬季战神的地方。在昼夜平分点， 太阳会在两方之间升起。仪式一开始，是由接生婆 与其他医护人员之间展开一场模拟作战。胥夸特莉所在小组全情投入， 扔着果实，金盏花，以及芦苇和苔藓做成的球。他们说着玩笑， 叫对手的名字，发出笑声。就在这时，一个女孩跑过来， 给胥夸特莉带来一个消息。她的病人要分娩了！她急忙赶回病人房间。整个大家族的所有年老女性，已经到来，等待着新生命降临——如果哪里不对劲， 她们的经验非常宝贵。胥夸特莉祈祷并准备使用 她最重要的工具，她的手指。然后她让赤花帕特里 协助病人用力生出孩子。在产房中给她按摩， 并用烟草按揉肚子。给特里欧娜一个很短的祈祷，她鼓励病人表现得像战士一样。一个强健的女宝宝 滑落到伸着等待的手中老年的妇女们发出胜利的呼叫。胥夸特莉从一个玉制碗中 沾了几滴水，靠近闻了闻，然后放到了小宝宝的小舌头上。她称小宝宝是珍贵的 绿宝石，小战士，并告诉她，第九天空的 众神和女神是怎样给她带来生命，送到这个 满是责任和磨难的地方。她然后转向新妈妈，赞扬她，告诉她，她表现得就像 一位鹰斗士，或虎斗士。他们结束时，天色已晚， 燃起的火苗也已经熄灭。胥夸特莉把剩下的 热炭堆在在炉子中，煽动着它们继续燃烧。她把宝宝放入一个编织的篮子中， 面朝着温暖的炉火。这会暖和她的托纳利， 一个她身体重要的 “灵魂” 中心对健康和幸福非常重要。几乎到午夜了—— 如果胥夸特莉抓紧时间，她还能赶回神庙， 加入到庆典高潮中。她一路走到市中心，在那里， 一位神父背着一位妇女往金字塔顶走去。为了回馈众神、 迎接季节的开始，她会被砍头，象征着田地里玉米被收割。之后，她会以 特里欧娜女神的模样重生，掌管着新斗士的到来。

**P856 2020-05-05 Can you solve the world’s most evil wizard riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=856)

The evil wizard MoldeVort has been trying to kill you for years, and today it looks like he’s going to succeed. But your friends are on their way, and if you can survive until they arrive, they should be able to help stop him. The evil wizard’s protective charms ward off every spell you know, so in an act of desperation you throw the only object in reach at him: Pythagoras’s cursed chessboard. It works, but with a catch. MoldeVort starts in one corner of the 5x5 board. You have a few minutes to choose four distinct positive whole numbers. MoldeVort gets to say one of them, and if you can pick a square on the board whose center is exactly that distance away, the curse will force him to move to that spot. Then he’ll have to choose any of the four numbers, and the process repeats until you can’t keep him inside the board with legal moves. Then he’ll break free of the spell and almost certainly kill you. What four numbers can you choose to keep MoldeVort trapped by your spell long enough for help to arrive? And what’s your strategy? Pause the video to figure it out yourself. Answer in 3 Answer in 2 Answer in 1 The trick here is to keep MoldeVort where you want him. And one way to figure out how to do that is to play out the game as MoldeVort would: always trying to escape. You’re dealing with a relatively small board, so the numbers can’t be too big. Let’s start by trying 1, 2, 3, 4 to see what happens. Moldevort could escape those numbers in just three moves. By saying 2, then 3, he would force you to let him into one of the middle points of the grid, and then a 4 would break him free. But that means you’ll need to allow a number larger than 4, which is the distance from one end of a row to another. How is that even possible? Through diagonal moves. There are, in fact, points that are distance 5 from each other, which we know thanks to the Pythagorean Theorem. That states that the squares of the sides of a right triangle add up to the square of its hypotenuse. One of the most famous Pythagorean triples is 3, 4, 5, and that triangle is hiding all over your chessboard. So if MoldeVort was here, and he said 5, you could move him to these spaces. There’s another insight that will help. The board is very symmetrical: If MoldeVort is in a corner, it doesn’t really matter to you which corner it is. So we can think of the corners as being functionally the same, and color them all blue. Similarly, the spaces neighboring the corners behave the same as each other, and we’ll make them red. Finally, the midpoints of the sides are a third type. So instead of having to develop a strategy for each of the 16 spaces on the outside of the board, we can reduce the problem to just three. Meanwhile, all the inside spaces are bad for us, because if MoldeVort ever reaches one, he’ll be able to say any number larger than 3 and go free. Orange spaces are trouble too, since any number except 1, 2, or 4 would take him to an inside space or off the board. So orange is out and you’ll need to keep him on blue and red. That means 2 is bad, since it could take MoldeVort to orange on the first turn. But the four other smallest numbers, 1, 3, 4, and 5, might work. Let’s try them and see what happens. If MoldeVort says 1, you can make him go from blue to red or red to blue. And the same works if he says 3. Thanks to our diagonals, this is even true if he says 5. If he says 4, you can keep him on the color he’s already on by moving the length of a row or column. So these four numbers work! Even if your friends don’t get here right away, you’ll be able to keep the world’s most evil wizard contained for as long as you need.

**P856 2020-05-05 Can you solve the world’s most evil wizard riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=856)

翻译人员: Tingwen Yan 校对人员: Yanyan Hong邪恶的巫师莫地魔 多年来处心积虑要把你杀掉，看来今天他就要成功了。但是你的朋友正在赶来的路上， 如果你能坚持到他们赶到，他们可以帮你阻止他。邪恶巫师的护身符咒 抵挡了你知道的所有魔咒，因而在绝望之余，你把手边 唯一能够到的东西扔向他：受诅咒的毕达哥拉斯棋盘。这招有用，但却内藏玄机。棋盘大小为 5x5， 莫地魔从一个角落开始。你有几分钟去选择四个不同的正整数。莫地魔说出其中一个数字， 如果你能在棋盘上选一个格子，格子中心与他的距离刚好是那个数字，诅咒将迫使他移动到你选的格子。之后，他会再从四个数字中 选择任意一个，这个步骤会不断重复， 直到按规则的任意移动都无法让他留在棋盘内。然后，他便能摆脱诅咒束缚， 几乎肯定他会杀了你。你要选择哪四个数字 可以确保在支援抵达前莫地魔都无法摆脱你的咒语？ 那么，你的策略是什么？暂停此视频，自己寻找答案。3 秒后公布答案2 秒后公布答案1 秒后公布答案这里的诀窍是要让莫地魔 留在你希望的地方。其中一个可以做到的方法是用莫地魔的思维玩这个游戏：不断尝试逃脱。这个棋盘相对较小，所以数字不能太大。让我们先尝试 1、2、3、4 ， 看看会发生什么。莫地魔只需用三步就能逃出来。他可以说 2 ，然后再说 3 ，就会迫使你让他移动到 棋盘的中心一个格子，接着，他只需说 4 ， 就可以逃出来了。但这意味着你要选择 一个大于 4 的数字，而从棋盘一端到 另一端的距离就是 4 格。这怎么可能成功呢？通过对角移动。实际上，这里有方块相隔 5 步，这点要多亏勾股定理。勾股定理指出， 三角形的两条边的平方相加等于最长边的平方。勾股定理最著名的例子 就是边长为 3、4、5 的三角形，而你的棋盘上满是这些三角形。所以如果莫地魔在这里，说了 5 ， 你可以让他挪到这些位置。还有另一项有帮助的想法。这个棋盘非常对称： 如果莫地魔在其中一个角落，对你而言，他在哪个角落并不重要。就功能而言，我们可以想 所有角落是相同的，将它们标记为蓝色。同样地，邻近角落的方块也是一样的，我们把它们标记为红色。最后，每条边的中央格子是属于第三类。所以，我们不用为棋盘边缘的16 个格子全都设计策略，我们可以简化问题至三种思路。同时，中间区域格子都对我们不利，因为只要莫地魔来到了其中之一，他就可以说一个 大于 3 的数字获得自由。橙色的地方也有麻烦， 因为数字除了 1、2、4都会让他脱身或来到中间区域。所以不能选择橙色， 你需要把他留在蓝色和红色内。这意味着 2 是不合适的，因为这会让莫地魔 第一局就来到橙色地带。但是其他的四个最小的数字 1、3、4、5 则可行。让我们尝试一下会发生什么。如果莫地魔说 1， 你可以让他去蓝到红或者红到蓝。如果他选择 3 也是一样的。多亏我们的对角线， 所以 5 也行得通。如果他说了 4 ， 你可以让他直向或者横向移动。所以这四个数字行得通！就算你的朋友不能立刻赶到，你也能困住世界上最邪恶的巫师，让他在棋盘上困多久都行。

**P857 2020-05-05 What causes opioid addiction, and why is it so tough to combat - Mike**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=857)

More than 3,000 years ago, a flower began to appear in remedies in Ancient Egyptian medical texts. Across the Mediterranean, the ancient Minoans likely found ways to use the same plant for its high. Both ancient civilizations were on to something— opium, an extract of the poppy in question, can both induce pleasure and reduce pain. Though opium has remained in use ever since, it wasn’t until the 19th century that one of its chemical compounds, morphine, was identified and isolated for medical use. Morphine, codeine, and other substances made directly from the poppy are called opiates. In the 20th century, drug companies created a slew of synthetic substances similar to these opiates, including heroin, hydrocodone, oxycodone, and fentanyl. Whether synthetic or derived from opium, these compounds are collectively known as opioids. Synthetic or natural, legal or illicit, opioid drugs are very effective painkillers, but they are also highly addictive. In the 1980s and 90s, pharmaceutical companies began to market opioid painkillers aggressively, actively downplaying their addictive potential to both the medical community and the public. The number of opioid painkillers prescriptions skyrocketed, and so did cases of opioid addiction, beginning a crisis that continues today. To understand why opioids are so addictive, it helps to trace how these drugs affect the human body from the first dose, through repeated use, to what happens when long-term use stops. Each of these drugs has slightly different chemistry, but all act on the body’s opioid system by binding to opioid receptors in the brain. The body’s endorphins temper pain signals by binding to these receptors, and opioid drugs bind much more strongly, for longer. So opioid drugs can manage much more severe pain than endorphins can. Opioid receptors also influence everything from mood to normal bodily functions. With these functions, too, opioids’ binding strength and durability mean their effects are more pronounced and widespread than those of the body’s natural signaling molecules. When a drug binds to opioid receptors, it triggers the release of dopamine, which is linked to feelings of pleasure and may be responsible for the sense of euphoria that characterizes an opioid high. At the same time, opioids suppress the release of noradrenaline, which influences wakefulness, breathing, digestion, and blood pressure. A therapeutic dose decreases noradrenaline enough to cause side effects like constipation. At higher doses opioids can decrease heart and breathing rates to dangerous levels, causing loss of consciousness and even death. Over time, the body starts to develop a tolerance for opioids. It may decrease its number of opioid receptors, or the receptors may become less responsive. To experience the same release of dopamine and resulting mood effects as before, people have to take larger and larger doses— a cycle that leads to physical dependence and addiction. As people take more opioids to compensate for tolerance, noradrenaline levels become lower and lower, to a point that could impact basic bodily functions. The body compensates by increasing its number of noradrenaline receptors so it can detect much smaller amounts of noradrenaline. This increased sensitivity to noradrenaline allows the body to continue functioning normally— in fact, it becomes dependent on opioids to maintain the new balance. When someone who is physically dependent on opioids stops taking them abruptly, that balance is disrupted. Noradrenaline levels can increase within a day of ceasing opioid use. But the body takes much longer to get rid of all the extra noradrenaline receptors it made. That means there’s a period of time when the body is too sensitive to noradrenaline. This oversensitivity causes withdrawal symptoms, including muscle aches, stomach pains, fever, and vomiting. Though temporary, opioid withdrawal can be incredibly debilitating. In serious cases, someone in withdrawal can be violently ill for days or even weeks. People who are addicted to opioids aren't necessarily using the drugs to get high anymore, but rather to avoid being sick. Many risk losing wages or even jobs while in withdrawal, or may not have anyone to take care of them during withdrawal. If someone goes back to using opioids later, they can be at particularly high risk for overdose, because what would have been a standard dose while their tolerance was high, can now be lethal. Since 1980, accidental deaths from opioid overdose have grown exponentially in the United States, and opioid addictions have also exploded around the world. While opioid painkiller prescriptions are becoming more closely regulated, cases of overdose and addiction are still increasing, especially among younger people. Many of the early cases of addiction were middle-aged people who became addicted to painkillers they had been prescribed, or received from friends and family members with prescriptions. Today, young people are often introduced to prescription opioid drugs in those ways but move on to heroin or illicit synthetic opioids that are cheaper and easier to come by. Beyond tighter regulation of opioid painkillers, what can we do to reverse the growing rates of addiction and overdose? A drug called naloxone is currently our best defense against overdose. Naloxone binds to opioid receptors but doesn’t activate them. It blocks other opioids from binding to the receptors, and even knocks them off the receptors to reverse an overdose. Opioid addiction is rarely a stand-alone illness; frequently, people with opioid dependence are also struggling with a mental health condition. There are both inpatient and outpatient programs that combine medication, health services, and psychotherapy. But many of these programs are very expensive, and the more affordable options can have long waiting lists. They also often require complete detoxification from opioids before beginning treatment. Both the withdrawal period and the common months-long stay in a facility can be impossible for people who risk losing jobs and housing in that timeframe. Opioid maintenance programs aim to address some of these obstacles and eliminate opioid abuse using a combination of medication and behavior therapy. These programs avoid withdrawal symptoms with drugs that bind to opioid receptors but don’t have the psychoactive effects of painkillers, heroin, and other commonly abused opioids. Methadone and buprenorphine are the primary opioid maintenance drugs available today, but doctors need a special waiver to prescribe them— even though no specific training or certification is required to prescribe opioid painkillers. Buprenorphine can be so scarce that there’s even a growing black market for it. There’s still a long way to go with combating opioid addiction, but there are great resources for making sense of the treatment options. If you or someone you know is struggling with opioid use in the United States, the Department of Health and Human Services operates a helpline: 800-662-4357 and a database of more than 14,000 substance abuse facilities in the US: www.hhs.gov/opioids

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翻译人员: Wanting Zhong 校对人员: Rong Han三千多年前， 有一种花开始出现在古埃及医学文献的药方里。而在地中海的对岸， 古代的米诺斯人很可能也在用这种植物取得快感。这两个古代文明 都发现了同一样东西：鸦片 —— 这种提炼自罂粟花的物质，既能产生快感，也能减轻疼痛。虽然鸦片一直沿用到了现在，但是直到 19 世纪， 它的一种化合物——吗啡才以医疗为目的 被鉴定和分离出来。吗啡、可待因，以及其他 直接从罂粟中提取的物质统称天然阿片剂。在 20 世纪， 制药公司研制了一系列与这些阿片剂相似的合成物质，比如海洛因、氢可酮、 羟考酮和芬太尼。无论是合成的还是由鸦片衍生的，这些化合物统称为阿片类药物。不管是合成的还是天然的、 合法的还是非法的，阿片类药物都是很有效的止痛药， 但同时也极容易让人上瘾。20 世纪 80 和 90 年代，制药公司开始 极力营销阿片类止痛药，并故意在医学界和公众面前淡化它们的成瘾潜力。阿片类止痛药的处方数量直线上升，阿片类药物成瘾的人数也随之猛增， 形成了一直延续至今的危机。要想了解阿片类药物为什么 那么容易让人上瘾，首先就要追踪这类药物 在各阶段对人体的影响，包括第一次使用时，反复使用之后， 以及长期用药后又突然停药时会发生什么。各种阿片类药物的 化学性质都略有不同，但都会与大脑中的阿片类受体结合， 从而作用于人体的“愉悦系统”。人体内的内啡肽会与这些受体结合， 从而削弱疼痛信号，而阿片类药物与受体的结合 更强，也更持久。所以，相比内啡肽，阿片类药物 能缓解更加严重的疼痛。阿片类受体的影响范围很广， 从情绪到人体日常功能都包括在内。阿片类药物的结合强度和持久性意味着它们的作用比体内的天然信号分子 更明显、更广泛。药物与阿片类受体的结合 会触发多巴胺的分泌。多巴胺与愉悦感有关，摄取阿片类药物时标志性的愉悦感 可能就是由它引起的。与此同时，阿片类药物 会抑制去甲肾上腺素的分泌，从而影响清醒度、呼吸、消化和血压。治疗剂量的阿片类药物 会导致去甲肾上腺素水平减少，从而引发一些副作用，比如便秘。更高剂量的阿片类药物则会让心跳 和呼吸频率下降到危险水平，令人失去意识，甚至死亡。随着时间的推移， 人体开始对阿片类药物产生耐药性。体内的阿片类受体数量可能会减少，或者受体的反应会变弱。要想体验与以往等同的 多巴胺分泌和相应的情绪作用，人们就必须服用越来越大的剂量，而这一循环会导致身体产生 药物依赖性和成瘾。随着人们摄取更多阿片类药物 以补偿耐药性的作用，去甲肾上腺素的水平就会逐渐降低，直到开始影响人体的基本功能。为了对抗这种变化，人体会增加 去甲肾上腺素受体的数量，以便能侦测到更低浓度的 去甲肾上腺素。这种对去甲肾上腺素敏感度的增加，让人体得以继续正常运作；事实上，人体变得必须依赖阿片类药物 才能维持这种新的平衡。当一个对阿片产生生理依赖的人 突然停止服用阿片类药物时，这一平衡就会被破坏。去甲肾上腺素水平能在停止服用 阿片类药物的一天之内增加，但是人体需要更长的时间才能除掉体内生成的 额外的去甲肾上腺素受体。这意味着，人体会有一段时间对去甲肾上腺素过于敏感，从而导致戒断症状的产生，比如肌肉酸痛、腹痛、发烧和呕吐。阿片类药物戒断症状虽然短暂， 却能让人极度衰弱。严重的情况下， 戒断症状患者可能会重病一场，持续几天，甚至几周。对阿片类药物上瘾的人 服药不再是为了寻求快感，而是为了避免生病。很多人一旦陷入戒断症状， 可能会面临减薪，甚至丢掉工作，或者在发生戒断症状时没人照顾。如果他们以后 重新开始服用阿片类药物，他们用药过量的风险 将会大幅提高，因为他们在高度耐药时 服用的“标准”剂量，现在有可能会致命。自从 1980 年以来， 阿片类药物过量导致的意外死亡案例在美国已呈现指数性增长，而世界各地的阿片类药物 成瘾人数也在爆发性增加。虽然阿片类止痛药的处方 已经得到了更严密的监管，但是过度用药和成瘾的 案例数量仍在持续攀升，特别是在年轻人中。很多早期染上药瘾的人是中年人，让他们上瘾的是开给他们的止痛药，或是家人朋友给他们的处方药。如今，年轻人通常是先通过这些途径 接触到阿片类处方药，后来却转而吸食海洛因 和非法的合成类阿片剂，因为它们更便宜，也更容易入手。除了更严格地监管 阿片类止痛药之外，我们还能用什么方法减缓 成瘾和用药过量事件的快速增长呢？目前，有一种叫做纳洛酮的药物 是防止阿片类药物过量的最佳手段。纳洛酮会与阿片类受体结合， 但不会激活受体。它会阻止其他阿片类药物 与受体结合，甚至能把它们从受体上撞开， 逆转用药过量的情况。阿片类药物成瘾 鲜少作为患者的唯一病症，很多时候， 患有阿片类药物依赖的人同时也在受某种精神疾病的困扰。目前，有些住院和门诊疗程综合了药物、保健服务和心理治疗等疗法，但是，这类项目大都费用昂贵，而相对便宜的项目 则呈僧多粥少的局面。而且在开始这类综合治疗之前，患者往往必须先进行彻底的 阿片类药物解毒。戒断期和往往长达数个月的住院期对可能在这段时间内失去工作 和住所的人来说是难以承受的。阿片类维持治疗的目的 就是克服这类障碍，并且通过结合药物和行为治疗来消除阿片类药物滥用的问题。为了避免引发戒断症状，这类疗程使用的药物 会与阿片受体结合，但不会像止痛药、海洛因等 那样产生精神作用。美沙酮和丁丙诺啡是目前主流的阿片类维持药物，但是医生必须申请特别许可 才能开出这类药物，尽管开出阿片类止痛药不需要接受特定训练或获得认证。丁丙诺啡非常稀缺，甚至出现了日渐增长的地下市场。想要赢得与阿片类药物成瘾的战斗， 我们还有很长的路要走，不过存在很多优质的资源 能帮助你了解各种治疗方案。在美国，如果你自己或你认识的人 对阿片类药物成瘾，可以拨打美国卫生与公众服务部的 求助热线，号码是 800-662-4357，他们还建立了一个数据库，包含美国 1.4 万多间治疗药物滥用的机构，网址是 www.hhs.gov/opioids。

**P858 2020-05-08 What is a coronavirus - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=858)

For almost a decade, scientists chased the source of a deadly new virus through China’s tallest mountains and most isolated caverns. They finally found it here: in the bats of Shitou Cave. The virus in question was a coronavirus that caused an epidemic of severe acute respiratory syndrome, or SARS, in 2003. Coronaviruses are a group of viruses covered in little protein spikes that look like a crown— or "corona" in Latin. There are hundreds of known coronaviruses. Seven of them infect humans, and can cause disease. The coronavirus SARS-CoV causes SARS, MERS-CoV causes MERS, and SARS-CoV-2 causes the disease COVID-19. Of the seven human coronaviruses, four cause colds, mild, highly contagious infections of the nose and throat. Two infect the lungs, and cause much more severe illnesses. The seventh, which causes COVID-19, has features of each: it spreads easily, but can severely impact the lungs. When an infected person coughs, droplets containing the virus spray out. The virus can infect a new person when the droplets enter their nose or mouth. Coronaviruses transmit best in enclosed spaces, where people are close together. Cold weather keeps their delicate casing from drying out, enabling the virus to survive for longer between hosts, while UV exposure from sunlight may damage it. These seasonal variations matter more for established viruses. But because no one is yet immune to a new virus, it has so many potential hosts that it doesn’t need ideal conditions to spread. In the body, the protein spikes embed in the host’s cells and fuse with them— enabling the virus to hijack the host cell’s machinery to replicate its own genes. Coronaviruses store their genes on RNA. All viruses are either RNA viruses or DNA viruses. RNA viruses tend to be smaller, with fewer genes, meaning they infect many hosts and replicate quickly in those hosts. In general, RNA viruses don’t have a proofreading mechanism, whereas DNA viruses do. So when an RNA virus replicates, it’s much more likely to have mistakes called mutations. Many of these mutations are useless or even harmful. But some make the virus better suited for certain environments— like a new host species. Epidemics often occur when a virus jumps from animals to humans. This is true of the RNA viruses that caused the Ebola, Zika, and SARS epidemics, and the COVID-19 pandemic. Once in humans, the virus still mutates— usually not enough to create a new virus, but enough to create variations, or strains, of the original one. Coronaviruses have a few key differences from most RNA viruses. They’re some of the largest, meaning they have the most genes. That creates more opportunity for harmful mutations. To counteract this risk, coronaviruses have a unique feature: an enzyme that checks for replication errors and corrects mistakes. This makes coronaviruses much more stable, with a slower mutation rate, than other RNA viruses. While this may sound formidable, the slow mutation rate is actually a promising sign when it comes to disarming them. After an infection, our immune systems can recognize germs and destroy them more quickly if they infect us again so they don’t make us sick. But mutations can make a virus less recognizable to our immune systems— and therefore more difficult to fight off. They can also make antiviral drugs and vaccines less effective, because they’re tailored very specifically to a virus. That’s why we need a new flu vaccine every year— the influenza virus mutates so quickly that new strains pop up constantly. The slower mutation rate of coronaviruses means our immune systems, drugs, and vaccines might be able to recognize them for longer after infection, and therefore protect us better. Still, we don’t know how long our bodies remain immune to different coronaviruses. There’s never been an approved treatment or vaccine for a coronavirus. We haven’t focused on treating the ones that cause colds, and though scientists began developing treatments for SARS and MERS, the epidemics ended before those treatments completed clinical trials. As we continue to encroach on other animals’ habitats, some scientists say a new coronavirus jumping to humans is inevitable— but if we investigate these unknowns, it doesn’t have to be devastating.

**P858 2020-05-08 What is a coronavirus - Elizabeth Cox**

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翻译人员: Ethan Huang 校对人员: Yolanda Zhang在近十年间，从中国的 最高峰到最偏远的洞穴里，科学家们一直在追寻一种 新型致命病毒的源头。他们最终在“石头洞”的蝙蝠 身上找到了答案。人们所找寻的病毒是 一种在 2003 年引发了严重急性呼吸系统 综合症流行病，简称非典型肺炎（SARS）的冠状病毒。冠状病毒是一群表面有着 棘突蛋白的病毒，看起来很像皇冠——在拉丁文中意为“冠状物”。目前已知的冠状病毒有数百种。其中的七种可以传染给人类 并且引起疾病。冠状病毒 SARS-CoV 可引起非典型肺炎， MERS-CoV 可引起中东呼吸系统综合征，而 SARS-CoV-2 则可引起 新型冠状病毒肺炎（COVID-19）。七种会感染人类的冠状病毒中， 有四种会导致感冒，即症状温和 且具有高传染性的鼻喉感染。有两种会感染肺部并且 引起更严重的疾病。引起 COVID-19 的第七种病毒 综合了上述两类的特征：不仅极易传播， 而且会严重地影响肺部。当受感染者咳嗽时，含有病毒 的飞沫就会喷溅而出。当飞沫进入其他人的鼻腔或口腔时， 这些人就会被病毒感染。冠状病毒在封闭的 空间内最易传播，在这些地方人与人之间距离很近。寒冷的天气可以防止病毒的 精密外壳变干，使得它们在宿主之间 传播时能够存活更长时间。但是紫外线的照射 可能会消灭它们。这些季节上的变化对于 已经存在的病毒影响更大。但是因为至今没有任何人 对新出现的病毒免疫，所以它有很多不需要在理想环境下 就可以感染的潜在宿主。进入人体后，棘突蛋白会嵌入 宿主的细胞内并与它们融合——这个过程让病毒能够控制 宿主细胞的运转体系，以复制其自身的遗传基因。冠状病毒把它们的基因 储存在 RNA 内。所有病毒都是 RNA 或者 DNA 病毒。RNA 病毒通常更小， 携带更少的基因，这意味着它们可以感染众多宿主， 并且在宿主体内快速复制。一般来说，RNA 病毒没有校对机制，而 DNA 病毒则有。因此，当 RNA 病毒进行自我复制时，更有可能发生错误，即所谓的“突变”。大多数的突变都是对其自身 无用，甚至是无益的。但是有一些变异可以帮助病毒 更加适应某些特定的环境——比如说新的宿主物种。传染病通常在病毒从动物 传染到人类时出现，比如由 RNA 病毒导致的埃博拉、寨卡和非典传染病，以及 COVID-19 全球性大流行病。进入人体以后， 病毒仍然会发生突变——虽然这种突变不足以 创造新型的病毒，但足以使原本的病毒 产生变化，或产生新株系。相比大多数 RNA 病毒， 冠状病毒有几个主要的差别。它们是体积最大的 RNA 病毒， 有着最多的遗传基因，也就更可能出现 对自身有害的变异。为了抵消这种风险，冠状病毒 展现出了一种独有的特性：一种可以检验基因复制错误 并进行纠正的酶。这一特征使得冠状病毒 比其他 RNA 病毒的突变速度更加缓慢， 因此更加稳定。虽然这可能听上去很可怕，但是当涉及到削弱其致病性，其缓慢的突变速率 实际上是一个很好的现象。在被感染以后，我们的 免疫系统可以识别病菌，并且在它们再次感染我们时 快速地摧毁它们，从而起到免疫效果。但是突变会让病毒变得更不易 被我们的免疫系统察觉——因此也就更难去击溃它们。它们也会使抗病毒药品 和疫苗的效果大打折扣，因为这些药物都是 为每种病毒而特别定制的。这就是为什么我们每年都 需要研发新的流感疫苗——因为流感病毒的突变发生得太快， 新株系会持续地出现。冠状病毒更慢的突变速率意味着人体的免疫系统、药品以及疫苗也许在感染之后的 更长时间内依然可以辨别它们，从而更好地保护我们的健康。目前，我们还不知道被冠状病毒感染后， 人体的免疫时间能持续多久。对于冠状病毒，我们也尚未研发出 被证实有效的治疗方法或者疫苗。我们还从未专注于应对 引起感冒的冠状病毒，虽然科学家们已经开始钻研 非典和中东呼吸综合征的治疗方法，但是疫情都在治疗方案 尚未完成临床实验时就结束了。随着我们继续不断侵占 其它动物的栖息地，科学家们宣称，新型冠状病毒 从动物传染给人类是无法避免的——但如果我们调查清楚这些未知事物， 就可以避免大规模的破坏性后果。

**P859 2020-05-08 Why should you read “Moby Dick” - Sascha Morrell**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=859)

A mountain separating two lakes. A room papered floor to ceiling with bridal satins. The lid of an immense snuffbox. These seemingly unrelated images take us on a tour of a sperm whale’s head in Herman Melville’s "Moby Dick." On the surface, the book is the story of Captain Ahab’s hunt for revenge against Moby Dick, the white whale who bit off his leg. But though the book features pirates, typhoons, high-speed chases, and giant squid, you shouldn’t expect a conventional seafaring adventure. Instead, it’s a multilayered exploration of not only the intimate details of life aboard a whaling ship, but also subjects from across human and natural history, by turns playful and tragic, humorous, and urgent. The narrator guiding us through these explorations is a common sailor called Ishmael. Ishmael starts out telling his own story as he prepares to escape the “damp and drizzly November in [his] soul” by going to sea. But after he befriends the Pacific Islander Queequeg and joins Ahab’s crew aboard the Pequod, Ishmael becomes more of an omniscient guide for the reader than a traditional character. While Ahab obsesses over revenge and first mate Starbuck tries to reason with him, Ishmael takes us on his own quest for meaning throughout “the whole universe, not excluding its suburbs.” In his telling, life’s biggest questions loom large, even in the smallest details. Like his narrator, Melville was a restless and curious spirit, who gained an unorthodox education working as a sailor on a series of grueling voyages around the world in his youth. He published "Moby Dick" in 1851, when the United States’ whaling industry was at its height. Nantucket, where the Pequod sets sail, was the epicenter of this lucrative and bloody global industry which decimated the world’s whale populations. Unusually for his time, Melville doesn’t shy away from the ugly side of this industry, even taking the whale’s perspective at one point, when he speculates on how terrifying the huge shadows of the ships must be to the creature swimming below. The author’s first-hand familiarity with whaling is evident over and over again in Ishmael’s vivid descriptions. In one chapter, the skin of a whale’s penis becomes protective clothing for a crewman. Chapters with titles as unpromising as “Cistern and Buckets” become some of the novel’s most rewarding as Ishmael compares bailing out a sperm-whale’s head to midwifery, which leads to reflections on Plato. Tangling whale-lines provoke witty reflections on the “ever-present perils” entangling all mortals. He draws on diverse branches of knowledge, like zoology, gastronomy, law, economics, mythology, and teachings from a range of religious and cultural traditions. The book experiments with writing style as much as subject matter. In one monologue, Ahab challenges Moby Dick in Shakespearean style: “Towards thee I roll, thou all-destroying but unconquering whale; to the last I grapple with thee; from hell’s heart I stab at thee; for hate’s sake I spit my last breath at thee.” One chapter is written as a playscript, where members of the Pequod’s multi-ethnic crew chime in individually and in chorus. African and Spanish sailors trade insults while a Tahitian seaman longs for home, Chinese and Portuguese crewmembers call for a dance, and one young boy prophesies disaster. In another chapter, Ishmael sings the process of decanting whale oil in epic style, as the ship pitches and rolls in the midnight sea and the casks rumble like landslides. A book so wide-ranging has something for everyone. Readers have found religious and political allegory, existential enquiry, social satire, economic analysis, and representations of American imperialism, industrial relations and racial conflict. As Ishmael chases meaning and Ahab chases the white whale, the book explores the opposing forces of optimism and uncertainty, curiosity and fear that characterize human existence no matter what it is we’re chasing. Through "Moby Dick’s" many pages, Melville invites his readers to leap into the unknown, to join him on the hunt for the “ungraspable phantom of life.”

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=859)

翻译人员: Ameerah Arjanee 校对人员: Yolanda Zhang分隔两湖的一座山。整屋贴满婚服缎的房间。一个巨大鼻烟盒的盖子。在赫尔曼·麦尔维尔的《白鲸记》中， 这些看起来无关的画面带我们探索了一只抹香鲸的头部。表面上，本书讲述的是船长亚哈（Ahab）为了复仇 而追猎莫比·迪克（Moby Dick）——咬掉了他一条腿的白鲸——的故事。尽管这本书中有海盗、 台风、高速追逐和巨型乌贼，但这绝不是一段 传统的航海冒险经历。相反，这是一番多层次的探索，不仅描述了 捕鲸船上生活的细枝末节，而且包含了从人类历史 到自然历史的主题——有好玩的、悲剧的、 幽默的和紧急的。在这些探索中引导我们的是一个普通水手 以实玛利（Ishmael）。以实玛利从他准备出海来逃离“（他的）灵魂中 潮湿而多雨的十一月”，开始了他的故事叙述。但在他和太平洋岛民 魁魁格（Queequeg）成为朋友，并加入亚哈（Ahab）的团队 上了裴廓德号（Pequod）后，以实玛利更像是 读者无所不在的向导，而不是一个常规的人物。当亚哈沉迷于复仇，大副斯达巴克（Starbuck） 尝试和他讲道理时，以实玛利带领我们在 “整个宇宙，包括边缘地带”寻求着自己的价值。在他的叙述中，人生中最大的问题 显得很突出，即使是在最微小的细节中。像他的叙述者一样，梅尔维尔（Melville） 也有一种永不停歇、充满好奇心的精神。年轻时，他作为一名海员 接受了非正统的教育，进行了一系列艰苦的环球航行。他在 1851 年出版了《白鲸记》，当时美国捕鲸业正处于鼎盛时期。裴廓德号起航的 南塔开特（Nantucket）是这种有利可图、 血腥的全球捕鲸业的中心｡这种捕鲸业大量捕杀了 世界上的鲸鱼。在他的时代很不寻常的是,梅尔维尔并不隐藏 这个行业丑陋的一面。有一次，他甚至 从鲸鱼的角度来推测，船的巨大阴影 对下面游动的生物来说一定非常可怕。在以实玛利生动的描写中，作者对捕鲸经历的描述 逐渐生动起来。在其中一章里，鲸鱼阴茎的皮肤变成了一名船员的防护服。标题不起眼的章节， 例如《水池和水桶》，成为了小说中最有价值的部分，正如以实玛利 把拉出抹香鲸的头比作接生，这引起了对柏拉图的思考。纠缠在一起的捕鲸叉激起了人们对“无时无刻不困扰着 人类的危险”的诙谐思考。他借鉴了不同的知识分支， 如动物学、烹饪学、法律、经济学、神话，以及来自各类宗教 和文化传统的教诲。这本书在写作风格和主题上 都进行了实验。在一段独白中， 亚哈以莎士比亚的风格挑战莫比·迪克:“我向你翻滚过去，你这毁灭一切 却无法征服的大鲸;我和你搏斗到最后; 我从地狱之心向你刺去;为了仇恨，我把最后一口气 吐在你身上。”有一章写得像剧本，裴廓德号上的多民族船员们 时而独自，时而齐声唱歌。非洲和西班牙水手互相侮辱， 而塔希提的一位水手只渴望回家｡中国和葡萄牙的船员要求跳舞，一个年轻男孩在预言灾难。在另一章中，当船在午夜的海面上不停颠簸，木桶如山崩一般隆隆作响，以实玛利以史诗般的风格 唱出了倒鲸油的过程。一本内容如此广泛的书 让每个人都开卷有益。读者在书中找到了 宗教和政治寓言、存在主义询问、 社会讽刺、经济分析以及对美帝国主义、劳资关系和种族冲突的描述。在以实玛利追逐意义、 亚哈追逐白鲸的过程中，这本书探索了 乐观主义与不确定性、好奇与恐惧这两种对立的力量，而不管我们追逐的是什么， 它们都是人类生存的特征。在《白鲸记》的众多篇章中，梅尔维尔邀请 他的读者跳入未知的世界，与他一起寻找 “难以捉摸的生命幽灵”。

**P860 2020-05-15 How do you know if you have a virus - Cella Wright**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=860)

A new virus emerges and spreads like wildfire. In order to contain it, researchers must first collect data about who’s been infected. Two main viral testing techniques are critical: one tells you if you have the virus and the other shows if you’ve already had it. So, how exactly do these tests work? PCR, or polymerase chain reaction testing, targets the virus’s genetic material in the body and is used to diagnose someone who is currently infected. Yet, this genetic material may be present in such imperceptible amounts that actually detecting it is difficult. This is where PCR comes in: it’s widely used to amplify genetic information to large enough quantities that it can be readily observed. To develop a PCR test for a never-before-seen virus, researchers first sequence its genetic material, or genome, and identify regions that are unique to that specific virus. PCR then targets these particular segments. A PCR test begins by collecting a sample: this can be blood for hepatitis viruses, feces for poliovirus, and samples from the nose or throat for coronaviruses. The sample is taken to a central laboratory where PCR is performed to test for the presence of the virus’ genome. Genetic information can be encoded via DNA or RNA. HPV, for example, uses DNA, while SARS-CoV-2, the cause of COVID-19, uses RNA. Before running the PCR, the viral RNA— if present— must be reverse transcribed to make a strand of complementary DNA. Researchers then run the PCR. If the virus is present in the sample, its unique regions of genetic code will be identified by complementary primers and copied by enzymes. One strand of DNA becomes hundreds of millions, which are detected using probes marked with fluorescent dye. If the PCR machine senses fluorescence, the sample has tested positive for the virus, meaning the individual is infected. Immunoassays, on the other hand, tap into the immune system’s memory of the virus, showing if someone has previously been infected. They work by targeting virus-specific antibodies generated by the immune system during infection. These are specialized classes of proteins that identify and fight foreign substances, like viruses. Immunoassays may detect IgG antibodies, the most abundant class, and IgM antibodies, the type that’s first produced in response to a new infection. The presence of IgM antibodies suggests a recent infection, but since it can take the body over a week to produce a detectable amount, they’re unreliable in diagnosing current infections. Meanwhile, IgG antibodies circulate for an extended period after infection; their presence usually indicates that someone was exposed and recovered. Before the immunoassay, health professionals draw blood from an individual. This sample then comes into contact with a portion of the virus of interest. If the body has, in fact, been exposed to the virus in the past, the body’s virus-specific antibodies will bind to it during the test. This reaction produces a change in color, indicating that the sample tested positive and that the individual has been exposed to the virus. Immunoassays are especially important when it comes to retroactively diagnosing people who were infected but went untested. And there’s exciting potential for those who have developed immunity to a virus: in some cases, their blood plasma could be used as treatment in people who are currently fighting it. PCR and immunoassays are always in the process of becoming more accurate and efficient. For example, innovations in PCR have led to the use of self-contained testing devices that relay results within one hour. Digital PCR, which quantifies individual pieces of target DNA, shows promise in further boosting accuracy. And although immunoassays are difficult to develop quickly, researchers in Singapore were able to create one for SARS-CoV-2 even before COVID-19 was declared a pandemic. These tests— along with the scientists who develop them and the health professionals who administer them— are absolutely essential. And when deployed early, they can save millions of lives.

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翻译人员: Wanting Zhong 校对人员: Ameerah Arjanee一种新型病毒已经出现， 并如野火般迅速传播。为了控制住它，研究者先必须收集数据 来确定谁受到了感染。两种病毒检测技术至关重要：一种判断你是否携带病毒，另一种显示你是否曾受到过感染。那么，这些检测的原理是什么？PCR，也就是 聚合酶链式反应，一种针对人体内病毒的 遗传物质进行检测手段，被用来诊断目前已被感染的患者。但病毒遗传物质的含量 可能微乎其微，导致实际检测非常困难。这就是 PCR 派上用场的地方：它被广泛运用于 大量扩增遗传信息，使其能被轻松地检测出来。要想为前所未有的新病毒 开发 PCR 检测，研究者首先要对其遗传物质， 即基因组，进行测序，并且识别出 这种病毒独有的基因片段。PCR 随后就能针对 这些特定片段进行扩增。PCR 检测从采集样本开始：例如用于肝炎病毒检测的血液、 用于脊髓灰质炎病毒检测的粪便，或是用于冠状病毒检测 的鼻腔或咽喉拭子。样本会被带至中心实验室，在那里进行 PCR 来检测 病毒基因组的存在。遗传信息可以通过 DNA 或 RNA 进行编码。例如，人类乳头瘤病毒（HPV） 用 DNA 编码，而导致新冠肺炎的 SARS-CoV-2 则用 RNA 编码。在进行 PCR 操作之前， 如果还存在病毒的 RNA，则必须先将其逆转录， 合成一股互补 DNA，然后再进行 PCR 检测。如果样品中含有病毒， 它的独特基因编码区域会被互补的引物识别， 并被酶复制。一股 DNA 变成数亿股，并被用荧光染料标记的 探针检测出来。如果 PCR 仪器检测到荧光，样本对该病毒的检测就呈阳性，即被检个体为感染者。另一种方法，免疫分析，则通过发掘免疫系统对病毒的记忆，来显示某人之前是否曾受过感染。它的原理是检测 免疫系统在感染时生成的针对特定病毒的抗体。抗体是一类特化的蛋白质，能识别并抵抗外来物质， 例如病毒。免疫分析可以检测 IgG 抗体， 含量最充足的一类抗体，以及 IgM 抗体，在响应新感染时 最先生成的抗体。IgM 抗体的存在 意味着最近有受到过感染，但因为身体至少需要一周 才能产生可检测的抗体量，IgM 检测在用于诊断 目前的感染时并不可靠。而 IgG 抗体在感染后的 较长时间内仍会在体内循环；它们的存在通常表明 某人曾被感染，然后痊愈了。在免疫分析前，医护人员会为被检个体抽血，然后将血样和一部份 目标病毒进行接触。如果被检者在过去 确实接触过这种病毒，那体内的特异性抗体 会在检测中与病毒结合。这个反应会产生颜色变化， 表明样品检测呈阳性，并且被检者曾接触过病毒。在回溯诊断曾被感染却未经检测的人群时，免疫分析就十分重要。已经对病毒产生免疫的人 有令人振奋的潜力：某些情况下，他们的血浆 可以用来治疗正在与病毒奋战的患者。PCR 和免疫分析的精确性和效率一直在不断提升。比如，PCR 技术的革新 已经带来了独立检测设备，能在一个小时内得出结果。数字 PCR 能对 目标 DNA 的个别片段进行定量，在进一步提高精确性方面前景可观。虽然免疫分析难以快速开发，但新加坡的研究者得以在 新冠疫情被宣布为大流行前，就研发了出针对新冠病毒的 免疫分析手段。这些检测—— 以及开发它们的科学家和进行检测的医疗人员——都是至关重要的。如果可以尽早投入使用， 它们就能拯救数以百万计的生命。

**P861 2020-05-16 How to see more and care less - The art of Georgia O'Keeffe - Iseult**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=861)

A canvas drenched in sunset hues, colors radiating like flame. At first glance, this painting may appear to be an impossible, abstract image. But a closer look reveals the tender stems, lush petals and velvety texture of a Canna Lily. This metamorphosis of natural subjects into abstract geometry is commonplace in the work of Georgia O’Keeffe— the revolutionary American painter and sculptor. But the magic behind this transformation remains just as elusive as the artist herself. Born in Wisconsin in 1887, O’Keeffe spent her childhood plucking wildflowers and arranging fruits to paint. At seventeen, she moved to Chicago to study at the prestigious Art Institute. Her teachers trained her to faithfully reproduce reality in the conventions of European masters. Although she enjoyed the solitude and precision of this work, O’Keeffe felt little personal connection to it. After moving to New York, she was increasingly drawn to the clean lines, striking composition and vivid colors of Japanese art. O’Keeffe soon found a teacher whose lessons inspired her to put those interests into practice. Unlike her previous teachers, Arthur Wesley Dow urged his students to focus on more abstract representations of light, shape, and color. These lessons manifested in O’Keeffe’s first series of abstract drawings. Rendered in charcoal, they present a series of undulating lines, bold shading and billowing clouds. These drawings defy easy classification— suggesting, but never quite matching, any specific natural reference. Earlier European painters in the Cubist tradition had employed rigid geometry to abstract external subjects. But here, O’Keeffe employed the shapes and rhythms of nature to capture her internal feelings. Experiments like these would soon become a cornerstone of an artistic movement called American Modernism. Although no single style defines Modernist painting, its proponents shared a desire to challenge the realist traditions that dominated art education. Beginning in the late 1910’s, Modernist painting often used geometric shapes and bold colors to probe the American psyche. O’Keeffe threw herself into these experiments — but she was reluctant to share her new work. However, when a friend sent her charcoals to the art dealer Alfred Stieglitz, he became entranced. In 1916, he arranged for a grand exhibition in New York. This marked the beginning of O’Keeffe’s career as a popular artist— and a relationship that would lead to marriage in 1924. Marriage didn’t diminish O’Keeffe’s taste for solitude. She travelled widely to teach, and often retreated to paint for months at a time. Whether she was exploring the craggy canyons of Texas, the quiet forests of South Carolina, or the sun-bleached desert of New Mexico, her creative process was based on ritual and close observation. She paid meticulous attention to small details, and spent hours mixing paints to create exactly the right colors. When she found the perfect hue, she’d record it in her ever-growing collection of handmade color cards. O’Keeffe also experimented with perspective to celebrate objects that were often overlooked. In "Rams Head with Hollyhock," she places a weathered skull and a delicate flower high above the hills below. This massive skull overshadows the landscape, casting both the skeleton and the mountains in a new, eerie light. The public was captivated by her unique perspective and secretive behavior. She was particularly praised for her massive flower paintings, ranging from fiery poppies to ghostly calla lillies. Stieglitz and other critics of the time were infatuated by Freudian psychology, and were quick to link these paintings to female genitalia. But O’Keeffe dismissed such interpretations. She resented the male gaze that dominated the art world, and demanded her work be respected for its emotional evocation of the natural world. Eventually, O’Keeffe settled down in New Mexico, near one of her favorite artist retreats. In her 70’s, her eyesight began to fail, but she continued to mine the landscape’s mysteries in new, tactile mediums. O’Keeffe kept creating until her death at 98, and is remembered as the “Mother of American Modernism.” Decades on, her work retains its wild energy— and O’Keeffe her personal mystique.

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翻译人员: Wanting Zhong 校对人员: Yanyan Hong这块画布沉浸在落日的色调中， 像火焰放射光芒的色彩。一眼看去，这幅画描绘的 似乎是不真实的抽象影像。但近一步观察，浮现在眼前的 是美人蕉柔嫩的花茎、娇艳的花瓣和天鹅绒般的质感。这种将大自然的元素 转换成抽象几何的变形在这位划时代的美国画家、雕刻家——乔治亚 · 欧姬芙 （ Georgia O’Keeffe）的作品中比比皆是。但这种变化背后的魔法 仍如艺术家本人一样难以捉摸。欧姬芙 1887 年生于威斯康星州， 童年时，她会临摹摘下的野花和摆放好的水果。17 岁时，她搬去了芝加哥， 在著名的芝加哥艺术学院求学。她的老师们训练她 依照欧洲大师们的传统忠实地对现实进行再现。虽然这种作业的孤独与精准 让她乐在其中，欧姬芙却几乎无法从中感受到 与她个人的共鸣。在搬去纽约之后， 她愈发被日本艺术干净的线条、醒目的构图 与鲜活的色彩所吸引。欧姬芙很快找到了一位新老师， 他的课程鼓舞她将这些兴趣投入实践。与她之前的老师们不同，阿瑟·卫斯礼·道（Arthur Wesley Dow） 鼓励学生注重光线、形状与颜色这些更加抽象的表现形式。这些课程催生了欧姬芙的 第一组抽象画。这些画用炭笔绘成， 展现了一系列波动的线条、大胆的阴影与舞动的云朵。这些画作无法被轻易归类——它们似乎在暗示特定的自然参考物， 却从不会与之特别吻合。早期的欧洲立体主义画家会采用棱角分明的几何形状 将外在的主体抽象化。但在这里，欧姬芙使用了 自然的形状与韵律捕捉她自己的内在情感。像这样的实验很快就变成了“美国现代主义” 艺术运动的基石。虽然现代主义艺术 无法用单一的风格定义，它的倡导者们共同怀抱着 挑战长期主宰艺术教育的现实主义传统的渴望。始于 20 世纪 10 年代末期， 现代主义艺术常常使用几何形状与大胆的色彩来探索美国人的心理。欧姬芙也投身于这些实验——但是她不情愿分享自己的新作。然而，当一位朋友将她的炭笔画寄给艺术商阿尔弗雷德 · 史蒂格利兹 (Alfred Stieglitz) 后，他立刻深深陶醉于她的作品。1916 年，他在纽约 举办了一场大型画展。这也标志着欧姬芙风靡画坛的 艺术家生涯的开始——同时开始的还有一段 于 1924 年修成正果的姻缘。婚姻并没有磨灭 欧姬芙对寂寞的钟情。她广泛游历进行教学， 也常常隐居数月潜心进行创作。无论她是在探索 德克萨斯州嶙峋的峡谷，南卡罗莱纳州静谧的森林， 还是新墨西哥州烈日下的沙漠，她的创作过程都是 基于仪式感和细致的观察。她会对小细节一丝不苟，还会花费数小时混合颜料， 以调出最为恰当的色彩。当她找到了完美的颜色， 她便会将其记录在自己日益丰富的手工色卡收藏里。欧姬芙还尝试通过不同的视角去赞美那些往往被忽视的事物。在《公羊头与蜀葵》 （“Rams Head with Hollyhock”）中，她把一枚沧桑的头骨 和一朵纤弱的花高高置于群峦之上。巨大的头骨令景观相形见绌，将骷髅与群山都笼罩于 新奇诡谲的氛围中。欧姬芙独特的视角和隐秘的作风 令公众深深着迷。尤其是她饱受赞誉的巨大花卉画，从烈焰般的罂粟花到鬼魅般的海芋。史蒂格利兹和当时的其他评论家 沉迷于弗洛伊德心理学，急于将这些画作 和女性生殖器联系在一起。但欧姬芙驳回了这种诠释。她憎恨主导艺术界的男性凝视，并要求他人尊重自己作品中对自然界的情感唤醒。最后，欧姬芙在新墨西哥州定居，邻近她最爱的艺术家隐居地之一。年过七旬的欧姬芙，视力渐渐衰退，但她仍继续用新的触觉媒介 挖掘这片土地的神秘之处。直到 98 岁辞世， 欧姬芙还一直在创作，并作为 “美国现代主义之母” 被世人铭记。历经数十载，她的作品依旧 留存着其狂野的能量——正如欧姬芙保留了她的神秘感。

**P862 2020-05-19 How do ventilators work - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=862)

In the 16th century, Flemish physician Andreas Vesalius described how a suffocating animal could be kept alive by inserting a tube into its trachea and blowing air to inflate its lungs. In 1555, this procedure didn’t warrant much acclaim. But today, Vesalius’s treatise is recognized as the first description of mechanical ventilation— a crucial practice in modern medicine. To appreciate the value of ventilation, we need to understand how the respiratory system works. We breathe by contracting our diaphragms, which expands our chest cavities. This allows air to be drawn in, inflating the alveoli— millions of small sacs inside our lungs. Each of these tiny balloons is surrounded by a mesh of blood-filled capillaries. This blood absorbs oxygen from the inflated alveoli and leaves behind carbon dioxide. When the diaphragm is relaxed, the CO2 is exhaled alongside a mix of oxygen and other gases. When our respiratory systems are working correctly, this process happens automatically. But the respiratory system can be interrupted by a variety of conditions. Sleep apnea stops diaphragm muscles from contracting. Asthma can lead to inflamed airways which obstruct oxygen. And pneumonia, often triggered by bacterial or viral infections, attacks the alveoli themselves. Invading pathogens kill lung cells, triggering an immune response that can cause lethal inflammation and fluid buildup. All these situations render the lungs unable to function normally. But mechanical ventilators take over the process, getting oxygen into the body when the respiratory system cannot. These machines can bypass constricted airways, and deliver highly oxygenated air to help damaged lungs diffuse more oxygen. There are two main ways ventilators can work— pumping air into the patient’s lungs through positive pressure ventilation, or allowing air to be passively drawn in through negative pressure ventilation. In the late 19th century, ventilation techniques largely focused on negative pressure, which closely approximates natural breathing and provides an even distribution of air in the lungs. To achieve this, doctors created a tight seal around the patient’s body, either by enclosing them in a wooden box or a specially sealed room. Air was then pumped out of the chamber, decreasing air pressure, and allowing the patient’s chest cavity to expand more easily. In 1928, doctors developed a portable, metal device with pumps powered by an electric motor. This machine, known as the iron lung, became a fixture in hospitals through the mid-20th century. However, even the most compact negative pressure designs heavily restricted a patient’s movement and obstructed access for caregivers. This led hospitals in the 1960’s to shift towards positive pressure ventilation. For milder cases, this can be done non-invasively. Often, a facemask is fitted over the mouth and nose, and filled with pressurized air which moves into the patient’s airway. But more severe circumstances require a device that takes over the entire breathing process. A tube is inserted into the patient’s trachea to pump air directly into the lungs, with a series of valves and branching pipes forming a circuit for inhalation and exhalation. In most modern ventilators, an embedded computer system allows for monitoring the patient’s breathing and adjusting the airflow. These machines aren’t used as a standard treatment, but rather, as a last resort. Enduring this influx of pressurized air requires heavy sedation, and repeated ventilation can cause long-term lung damage. But in extreme situations, ventilators can be the difference between life and death. And events like the COVID-19 pandemic have shown that they’re even more essential than we thought. Because current models are bulky, expensive, and require extensive training to operate, most hospitals only have a few in supply. This may be enough under normal circumstances, but during emergencies, this limited cache is stretched thin. The world urgently needs more low-cost and portable ventilators, as well as a faster means of producing and distributing this life-saving technology.

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翻译人员: Lipeng Chen 校对人员: Yolanda Zhang十六世纪，弗拉芒医生 安德烈 · 维萨里（Andreas Vesalius）描述了通过将管子插入气管 并向肺部吹入空气，让窒息的动物活下来的方法。在 1555 年，这种方式 并未得到多少认可。但如今，维萨里的论述被认为是首次对于机械呼吸机的描述——这是当代医学中一项重要的治疗手段。要理解呼吸机的价值，我们需要了解呼吸系统是如何运作的。我们通过收缩横膈膜来扩张胸腔呼吸。于是空气被吸进来，充满肺泡——肺泡是我们肺部成千上万的小囊。每个这样的小球都被 充满血液的网状毛细血管包围着。血液从充气的肺泡中吸收氧气，并释放二氧化碳。当横膈膜放松时，二氧化碳同氧气以及其他气体 一同被呼出体外。当我们的呼吸系统正常运作时，这一过程会自动发生，但是该过程也会因多种因素中断。睡眠窒息症会让横膈膜肌肉停止收缩。哮喘会导致气道发炎， 进而阻碍氧气的流通。肺炎——常常由细菌 或病毒感染引发——会攻击肺泡本身。外来病原体会杀死肺细胞，引发免疫反应，可能会导致致命的炎症和肺部积液。所有这些情况 都会让肺部无法正常运作。但是机械呼吸机替代了这一过程，在呼吸系统无法正常工作时 让氧气进入身体。呼吸机可以绕过受阻的气道，传递富氧空气来帮助 受损的肺扩散更多氧气。呼吸机有两种主要的工作方式——通过正压式呼吸 将空气冲入病人肺部，或通过负压式呼吸让空气被动吸入。十九世纪晚期的呼吸机技术主要为负压式呼吸，这一过程模拟了自然呼吸，并保证了肺部均匀的空气分布。为了实现这一目标，医生会 在病人身体周围构造密闭空间，比如将病人放在木盒 或特殊的密闭房间内。然后，空气从密室中被吸出，降低气压，使得病人的胸腔能更容易扩张。在 1928 年，医生发明了 一种便携式金属装置，气泵由电动机供能。这一装置，也就是俗称的“铁肺”，成为了二十世纪中期 医院中的常备装置。但是，即使是最小巧的负压式呼吸机也会大大限制病人的移动，妨碍看护人员的工作。这使得医院在六十年代 转而开始使用正压式呼吸机。对于较轻的病症，正压式呼吸 可以通过非侵入的方式实现。通常用面罩覆盖口鼻，并将加压空气注入病人的气道。但对于更加严重的状况，则需要能够接管整个呼吸过程的装备。一根管子会被插入病人的气管，向肺部直接打入空气，并通过一系列的气阀和支管形成吸气和呼气的回路。在最现代的呼吸机中，内嵌的电脑系统可以监控病人的呼吸，并调整气流。这些机器并不是常规治疗手段，而是最后的救命稻草。忍受加压空气的流入 需要大剂量的镇定剂，而且重复的换气可能会导致 长期的肺部损伤。但在极端情况下，呼吸机就是生与死的差别。譬如新冠肺炎大流行的情况就证明了它们比我们想象的更重要。因为现有的呼吸机模型笨重且昂贵，还需要大量的训练才能安全操作， 大部分医院只配备了少量几台呼吸机。这在一般情况下可能够用了，但在紧急情况下， 这样的配置就捉襟见肘了。世界亟需更多廉价的便携式呼吸机，以及能够更快速的生产和分配这种救命技术的手段。

**P863 2020-05-20 What can DNA tests really tell us about our ancestry - Prosanta Chakr**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=863)

Two sisters take the same DNA test. The results show that one sister is 10% French, the other 0%. Both sisters share the same two parents, and therefore the same set of ancestors. So how can one be 10% more French than the other? Tests like these rely on our DNA to answer questions about our ancestry, but our DNA actually can’t tell us everything about who we are or where we’re from. DNA tests are great at answering some questions, like who your parents are, but can provide baffling results to others, like whether you have ancestors from a particular region. To understand why, it helps to know where our DNA comes from in the first place. Each person’s DNA consists of about 6 billion base pairs stored in 23 pairs of chromosomes— 46 total. That may seem like a dizzying amount of information, but 99% of our genome is shared among all humans. The remaining 1% contains everything distinct about an individual’s ancestry. Commercial DNA tests utilize less than 1% of that 1%. One chromosome in each pair comes from each parent. These halves join at conception: when a sperm and egg, each with only 23 chromosomes, combine. The story of our ancestry becomes muddled before conception. That’s because the 23 chromosomes in a sperm or egg aren’t identical to the chromosomes of every other cell in the body. As they go from a cell with 46 chromosomes to a sex cell with only 23, the chromosomes within each pair swap some sections. This process is called recombination, and it means that every sperm or egg contains single chromosomes that are a unique mash up of each pair. Recombination occurs uniquely in each sex cell— making two sisters’ chromosomes different not only from their parents’, but from each other’s. Recombination happens before conception, so you get exactly half of your DNA from each parent, but going further back things get more complicated. Without recombination, you would get 1/4 from each grandparent, 1/8 from each great-grandparent, and so on, but because recombination happens every generation, those numbers vary. The more generations removed an ancestor is, the more likely they won’t be represented in your DNA at all. For example, without recombination, just 1/64 of your DNA would come from each ancestor six generations back. Because of recombination, that number can be higher, though we don’t know for sure how high— or it can as low as 0. So one sister isn’t more French in the sense of having more ancestors from France. Instead, the French ancestors are simply more represented in her DNA. But the story doesn’t end there. Tests don’t trace the DNA of the sisters' actual French ancestors— we don’t have access to the genomes of deceased individuals from previous generations. Instead, these results are based on a comparison to the DNA of people living in France today. The tests look for genetic markers, or combinations of genetic markers. These markers are short sequences that appear in specific places. The sister deemed "more French" shares genetic markers with people currently living in France. The assumption is that these shared markers indicate ancestors from the same place: France. It’s important to note that results are based on people who’ve had their genomes sequenced— 80-90% of which are of European descent. Many indigenous peoples are barely represented, if at all. The test won’t reveal heritage from people not represented in the database, and shouldn’t be used to prove race or ethnicity. And as more people get sequenced, your results might change. Looking further back, you may get a result like 2% Neanderthal. Though Neanderthals were a separate species from humans, that 2% doesn’t come out of the 99% of our genome shared among all humans, but the 1% that varies. That’s because about 40,000 years ago, certain human populations interbred with Neanderthals, meaning some people alive today have Neanderthal ancestors. Many Neanderthal ancestors, in fact: there are so many generations in 40,000 years that a single Neanderthal’s genetic contribution would be untraceable. You can be both 100% French and 2% Neanderthal— though both come from the 1% of DNA that makes us different, they’re accounting for different things. Looking for traces of our ancestry in our DNA gets complicated very quickly. Both the way we inherit DNA and the information available for testing makes it difficult to say certain things with 100% certainty.

**P863 2020-05-20 What can DNA tests really tell us about our ancestry - Prosanta Chakr**

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翻译人员: Zining Chen 校对人员: Yolanda Zhang两姐妹做了相同的 DNA 测试。检测结果表明，其中一位带有 10% 的法国血统，另一位却没有。两姐妹有着相同的父母，因此具有相同的祖先。那为什么其中一位的法国血统 比另一位多了 10%？类似这样的测试依靠 DNA 来一探我们的祖先，可是 DNA 并不能 解答所有关我们是谁和我们来自哪里的所有疑问。DNA 非常擅于回答一些问题，比如谁是我们的亲生父母， 却不能清晰的解答其他的问题，比如你是否有特定地区的祖先。为了了解其中的原因， 我们需要先了解 DNA 从何而来。每一个人的 DNA 都含有大约 60 亿个碱基对，存储于 23 对，总共 46 条染色体中。这些数字看似令人眼花缭乱，但 99% 的基因组是所有人共享的。那剩下的 1% 则包含了 所有人祖先之间的差异。市面上的 DNA 测试工具 只能向我们揭示那 1% 中 1% 的信息。每对染色体中的其中一条 来自其中一位父母。当母体受孕时， 这两条染色体相互接触，即各自携带 23 条染色体的 精子和卵子会彼此结合。我们祖先的故事在受孕前 是难以捉摸的。这是因为精子和卵子中的 23 条染色体与体内其余细胞的染色体并不相同。当体内其余带有 46 条染色体的细胞 变成只有 23 条染色体的性细胞时，每对染色体中的某些信息 会被提取和合并。这个过程被称为重组， 这代表每一个精子和卵子含带的染色体经过“混搭”而变得独一无二。重组也会在每个性细胞中单独进行，使两个姐妹的染色体 不仅与亲本有着不同的基因组合，而且彼此也不相同。重组发生在受孕前，这使你拥有来自父母各一半的 DNA，但越往前推，情况就越复杂。假设重组并不存在， 你将会得到你祖父母 DNA 的 1/4，曾祖父母 DNA 的 1/8，以此类推，可正因为重组会在每一代发生， 这些数据每次都会有所变化。你与你祖先相隔的辈数越多，他们 DNA 就越不可能 出现在你的 DNA 当中。比如，我们假设重组不会发生，你的 DNA 中只有 1/64 来源于你的六代之前的每一位祖先。但由于重组，这个数字可能会更大，我们并不确定它有多大—— 或者也可能小到接近于 0。所以说，两姐妹之一 有更多来自法国的祖先，并不意味着她有更多法国血统，而是因为有更多法国祖先的 DNA 出现在了她的 DNA 中。但故事还远没有这么简单。测试并不能追踪两姐妹 真正的法国祖先的基因——我们无法获得前几代已故个体的基因组。相反，这些测试结果依赖于你的基因组 与当代法国人基因组的差异。这些测试是基于 遗传标记或遗传标记组合，而这些标记是出现于特定地区的短序列。那位更“法国”的姐妹只不过是与当代住在法国的人 有着更相似的基因标记。这种假设阐述的是， 这些共享的标记表明他们的祖先来自于同一地区：法国。需要注意的是， 这些结果都是基于已经做过基因测试的人，其中 80%-90% 为欧洲血统。土著人民的 DNA 几乎都没有被记录。因此，这种测试无法给出 没有被数据库收录的人群的遗传信息，也不应该被当作 一个人种族背景的证据。你的测试结果 会随着数据库的增大而变化。再往前推，你的测试结果可能表明 你带有 2% 尼安得特人的血统，尽管尼安得特人并非 与人类属于同一物种。那 2% 并不来源于 人类共享的那 99% 的基因组，而是来自于那独特的 1%。这是因为在大约 4 万年前，个别人类与尼安得特人杂交，这表明有些当代人的祖先 是尼安得特人，甚至很多尼安得特人。他们在 4 万年内拥有许多世代，这导致了单个尼安得特人的 基因贡献是无法被追踪到的。你可以同时拥有 100% 的法国血统 和 2% 尼安得特人血统——虽然它们都来自于 使我们与众不同的那 1% 的基因，但它们解释的却是不同的事情。利用 DNA 来寻找我们祖先的踪迹 很快就会变得非常复杂。我们继承 DNA 的方式 以及可供测试的信息使得我们很难笃定结论。

**P864 2020-05-20 When is a pandemic over**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=864)

Consider this unfortunately familiar scenario. Several months ago a highly infectious, sometimes deadly respiratory virus infected humans for the first time. It then proliferated faster than public health measures could contain it. Now the World Health Organization (WHO) has declared a pandemic, meaning that it’s spreading worldwide. The death toll is starting to rise and everyone is asking the same question: when will the pandemic end? The WHO will likely declare the pandemic over once the infection is mostly contained and rates of transmission drop significantly throughout the world. But exactly when that happens depends on what global governments choose to do next. They have three main options: Race through it, Delay and Vaccinate, or Coordinate and Crush. One is widely considered best, and it may not be the one you think. In the first, governments and communities do nothing to halt the spread and instead allow people to be exposed as quickly as possible. Without time to study the virus, doctors know little about how to save their patients, and hospitals reach peak capacity almost immediately. Somewhere in the range of millions to hundreds of millions of people die, either from the virus or the collapse of health care systems. Soon the majority of people have been infected and either perished or survived by building up their immune responses. Around this point herd immunity kicks in, where the virus can no longer find new hosts. So the pandemic fizzles out a short time after it began. But there’s another way to create herd immunity without such a high cost of life. Let’s reset the clock to the moment the WHO declared the pandemic. This time, governments and communities around the world slow the spread of the virus to give research facilities time to produce a vaccine. They buy this crucial time through tactics that may include widespread testing to identify carriers, quarantining the infected and people they’ve interacted with, and physical distancing. Even with these measures in place, the virus slowly spreads, causing up to hundreds of thousands of deaths. Some cities get the outbreak under control and go back to business as usual, only to have a resurgence and return to physical distancing when a new case passes through. Within the next several years, one or possibly several vaccines become widely, and hopefully freely, available thanks to a worldwide effort. Once 40-90% of the population has received it— the precise amount varying based on the virus— herd immunity kicks in, and the pandemic fizzles out. Let’s rewind the clock one more time, to consider the final strategy: Coordinate and Crush. The idea here is to simultaneously starve the virus, everywhere, through a combination of quarantine, social distancing, and restricting travel. The critical factor is to synchronize responses. In a typical pandemic, when one country is peaking, another may be getting its first cases. Instead of every leader responding to what’s happening in their jurisdiction, here everyone must treat the world as the giant interconnected system it is. If coordinated properly, this could end a pandemic in just a few months, with low loss of life. But unless the virus is completely eradicated— which is highly unlikely— there will be risks of it escalating to pandemic levels once again. And factors like animals carrying and transmitting the virus might undermine our best efforts altogether. So which strategy is best for this deadly, infectious respiratory virus? Racing through it is a quick fix, but would be a global catastrophe, and may not work at all if people can be reinfected. Crushing the virus through Coordination alone is also enticing for its speed, but only reliable with true and nearly impossible global cooperation. That’s why vaccination, assisted by as much global coordination as possible, is generally considered to be the winner; it’s the slow, steady, and proven option in the race. Even if the pandemic officially ends before a vaccine is ready, the virus may reappear seasonally, so vaccines will continue to protect people. And although it may take years to create, disruptions to most people’s lives won’t necessarily last the full duration. Breakthroughs in treatment and prevention of symptoms can make viruses much less dangerous, and therefore require less extreme containment measures. Take heart: the pandemic will end. Its legacy will be long-lasting, but not all bad; the breakthroughs, social services, and systems we develop can be used to the betterment of everyone. And if we take inspiration from the successes and lessons from the failures, we can keep the next potential pandemic so contained that our children’s children won’t even know its name.

**P864 2020-05-20 When is a pandemic over**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=864)

翻译人员: Richel Liu 校对人员: Yanyan Hong考虑一下这个对所有人来说 都很不幸却又熟悉的情景。几个月前，一种传染性极强， 且有可能致命的呼吸道病毒首次席卷了人类社会。其传播速度之快， 让各个公共健康防疫系统措手不及。现在，世界卫生组织（WHO） 宣布疫情升级至 “大流行”，意味着病毒已在世界各地蔓延。死亡人数开始上升的同时， 每个人都在问同样的问题：大流行什么时候结束？世界卫生组织 宣布大流行结束的前提是，疫情得到一定的控制，并且在全世界范围内 传播速度出现大幅下降。但是准确的结束时间取决于 全球政府下一步的应对策略。他们主要有三种选择：任其发展、延缓疫情并研制疫苗， 或者全球协作以消灭病毒。其中一种被公认为最佳手段， 而它很可能出乎你的意料。第一个策略，政府和社区 不采取任何应对扩散的措施，而是尽快让所有人都暴露于病毒之中。但由于来不及对病毒进行深入的研究，医生对如何救治患者都感到束手无策，医院的患者收治量会迅速饱和。接着会有数百万， 甚至数以亿计的人死于病毒感染， 或者医疗系统过载导致的崩溃。很快，大多数人都被病毒感染，有的没能挺过去， 有的则存活下来且获得了病毒免疫。这时候，群体免疫开始产生，因为病毒无法再找到新的宿主。因此大流行在爆发后的 短时间内会逐渐得到控制。不过，还有另一种 实现群体免疫的途径，不需要牺牲如此多的生命。让我们把时间倒回世界卫生组织 宣布疫情大流行的那一刻。这次，全世界的政府和社区一同采取手段 延缓病毒的传播速度，为研究机构研发疫苗争取时间。他们为赢得这段关键的时间 所采取的策略包括：扩大疫苗检测范围 来识别病毒携带者，隔离确诊患者和近距离接触者，以及保持人与人的距离。即使采取了这些防疫措施 来延缓病毒的传播，仍会有数十万人死于病毒。有些城市控制了疫情， 而后开始复工复产，城市逐步复苏，但是一旦新病例出现， 又要再次回到隔离的状态。在未来的几年内，通过全世界的共同努力， 一种或几种疫苗将得到广泛使用，并有望让人们进行免费接种。一旦 40-90% 的人口接种了疫苗——具体比例还要视疫情而定——群体免疫就会出现， 疫情大流行也会逐渐消失。我们让时间再次倒流， 考虑一下最后一种应对策略：全球协作，消灭病毒。该想法的核心是同时实施隔离、 保持社交距离以及限制出行，在全球各地断绝病毒传播的路径。而实现该目标的关键 在于全球的同步响应。在典型的疫情大流行中， 当一个国家成为疫情震中时，其他国家很可能就会 逐渐出现感染病例。比起各国领袖各自应对 本国境内发生的疫情，更应该将全球看作 一个互相联系的整体。只要采取适当的协作措施， 大流行就会在数个月内结束，因疫情死亡的人数也会大大减少。但是除非病毒被彻底根除 ——这一情况发生的可能性不大——否则疫情大流行很有可能卷土重来。同时，动物携带和传播病毒等因素也可能会破坏 我们在抗疫方面做出的努力。那么，面对致命的呼吸道传染病， 哪一种应对策略才是最佳选择？任其发展或许见效快， 但会造成全球性的灾难，而且如果人们有可能被二次感染， 这种方法就是完全无效的。全球合作抗击疫情听起来十分高效，但只有在彻底但不太可能 实现的合作中才有机会成功。所以，尽可能联合全球研发疫苗普遍被认为是最佳的选择；这是在与疫情赛跑中的 一个缓慢、稳定且被证实有效的做法。即使大流行在疫苗面世之前已结束，病毒仍然有可能会季节性出现， 所以疫苗会继续保护人们。即使疫苗研发可能要耗费数年，但疫情对大多数人的生活 影响不会一直持续。治疗方法上的突破性进展 和对相关症状的预防能够降低病毒的危害，因而可以进一步下调 防疫措施的应对级别。要有信心：疫情大流行终将结束。疫情带来的影响会持续， 但并不全是负面的；在此过程中我们实现的 突破性进展、社会服务和体制的改善都会成为大家的福祉。如果我们能从成功中获得启示，并从失败中吸取教训，就可以完全控制好 下一次潜在的疫情大流行，甚至有一天，这个概念会 从我们子孙后代的生活中彻底消失。

**P866 2020-06-02 A day in the life of a Peruvian shaman - Gabriel Prieto**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=866)

At the temple of the fisherman, Quexo, the village shaman, looks out over the ocean and frowns. It’s a still morning– unusually still, and the lack of wind is the latest in a series of troubling signs. The year is 1400 BCE. Quexo’s village sits in the dusty, treeless desert between the towering Andes and Pacific Ocean. The villagers live off the sea, harvesting reeds, drying them in the sun, and using them to build fishing boats. Every day in the summer, the men set out on these boats to hunt shark and other fish while the women harvest shellfish and sea urchins. In winter, storms bring powerful waves, which cross the vast ocean unobstructed to detonate on these shores. Most years, Quexo’s village catches more than enough fish. But this year, the winds have died and the fish have dwindled. Quexo has seen this pattern before: the fish disappear, then the violent rains arrive, causing flash floods that dissolve mud bricks and wash away settlements. He needs to stop the bad weather before the storms come— his only hope is a special ritual he’s been planning. Quexo spends much less time in the ocean than the other villagers. He became a shaman after seeing a sign in the sea one morning— like his father and grandfather before him. This morning, he walks to the nearby sacred mountain as the sun rises. There, he gathers ceremonial cactus and herbs like “horse tail,” “stonebreaker," and valerian, along with the mineral hematite. Back in the village, everyone is preparing to leave for a religious festival at a large temple inland. The festival marks the beginning of what is usually the season of abundance, but with the signs pointing to storms, Quexo isn’t feeling too celebratory. Whole families travel to the festival, where they camp for a few days. They’ve packed seaweed, carved bones, gourd bowls, reed mats, and other goods to trade in the market around the temple. Quexo inspects the goods to make sure everything is of the finest quality. He brings the herbs he gathered to trade for cinnabar, a mineral that comes from the highlands in the Andes. He needs cinnabar for his ritual to ward off the storms. Around lunchtime, the sprawling temple rises out of the desert ahead. People have come from all along the coast and the foothills. The women handle trade transactions— they’re looking for cotton and ceramics. Men aren’t usually allowed to do the trading, but shamans are an exception. Though Quexo is a man, during rituals he becomes half man, half woman, and this ambiguity makes his role more flexible outside ceremonies too. Quexo can’t find any cinnabar in the market, so he heads to the main temple, dodging children playing in the plaza. He puts on his ceremonial garb: red face paint, earrings, and a necklace of shark’s teeth and vertebrae. Inside, the ceremonies are already underway, and the shamans have drunk the sacred cactus drink. Many of them are Quexo’s friends from festivals over the years, but he doesn’t see the mountain shamans who would have cinnabar. He begins to panic. If the highland shamans don’t show up, his only option will be to make the long walk into the mountains. It’s a dangerous journey that takes five days, precious time he doesn’t have to waste. But perhaps he has no choice. He refuses the sacred cactus and sets off toward the mountains. As he leaves the settlement behind, he sees a group approaching. He recognizes them as highlanders by their llamas. He dashes toward their shaman. Barely pausing to say hello, he offers him hematite, dried seaweed, and empty shells to grind up for lime and chew with coca leaves. In return, the other shaman gives him the precious cinnabar. With the key to his ritual in hand, Quexo heads home to the temple of the fisherman in hopes of turning the tide.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=866)

翻译人员: Ye Shen 校对人员: Jiasi Hao在渔民的神庙里， 萨满祭司凯克索远眺大海，双眉紧锁。这是个寂静的早晨， 异乎寻常地寂静，而风力不足是一连串 令人不安的迹象中的最新状况。那年是公元前 1400 年，凯克索的村庄坐落于满是尘土的沙漠，介于高耸的安第斯山脉和太平洋之间。村民们以海洋为生，收集芦苇，将它们晒干，并用于建造渔船。每到夏季，男人们天天都要坐船出海， 去捕捞鲨鱼和其它鱼类，女人们则收集贝类和海胆。到了冬季， 风暴席卷巨浪在海面上翻涌，冲在岸上炸出浪花。多年以来，凯克索的村民们 能捕捞到足够多的鱼。但是今年，风停了，鱼也少了。凯克索曾见过这种规律：先是鱼类消失，再是倾盆大雨，这会导致洪水泛滥。 溶解泥砖，继而冲毁整个村庄。他需要在暴风雨来临前 尽快阻止这天灾的到来——他正在准备的特殊仪式 是他唯一的希望。凯克索比其他村民的 下海时间少得多。他成为一名萨满祭司，是因为 他在某天清晨的海上看到了一种征兆——就如同他的父亲和爷爷。这个早上，他于日出时分爬上了圣山。在这里，他采集到了 仪式用的仙人掌和各类草药，例如马尾草，断石草， 和缬草，还有赤铁矿。回到村子里，所有人都准备前往 坐落于内陆的神庙以庆祝宗教节日。这个节日标志着丰收季的开始，但是随着风暴的迹象， 凯克苏并不感到喜悦。所有家庭前往节日地点， 并会在那里野营几天。他们早已将在神庙周边市场上 交易用的海带、骨雕、瓢碗，和芦苇席等商品收拾进行李。凯克索仔细检查这些商品， 确保所有商品都品质上乘。他要把采集到的草药用来交换朱砂，那是一种产自安第斯高原的矿物。他需要朱砂来完成仪式， 继而抵抗风暴。中午时分， 神庙在沙漠尽头渐渐浮现。来自海边和丘陵的人们都聚集在此地，女人们正在交易—— 她们在留心寻找棉花和陶瓷。男性一般不允许参与买卖，但是萨满祭司是例外。尽管凯克索是个男人， 在仪式期间他被认为是半男半女，这种模糊的性别使他能灵活地 出现于包括仪式之外的任何场合。凯克索没在集市上找到任何朱砂，所以他决定前往主神庙，躲过在广场上嬉戏的儿童。他换上仪式装束： 把脸涂上红色，并戴上耳环，还有鲨鱼牙齿和脊椎骨做成的项链。在神庙里，仪式正在进行，萨满祭司们喝下了神圣的仙人掌汁水。他们当中的很多人是这几年 凯克索在庆典中结识的朋友，但他没有看见拥有朱砂的 高山萨满祭司。他慌张起来，如果高山萨满祭司没有出现，长途跋涉到山上拜访 则是他唯一的选择。这将会是整整五天的危险旅程，他不能浪费宝贵的时间。可是，他或许别无选择。凯克索谢绝了神圣的仙人掌汁水， 即刻动身前往山中。在他离开他的居住地后， 他看见一群人走来。从他们的羊驼可以认出 他们是高地人，凯克索随即奔向他们的萨满祭司，他几乎都没有停下先进行问候， 就立马向他兜售赤铁矿、干海带，以及空贝壳，可以磨成石灰粉， 或和古柯叶子一起嚼。对方的萨满给了他 珍贵的朱砂作为交换。手中紧握着仪式所需的关键物品，凯克索便返程回到渔民的神庙，希望着能扭转形势。

**P867 2020-06-02 The last chief of the Comanches and the fall of an empire - Dustin Ta**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=867)

Late one night in 1871, a group of riders descended on a sleeping army camp. In minutes they stirred the camp into a panic, stole about 70 horses, and disappeared. Led by a young chief named Quanah Parker, the raid was the latest in a long series of altercations along the Texas frontier between the indigenous people known as the Numunu, or Comanches, and the United States forces sent to steal Comanche lands for white settlers. Though the conflict was decades old, U.S. Colonel Ranald MacKenzie led the latest iteration. From summer to winter, he tracked Quanah. But Quanah was also tracking him, and each time the colonel drew near his targets, they disappeared without a trace into the vast plains. The Comanches had controlled this territory for nearly 200 years, hunting buffalo and moving whole villages around the plains. They suppressed Spanish and Mexican attacks from the south, attempts to settle the land by the United States from the east, and numerous other indigenous peoples’ bids for power. The Comanche Empire was not one unified group under central control, but rather a number of bands, each with its own leaders. What all of these bands had in common was their prowess as riders— every man, woman, and child was adept on horseback. Their combat skills on horseback far surpassed those of both other indigenous peoples and colonists, allowing them to control an enormous area with relatively few people— probably about 40,000 at their peak and only about 4-5,000 by the time Quanah Parker and Ranald Mackenzie faced off. Born around 1848, Quanah was the eldest child of Peta Nocona, a leader of the Nokoni band, and Cynthia Ann Parker, a kidnapped white settler who assimilated with the Comanches and took the name Naduah. When Quanah was a preteen, U.S. forces ambushed his village, capturing his mother and sister. Quanah and his younger brother sought refuge with a different Comanche band, the Quahada. In the years that followed, Quanah proved himself as a warrior and leader. In his early twenties, he and a young woman named Weakeah eloped, enraging her powerful father and several other leaders. They stayed on the run for a year, attracting followers and establishing Quanah as a paraibo, or chief, at an exceptionally young age. Under his leadership the Quahada band was able to elude the U.S. military and continue their way of life. But in the early 1870s, the East Coast market for buffalo hides became lucrative, and hunters slaughtered millions of buffalo in just a few years. Meanwhile, U.S. forces led a surprise attack, killing nearly all the Quahada band’s 1,400 horses and stealing the rest. Though he had vowed to never surrender, Quanah knew that without bison or horses, the Comanches faced certain starvation in winter. So in 1875 Quanah and the Quahada band moved to the Fort Sill reservation in Oklahoma. As hunter-gatherers, they could not transition easily to an agricultural way of life on the reservation. The U.S. government had promised rations and supplies, but what they provided was wildly insufficient. Quanah, meanwhile, was suddenly in a weak political position: he had no wealth or power compared to others who had been on the reservation longer. Still, he saw an opportunity. The reservation included ample grasslands— useless to the Comanches but perfect for cattle ranchers to graze their herds. He began a profitable arrangement leasing the land to cattle ranchers, quietly at first. Eventually, he negotiated leasing rights with the U.S. government, which ensured a steady source of income for the Comanches on the reservation. As Quanah’s status on the reservation and recognition from government officials grew, he secured better rations, advocated for the construction of schools and houses, and became one of three tribal judges on the reservation court. Tired of speaking with multiple leaders, the U.S. government wanted to appoint one chief of all Comanches— a role that hadn’t existed outside the reservation. Still, many Comanches supported Quanah for this role, just as several older leaders had supported him to lead them against the U.S. armed forces. Even Quanah’s former adversary, Ranald MacKenzie, advocated for his appointment. Quanah acted in Hollywood movies and befriended American politicians, riding in Theodore Roosevelt’s inauguration parade. Still, he never cut his long braids and advocated for the Native American Church and the use of peyote. He began to go by Quanah Parker, adopting his mother’s surname, and tried to track down his mother and sister, eventually learning they had both died shortly after their capture. Quanah adapted again and again— to different worlds, different roles, and circumstances that would seem insurmountable to most. Though he wasn’t without critics, after Quanah’s passing, Comanches began using the term “chairman” to designate the top elected official in the tribe, recognizing him as the last chief of the Comanches and a model of cultural survival and adaptation. In that spirit, today’s Comanche Nation looks towards the future, with over 16,000 enrolled citizens and countless descendants.

**P867 2020-06-02 The last chief of the Comanches and the fall of an empire - Dustin Ta**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=867)

翻译人员: Joyce He 校对人员: Rong Han1871 年的一个深夜， 一群骑兵突袭了沉睡中的军营。不一会儿，他们就把 军营搅得乱作一团，偷走了约 70 匹马后， 很快便消失得无影无踪。这场偷袭由名为夸纳·帕克 （Quanah Parker）的年轻酋长领导。而在此之前，努穆穆人，或科曼奇人 组成的土著部落和被派去为白人定居者 抢占科曼奇土地的美国军队之间已经在德克萨斯边界发生过一系列的冲突。这类冲突已经持续了数十年之久，而最近的一轮是由美军上校兰纳德·麦肯齐 （Ranald MacKenzie）发起并领导的。春去秋来，他始终没有停止 追寻夸纳的踪迹，但同时夸纳也在追踪着他。每当上校靠近了他的目标时，科曼奇人却已在广袤的平原上 消失无踪了。科曼奇人统治这块土地 已经快 200 年了，他们靠捕猎水牛为生， 整个部落在平原上四处迁徙。他们镇压了来自南边的 西班牙人和墨西哥人的袭击，阻挡了来自东边， 试图定居在这块土地上的美国人，还有众多争当老大的土著部落。科曼奇帝国并不是 受一个中央管辖的统一的组织，而是由很多帮派构成， 每个帮派有各自的领导。这些帮派的共同点是骑艺超群——每个男人、女人和孩童 都是马背上的能手。他们在马背上的格斗技能远超其他土著部落和殖民者，这使得他们能以很少的人口 控制很广阔的区域——他们的族群规模最大时 达到了四万人，但当夸纳·帕克和 兰纳德·麦肯齐兵戈相见时，只有约四五千的人口。夸纳大约出生在 1848 年， 是家中的长子，他的父亲佩塔·诺科纳（Peta Nocona） 是诺克尼部落的首领，母亲是被科曼奇人绑架 并同化的白人殖民者辛西娅·安·帕克（Cynthia Ann Parker）, 后改名为纳度阿（Naduah）。当夸纳还是个孩子时，美军伏击了他的村庄， 抓走了他的母亲和妹妹。夸纳和他弟弟后来在名为 夸哈达（Quahada）的另一个科曼奇部落寻得了庇护。随后几年间，夸纳证明了 自己的勇猛与领导才能。二十出头时，他和一个叫 维可（Weakeah ）的年轻女人私奔了，此举激怒了维可有权有势的父亲 和很多部落领袖。他们逃亡了一年，期间吸引了很多追随者，他们拥立 夸纳作为 paraibo， 即酋长，而那时夸纳还相当年轻。在他的领导下， 夸哈答部落得以避开美军，并继续他们特有的生活方式。但在 19 世纪 70 年代初的东海岸， 水牛皮变成了暴利行业，狩猎者在短短几年间 宰杀了数百万只水牛。与此同时，美军出其不意 发起了一次进攻，几乎把夸哈答部落的 1400 匹马 杀得精光，并偷走了剩下的马。尽管曾发誓永不投降， 但夸纳明白，失去了野牛和马，科曼奇人在冬季将面临饥荒。于是在 1875 年， 夸纳带着夸哈答部落搬到了俄克拉荷马的西尔堡居留地。作为游猎采集部族， 他们很难轻松的过渡到以农业为主的生活方式。美国政府保证 向他们定量提供补给，但还远远不够所需。与此同时，夸纳也立刻 陷入了一种弱势的政治境地：与其他在居留地 待得时间更长的人相比他既不富有，也无权力。但是，他发现了一个机会。居留地有充足的草场——对科曼奇人无用，但对牧牛人来说 却很适合用来放牧。他最先悄悄的与牧牛人签订了 出租草场的协定以牟利。后来，他与美国政府 商定了出租草场的权利，这保证了卡曼奇人 在居留地有稳定的收入来源。随着夸纳在居留地的地位和政府官员对他的认可逐渐上升，他争取到了更多的补给，提倡修建学校与住房，并成为了居留地 三位部落审判者中的一位。美国政府厌倦了 与多位部落领导者协商，决定指派一个领导整个 科曼奇部落的酋长——这个职位在居留地外还从未存在过。很多科曼奇人支持 由夸纳来担任此职，正如几位年长的首领曾支持由他来领导他们对抗美军。甚至连夸纳从前的对手， 兰纳德·麦肯齐，也支持任命他。夸纳曾出演过好莱坞电影， 和美国政客交好，还在西奥多·罗斯福的 就职游行中骑马带队。但是，他从未剪掉他的长辫子，而且支持建立美国土著人自己的教堂， 并大力推广佩奥特仙人掌的使用。他开始使用母亲的姓氏， 称自己为夸纳·帕克，并试图寻找他的母亲和妹妹，却发现她们在被抓后不久就丧生了。夸纳持续不断的适应着 不同的世界，不同的角色，以及被大多数人认为 无法克服的困境。尽管他也被一些评论家所批评， 但是在他去世后，科曼奇人改用 “主席” 一词来称呼部落中 被选出的最高官员，将夸纳尊为科曼奇部落的 最后一位酋长，他是文化传承和适应生存的典范。追随着他的精神， 现在的科曼奇国展望着未来，目前拥有着超过 1600 名 注册的公民和数不清的子孙后代。

**P868 2020-06-03 Which voting system is the best - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=868)

Imagine we want to build a new space port at one of four recently settled Martian bases, and are holding a vote to determine its location. Of the hundred colonists on Mars, 42 live on West Base, 26 on North Base, 15 on South Base, and 17 on East Base. For our purposes, let’s assume that everyone prefers the space port to be as close to their base as possible, and will vote accordingly. What is the fairest way to conduct that vote? The most straightforward solution would be to just let each individual cast a single ballot, and choose the location with the most votes. This is known as plurality voting, or "first past the post." In this case, West Base wins easily, since it has more residents than any other. And yet, most colonists would consider this the worst result, given how far it is from everyone else. So is plurality vote really the fairest method? What if we tried a system like instant runoff voting, which accounts for the full range of people’s preferences rather than just their top choices? Here’s how it would work. First, voters rank each of the options from 1 to 4, and we compare their top picks. South receives the fewest votes for first place, so it’s eliminated. Its 15 votes get allocated to those voters’ second choice— East Base— giving it a total of 32. We then compare top preferences and cut the last place option again. This time North Base is eliminated. Its residents’ second choice would’ve been South Base, but since that’s already gone, the votes go to their third choice. That gives East 58 votes over West’s 42, making it the winner. But this doesn’t seem fair either. Not only did East start out in second-to-last place, but a majority ranked it among their two least preferred options. Instead of using rankings, we could try voting in multiple rounds, with the top two winners proceeding to a separate runoff. Normally, this would mean West and North winning the first round, and North winning the second. But the residents of East Base realize that while they don’t have the votes to win, they can still skew the results in their favor. In the first round, they vote for South Base instead of their own, successfully keeping North from advancing. Thanks to this "tactical voting" by East Base residents, South wins the second round easily, despite being the least populated. Can a system be called fair and good if it incentivizes lying about your preferences? Maybe what we need to do is let voters express a preference in every possible head-to-head matchup. This is known as the Condorcet method. Consider one matchup: West versus North. All 100 colonists vote on their preference between the two. So that's West's 42 versus the 58 from North, South, and East, who would all prefer North. Now do the same for the other five matchups. The victor will be whichever base wins the most times. Here, North wins three and South wins two. These are indeed the two most central locations, and North has the advantage of not being anyone’s least preferred choice. So does that make the Condorcet method an ideal voting system in general? Not necessarily. Consider an election with three candidates. If voters prefer A over B, and B over C, but prefer C over A, this method fails to select a winner. Over the decades, researchers and statisticians have come up with dozens of intricate ways of conducting and counting votes, and some have even been put into practice. But whichever one you choose, it's possible to imagine it delivering an unfair result. It turns out that our intuitive concept of fairness actually contains a number of assumptions that may contradict each other. It doesn’t seem fair for some voters to have more influence than others. But nor does it seem fair to simply ignore minority preferences, or encourage people to game the system. In fact, mathematical proofs have shown that for any election with more than two options, it’s impossible to design a voting system that doesn’t violate at least some theoretically desirable criteria. So while we often think of democracy as a simple matter of counting votes, it’s also worth considering who benefits from the different ways of counting them.

**P868 2020-06-03 Which voting system is the best - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=868)

翻译人员: Jenny S 校对人员: Yolanda Zhang假如我们想在四个最新的火星基地建立一个新的太空港，并通过投票来决定 新太空港的地点。在火星上的 100 名殖民地居民中， 有 42 位住在西基地，26 位住在北基地，15 位住在南基地，17 位住在东基地。介于此次的目的， 先假设所有人都希望太空港离他们的基地越近越好， 并且会以此为参考进行投票。怎样举行投票才是最公平的？最直接的方案 就是让每一个人投一票，然后选出得票最多的地点。这就是多数制（plurality voting）， 或“领先者当选”（first past the post）。在这个情况下， 西基地很容易胜出，因为那里的居民多于其他的基地。可是，大多数的居民会认为 这是最差的结果，因为西基地离其他所有人都很远。那么，多数制投票 真的是最公平的方法吗？我们是否也可以尝试 “排序复选制”（instant runoff voting），即考虑大家所有的偏向，而不只是他们的第一选择？排序复选制的规则是这样的：首先，投票者将 把他们的选择按优先级排序，我们会比较他们的第一选择。南基地收到的投票最少， 所以最先将它排除。投给它的 15 票会被重新分配给 投票者的第二选择——东基地——那么它的总票数会是 32。然后，我们再次比较 首选并且排除最后一名。这次北基地会被排除。该基地居民的第二选择 本来会是南基地，但是南基地已经被排除了， 票数会分配到他们的第三选择。这样，东基地 58 票比西基地 42 票， 东基地胜出。但这似乎也不太公平。东基地不仅一开始是倒数第二名，并且，在大多数人的排序中， 它都位列最后两名。不过，我们也可以不用排名， 而尝试改用多轮投票。前两名的选择直接 进入独立的决选。通常来说，这意味着 西和北基地在第一轮胜出，北基地在第二轮胜出。但是东基地的居民认识到，虽然他们的票数不足以让他们胜出，他们仍然可以让结果偏向他们的喜好。在第一轮，他们投给南基地， 而不是他们自己的东基地，以成功地阻止北基地胜出。因为东基地居民的“战略性投票”，尽管拥有最少的居民， 南基地在第二轮轻松胜出。如果一个系统鼓励谎报偏好的话，它还能被称为一个公平的系统吗？也许我们需要让投票者针对 所有可能的两两配对做出选择，由此选出他们的喜好。这就是康德西法 （Condorcet method，即双序制）。比如：西基地对北基地。所有 100 名殖民地居民都要 在两者中选出他们的偏好。结果是西基地的 42 票对 北基地的 58 票，因为其他三个基地都偏向于北。现在对其他五个组合也进行一样的流程，胜出者将会是赢得最多次的基地。北基地赢得三次，南基地两次。它们确实是最靠近中心的地点，并且北基地的优势是， 它不是任何一方最排斥的选择。那么，这意味着康德西方法 总会是最理想的投票制度吗？不一定。假设在一场选举中 有三位候选人。如果投票者们喜欢 A 胜过 B， 喜欢 B 胜过 C，但喜欢 C 胜过 A，那么，这个方法就无法选出一个赢家。数十年来，研究者 和统计学家已经提出过数十种复杂的方法来投票和计票，有些甚至已经被投入实际应用。但不论你选择哪个，都可以想得出 某种结果不公平的情况。其实，我们对公平的直觉观念已经包含了数个 也许互相矛盾的假设。若某些投票者的影响力 比其他投票者大，似乎就不太公平。但忽略少数人的偏好， 或鼓励投票者利用制度耍小伎俩，似乎也不公平。事实上，已经有数学证明指出，只要选举的选项超出两个，那么设计出的投票制度 就一定会违反某些理论前提下的理想标准。虽然我们经常认为民主 只是数一数票那么简单的事，但我们也应该认真思考， 在不同的计票方式下，谁会收益。

**P869 2020-06-04 “What happened when we all stopped” narrated by Jane Goodall**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=869)

Today we have something a little different. Dr. Jane Goodall is going to tell you a story. Stay tuned after the animation to learn how to download this as a free children's book. Ready? Let's begin. It starts as a whisper, a word on the air. It can't quite be heard, but you know that it's there. As gentle as sunlight, as tenacious as hale, in its route to the heart, it could not but prevail. And the people looked up from their day-to-day tasks, their day-to-day jobs and their day-to-day masks. They heard or they felt where the whisper could lead, and they looked with eyes wide at what that might mean. And once they could see it, they hadn't a chance To resist the sweet song of the deep spell it cast. But the feeling it brought them at first glance was pain, as they lifted their eyes on the land they had claimed. Since they saw at last as if raised from a dream, they were almost alone on the land and the sea. For the trees had almost gone, and the bees had almost gone, and the creatures in their shells by the seas had almost gone. And the people felt sad as they saw their new Earth, but they knew this was it, one wild chance for rebirth. Breaking new ground, seeds rolling down, smell of the earth on your hands and your brow. No time for sorrow, we're building tomorrow. The sound of things growing now keeps us around. As the wildness grows, and the deep wood grows, and the sense that the future's come to meet you grows, There's no chance we can rest. We must do our best. This moment can lead us back home, that's our test. It starts as a whisper, a word on the air. It can't quite be heard, but you know that it's there. It then spoke like thunder. Until we all moved. And we could. And we did. And it's done. She's renewed. Help turn the whisper into a roar by sharing this poem today. You can download the illustrated book for free at ed.ted.com/whisper or keep your soul aflutter with one of these animated poems.

**P869 2020-06-04 “What happened when we all stopped” narrated by Jane Goodall**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=869)

翻译人员: Ethan Huang 校对人员: Yolanda Zhang今天的内容会有些不一样。珍妮·古道尔博士（Dr. Jane Goodall ） 会给你们讲个故事。在动画结束之后请耐心等待，了解如何把本视频下载为 免费的儿童读物。准备好了吗?让我们开始吧。一切都源于一声空中传来的低语。虽无法听清， 但你知道它就在那里。如阳光般温和，似冰雹般坚韧，它一往无前，直达心间。人们从日复一日的任务，周而复始的工作以及循环往复的口罩中 抬头观望。他们听到或是感受到了那声低语会引领的方向，他们瞪大双眼试图明白它可能意味着什么。一旦他们明白其含义， 便无法抗拒它施展魔法所唱出的甜美歌谣。但当人们再次抬眼四望 自己曾经拥有的世界时，这声低语带来的却是痛苦。当他们仿佛从梦中醒来，却发现自己几乎已是孤独地存在于这片大地与海洋之上。树木已近乎砍伐殆尽，蜜蜂已几乎悄然离去，住在海边贝壳里的生物已几乎销声匿迹。当人们看到新世界时， 不免感到悲伤，但他们知道，机会来了——一次可以焕发新生、 拥有无限可能性的机会。开垦土地，精心播种，泥土的芬芳残留在额前与手中。没有时间感伤颓废， 我们在为未来准备。萌芽声正将我们包围。当荒原重生， 森林长出新枝，未来可期的想法开始生根发芽。没时间懈怠和休息，我们必须竭尽全力。这一刻可以带领我们 回到最初那天，这是属于我们的试炼。一切都源于一声空中传来的低语。虽无法听清， 但你知道它就在那里。转瞬间它却如惊雷般炸响，直到我们都行动起来。我们可以做到。我们已参与其中。等一切大功告成，世界已重获新生。现在分享这首诗， 以助力将这声低语变为咆哮。前往 ed.ted.com/whisper 免费下载该视频的绘本，或者让你的心灵 随着这些动画诗歌一起飘扬。

**P870 2020-06-05 First person vs. Second person vs. Third person - Rebekah Bergman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=870)

“I am an invisible man.” “Mrs. Dalloway said she would buy the flowers herself.” “You are about to begin reading Italo Calvino's new novel.” These three opening lines, from Ralph Ellison’s "Invisible Man," Virginia Woolf’s "Mrs. Dalloway," and Italo Calvino’s "If on a winter’s night a traveler," each establish a different point of view. Who is telling a story, and from what perspective, are some of the most important choices an author makes. Told from a different point of view, a story can transform completely. Take this fairytale: "Rapunzel, Rapunzel," the Prince called, "let down your hair." Rapunzel unbraided her hair and slung it out the window. The prince climbed her tresses into the tower. Rapunzel is typically told like this, with the narrator outside the story. This point of view is called third person. But Rapunzel can also be told by a character in the story— a first person narrator. The tail end of Rapunzel’s locks plopped down at my feet. I grabbed on and began to climb… ugh! I couldn’t untangle myself. Strands came off all over me, sticking to my sweat. In a first person narrative, the story can change dramatically depending on which character is the narrator. Say Rapunzel was narrating instead of the prince: I hope he appreciates how long it takes to unbraid 25 feet of hair, I thought. OUCH! I'll be honest; I thought my scalp would stretch off of my skull. "Can you climb any faster?" I yelled. In second person, the narrator addresses the story to the reader: He calls your name. He wants you to let your hair down. You just finished braiding it, but hey– you don't get a lot of visitors. Third person, first person, and second person perspectives each have unique possibilities and constraints. So how do you choose a point of view for your story? Constraints aren’t necessarily a bad thing— they can help focus a story or highlight certain elements. For example, a third person narrator is necessarily a bit removed from the characters. But that can be good for stories where a feeling of distance is important. A third person narrator can be either limited, meaning they stick close to one character’s thoughts and feelings, or they can be omniscient, able to flit between characters’ minds and give the reader more information. A first person story creates closeness between the reader and the narrator. It’s also restricted by the narrator’s knowledge. This can create suspense as the reader finds out information along with the character. A first person narrator doesn’t necessarily have to represent the character’s experience faithfully— they can be delusional or dishonest. In Kazuo Ishiguro’s novel "The Remains of the Day," Stevens, an aging British butler in 1956, recounts his many years of service, but fails to acknowledge the flaws of the man he serves. The cracks in his narrative eventually draw the reader’s attention to the under-acknowledged failings of the culture and class system he inhabits. Justin Torres’s novel, "We the Animals," begins with a plural first person narrator: “We were six snatching hands, six stomping feet; we were brothers, boys, three little kings locked in a feud for more.” Partway through the story, the point of view shifts to first person singular, from we to I, as the boys come of age and one brother feels alienated from the others. Second person is a less common choice. It requires the writer to make the reader suspend disbelief to become another “you.” Placing the reader in a character’s perspective can build urgency and suspense. Sometimes, though, second person is intended to distance the narrator from their own story, rather than bring the reader closer to the story. In these cases, second person narrators refer to themselves as “you” rather than “I.” Writers are constantly experimenting with fresh variations on point of view. New virtual and augmented reality technologies may expand the possibilities for this experimentation. By placing people at a particular vantage point in virtual space, how might we change the way we tell and experience stories?

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翻译人员: Wanting Zhong 校对人员: Yolanda Zhang“我是一个看不见的人。”“达洛维夫人说她自己去买花。”“ 你即将开始阅读 伊塔洛 · 卡尔维诺的新小说了。”这三个开篇句子分别来自拉尔夫 · 埃里森 （Ralph Ellison）的《看不见的人》，弗吉尼亚 · 伍尔夫（Virginia Woolf）的 《达洛维夫人》，和伊塔洛 · 卡尔维诺（Italo Calvino）的 《如果在冬夜，一个旅人》，每句都建立起了 一个不同的叙述视角。谁在讲述故事， 又是从什么视角叙事，是一名作者要做出的 最重要的几个选择。不同的叙述视角能让 故事的情节发生翻天覆地的变化。以这个童话故事为例：“ 莴苣姑娘，莴苣姑娘，” 王子喊道，“ 放下你的长发。”莴苣姑娘解开了她的发辫， 将它垂出窗外。王子沿着她的发绺爬到了塔里。《莴苣姑娘》一般是这样讲的， 叙述者置身于故事之外。这种叙述视角叫做第三人称视角。但《莴苣姑娘》也能 由故事中的角色来讲述——即第一人称视角。莴苣姑娘的发尾 扑通地掉在我的脚边。我抓住了头发，开始攀爬……呃！我被缠住没法脱身了。发丝落了我一身， 被身上的汗渍黏住。在第一人称叙事中， 根据叙述角色的不同，故事情节就能发生戏剧性的变化。比如说，莴苣姑娘在叙事， 而不是王子：我希望他能体谅 解开八米长的发辫要花多少时间。好痛！说实话，我觉得我的头皮 都要被从头盖骨上扯下来了。“ 你能不能爬快一点？” 我大喊道。在第二人称叙事中， 叙述者是在对读者说话：他喊了你的名字。 他想让你把头发放下来。你才刚刚梳完辫子，不过嘛—— 来探望你的人确实没几个。第三人称、第一人称 和第二人称视角各有其独特的可能性与限制。那么你该怎样为你的故事 选择叙述视角呢？限制并不一定就是坏事——它们能让故事的焦点更明确， 或者突出某些要素。比如，一个第三人称叙述者 必然会离角色有些许疏远。但对于一个距离感很重要的故事， 这样的选择大有裨益。一个第三人称叙述者 可以是有限的，也就是说只紧跟 某一个角色的想法与感受，也可以通过“上帝视角”， 在不同角色的想法之间跳跃，给读者提供更多信息。第一人称视角的故事能在读者 与叙述者之间制造出亲密感，但也受限于叙述者本身拥有的信息。这能让读者同角色一起 逐渐发现信息，从而制造悬念。第一人称叙述者并不一定要忠实地 反映角色的经历——他们可以妄想，也可以说谎。在石黑一雄的小说《长日留痕》 （"The Remains of the Day"）中，史蒂芬斯是 1956 年 一位日渐老去的英国管家，他回忆了自己多年的服务，却未能承认自己侍奉的主人的缺点。他叙述中的裂痕 最终让读者注意到了他所居住的文化与阶级系统中 未经正视的缺陷。贾斯汀·托雷斯（Justin Torres）的小说 《我们这些动物》（“We the Animals”）由第一人称复数的叙述视角开篇：“ 我们是六只争抢的手， 六只狠跺的脚；我们是三兄弟，是小男孩，是三个 为抢夺更多而结下仇隙的小霸王。”故事进行到一半时， 叙述视角转变成了第一人称单数：随着男孩们长大， 其中一个少年觉得与另两人疏远，叙述者也从“我们”变成了“我”。第二人称视角 是一个更为少见的选择。它要求作者让读者放下置疑， 化身为另一个 “你”。令读者置身于某个角色的视角能制造紧迫感和悬念。然而有时候，使用第二人称是为了 让叙述者远离他们自己的故事，而不是要缩短读者与故事的距离。在这种情况下，第二人称叙述者指代他们自己时 会使用 “你”，而不是 “我”。作家们在不断试验 叙述视角的新鲜变体。新的虚拟现实和增强现实技术或许能为这些尝试 拓展出更多可能性。通过让人们置身于 虚拟空间中的特定视点，我们能如何改变 讲述与体验故事的方式？

**P871 2020-06-05 How fast can a vaccine be made - Dan Kwartler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=871)

When a new pathogen emerges, our bodies and healthcare systems are left vulnerable. In times like these, there’s an urgent need for a vaccine to create widespread immunity with minimal loss of life. So how quickly can we develop vaccines when we need them most? Vaccine development can generally be split into three phases. In exploratory research, scientists experiment with different approaches to find safe and replicable vaccine designs. Once these are vetted in the lab, they enter clinical testing, where vaccines are evaluated for safety, efficacy, and side effects across a variety of populations. Finally, there’s manufacturing, where vaccines are produced and distributed for public use. Under regular circumstances, this process takes an average of 15 to 20 years. But during a pandemic, researchers employ numerous strategies to move through each stage as quickly as possible. Exploratory research is perhaps the most flexible. The goal of this stage is to find a safe way to introduce our immune system to the virus or bacteria. This gives our body the information it needs to create antibodies capable of fighting a real infection. There are many ways to safely trigger this immune response, but generally, the most effective designs are also the slowest to produce. Traditional attenuated vaccines create long lasting resilience. But they rely on weakened viral strains that must be cultivated in non-human tissue over long periods of time. Inactivated vaccines take a much faster approach, directly applying heat, acid, or radiation to weaken the pathogen. Sub-unit vaccines, that inject harmless fragments of viral proteins, can also be created quickly. But these faster techniques produce less robust resilience. These are just three of many vaccine designs, each with their own pros and cons. No single approach is guaranteed to work, and all of them require time-consuming research. So the best way to speed things up is for many labs to work on different models simultaneously. This race-to-the-finish strategy produced the first testable Zika vaccine in 7 months, and the first testable COVID-19 vaccine in just 42 days. Being testable doesn’t mean these vaccines will be successful. But models that are deemed safe and easily replicable can move into clinical testing while other labs continue exploring alternatives. Whether a testable vaccine is produced in four months or four years, the next stage is often the longest and most unpredictable stage of development. Clinical testing consists of three phases, each containing multiple trials. Phase I trials focus on the intensity of the triggered immune response, and try to establish that the vaccine is safe and effective. Phase II trials focus on determining the right dosage and delivery schedule across a wider population. And Phase III trials determine safety across the vaccine’s primary use population, while also identifying rare side effects and negative reactions. Given the number of variables and the focus on long-term safety, it’s incredibly difficult to speed up clinical testing. In extreme circumstances, researchers run multiple trials within one phase at the same time. But they still need to meet strict safety criteria before moving on. Occasionally, labs can expedite this process by leveraging previously approved treatments. In 2009, researchers adapted the seasonal flu vaccine to treat H1N1— producing a widely available vaccine in just six months. However, this technique only works when dealing with familiar pathogens that have well-established vaccine designs. After a successful Phase III trial, a national regulatory authority reviews the results and approves safe vaccines for manufacturing. Every vaccine has a unique blend of biological and chemical components that require a specialized pipeline to produce. To start production as soon as the vaccine is approved, manufacturing plans must be designed in parallel to research and testing. This requires constant coordination between labs and manufacturers, as well as the resources to adapt to sudden changes in vaccine design— even if that means scrapping months of work. Over time, advances in exploratory research and manufacturing should make this process faster. Preliminary studies suggest that future researchers may be able to swap genetic material from different viruses into the same vaccine design. These DNA and mRNA based vaccines could dramatically expedite all three stages of vaccine production. But until such breakthroughs arrive, our best strategy is for labs around the world to cooperate and work in parallel on different approaches. By sharing knowledge and resources, scientists can divide and conquer any pathogen.

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翻译人员: Su Wang 校对人员: Yolanda Zhang当一个全新的病原体出现时，我们的身体很容易受到侵害。这时候，我们就迫切需要疫苗来激活人体的免疫系统， 挽救更多的生命。那么在紧急状态下， 最快需要多久可以研发出疫苗呢？疫苗研发大体可以分为三个阶段。 [ 研发 ] [临床试验 ] [ 生产 ]在早期研发阶段中， 科学家们会尝试各种各样的方法，去寻找安全并且可以复制的疫苗。在经过实验室检验后， 它们将进入临床测试阶段，针对不同群体， 对疫苗的安全性、高效性和副作用进行评估。最后，是制药阶段，疫苗将被生产和发配给大众接种。在正常情况下， 这个过程会持续 15 到 20 年。但是在疫情大流行期间， 研究人员会应用大量的方法，去尽可能快的通过每个阶段的试验。早期研发阶段是最具有灵活性的，这个阶段的目的是找到一个安全的途径将病毒或细菌引入人体的免疫系统，这将给人体提供所需要的信息，以产生足以对抗真正感染的抗体。许多方法可以安全地激活免疫反应，但通常来说，最有效的方法， 其研发时间也是最久的。传统的减毒活疫苗 会产生长效的免疫效力。但是它所依赖的弱毒株必须在非人体组织中 培养很长一段时间。灭活疫苗则需要花费 更长的时间去研发，它需要通过加热，酸处理 或者辐射来弱化病原体。亚单位疫苗， 即注射病毒蛋白的无害片段，也可以被快速的研制。但是这些相对快速的技术 会导致较弱的效力。这些只是众多疫苗设计中的三种方法，每一种都有其优缺点。没有任何一种技术是 100% 有效的，并且所有的技术 都需要经历耗时的研究。所以加快疫苗研发的最佳方法是让许多实验室同时研究不同的模型。这种竞争策略让科学家们在 7 个月内 研制出了可实验的寨卡疫苗，并且在 42 天内研制出了 第一支可实验的新冠病毒疫苗。拥有实验性疫苗并不代表 这些疫苗已经研发成功，但那些被认为安全 并且易于复制的模型可以在研发其他方案的同时 进行临床试验。无论实验性疫苗在四个月 还是四年内研制出来，下一个阶段往往是研发过程中 最漫长且最不可预测的。临床试验由四个阶段组成， 每个阶段包含多次试验。[ 1. 免疫反应 ] 第一阶段重点观察引起免疫反应的强度，并且确保疫苗是安全有效的。[ 2. 剂量和接种 ] 第二阶段着重确定对大范围群体的注射剂量和接种方案。[ 3. 安全性和副作用 ] 第三阶段试验负责确认疫苗在主要群体中的安全性，以及疫苗引起的副作用和不良反应。面对如此多的不确定因素 并且着眼于长期的安全性，想要加快临床试验是极其困难的。在极端情况下， 研究人员会在同一个阶段进行很多次实验。但是他们在进入下一个阶段前， 仍然需要满足严格的安全标准。偶尔，实验室可以通过 借助已批准的技术来加快这个过程。在 2009 年， 研究人员曾采用 季节性流感疫苗来治疗 H1N1——在六个月内生产出了 可大规模接种的疫苗。然而，这项技术只有在处理 和已拥有成熟疫苗设计的病毒相似的病原体时才可以使用。当第三阶段实验成功后， 国家监管机构会审查结果并批准 安全达标的疫苗投入生产。每种疫苗都拥有其独特的 生物和化学成分，需要一种专门的生产线进行生产。为了让疫苗在得到批准后 尽快投入生产，生产计划必须和 疫苗的研发、测试同步进行。这需要实验室 和生产商之间不断协调，并随时调整资源配置，以应对 疫苗设计中的突然变化——尽管那意味着 几个月的努力将付诸东流。随着时间的推移， 探索性研究和生产中的技术进步应该会加快这一进程。初步研究已表明， 未来的研究人员将有可能在同一种疫苗设计中替换不同病毒的遗传物质。这些基于 DNA 和 mRNA 的疫苗 会大大加快疫苗研发的所有三个阶段。但是在取得这项突破之前，最好的策略就是 全世界的实验室共同合作，并且同时进行多种方案的研发。通过共享知识和资源，科学家们将能够 辨别并且攻克任何病毒。

**P872 2020-06-09 The greatest mathematician that never lived - Pratik Aghor**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=872)

When Nicolas Bourbaki applied to the American Mathematical Society in the 1950s, he was already one of the most influential mathematicians of his time. He’d published articles in international journals and his textbooks were required reading. Yet his application was firmly rejected for one simple reason— Nicolas Bourbaki did not exist. Two decades earlier, mathematics was in disarray. Many established mathematicians had lost their lives in the first World War, and the field had become fragmented. Different branches used disparate methodology to pursue their own goals. And the lack of a shared mathematical language made it difficult to share or expand their work. In 1934, a group of French mathematicians were particularly fed up. While studying at the prestigious École normale supérieure, they found the textbook for their calculus class so disjointed that they decided to write a better one. The small group quickly took on new members, and as the project grew, so did their ambition. The result was the "Éléments de mathématique," a treatise that sought to create a consistent logical framework unifying every branch of mathematics. The text began with a set of simple axioms— laws and assumptions it would use to build its argument. From there, its authors derived more and more complex theorems that corresponded with work being done across the field. But to truly reveal common ground, the group needed to identify consistent rules that applied to a wide range of problems. To accomplish this, they gave new, clear definitions to some of the most important mathematical objects, including the function. It’s reasonable to think of functions as machines that accept inputs and produce an output. But if we think of functions as bridges between two groups, we can start to make claims about the logical relationships between them. For example, consider a group of numbers and a group of letters. We could define a function where every numerical input corresponds to the same alphabetical output, but this doesn’t establish a particularly interesting relationship. Alternatively, we could define a function where every numerical input corresponds to a different alphabetical output. This second function sets up a logical relationship where performing a process on the input has corresponding effects on its mapped output. The group began to define functions by how they mapped elements across domains. If a function’s output came from a unique input, they defined it as injective. If every output can be mapped onto at least one input, the function was surjective. And in bijective functions, each element had perfect one to one correspondence. This allowed mathematicians to establish logic that could be translated across the function’s domains in both directions. Their systematic approach to abstract principles was in stark contrast to the popular belief that math was an intuitive science, and an over-dependence on logic constrained creativity. But this rebellious band of scholars gleefully ignored conventional wisdom. They were revolutionizing the field, and they wanted to mark the occasion with their biggest stunt yet. They decided to publish "Éléments de mathématique" and all their subsequent work under a collective pseudonym: Nicolas Bourbaki. Over the next two decades, Bourbaki’s publications became standard references. And the group’s members took their prank as seriously as their work. Their invented mathematician claimed to be a reclusive Russian genius who would only meet with his selected collaborators. They sent telegrams in Bourbaki’s name, announced his daughter’s wedding, and publicly insulted anyone who doubted his existence. In 1968, when they could no longer maintain the ruse, the group ended their joke the only way they could. They printed Bourbaki’s obituary, complete with mathematical puns. Despite his apparent death, the group bearing Bourbaki’s name lives on today. Though he’s not associated with any single major discovery, Bourbaki’s influence informs much current research. And the modern emphasis on formal proofs owes a great deal to his rigorous methods. Nicolas Bourbaki may have been imaginary— but his legacy is very real.

**P872 2020-06-09 The greatest mathematician that never lived - Pratik Aghor**

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翻译人员: Zining Chen 校对人员: Yolanda Zhang当尼古拉斯·布尔巴基（Nicolas Bourbaki） 在 1950 年代向美国数学学会递交申请时，他已经是当时 最具影响力的数学家之一。他在国际期刊上发表了许多研究，所攥写的教科书 也成为了教学必读物。然而他的申请却遭到了果断的拒绝， 而原因只有一个——尼古拉斯·布尔巴基本人并不存在。二十年前的数学教学混乱不堪。许多颇有成就的数学家们 在一战时失去了性命，使得该领域变得支离破碎。不同分支使用不同的方法论 来追求自己的目标。缺乏共同的数学语言 导致数学家们很难分享自己的成就， 并拓展自己的研究。在 1934 年，一群法国的 数学家们受够了这种现状。在享有声望的 巴黎高等师范学校就学期间，他们发现自己所用的微积分 教科书上的内容竟然如此脱节，因此他们决定撰写一部更好的教材。他们的小组很快有了新成员的加入，随着项目的扩大， 他们的野心也越来越大。他们的最终成果便是《数学要素》 （"Éléments de mathématique"），一个创造了统一逻辑框架的论文合集，合并了每一个数学的分支。该书的内容以一组简单的公理开篇——用来支持其论点的定理和假设。自此以后，该书的作者们 得出了越来越多复杂的定理，与各个跨领域的结论相对应。但为了能够真正揭示理论的共同点，这群人还需要制定一套适用于各种各样问题的统一规则。为此，他们为一些 重要的数学概念赋予了新颖、清晰的定义，包括函数。一个普遍的解释是将函数比作机器，它接受输入并产生输出。但如果我们将函数 想像成连接两组数字的桥梁，我们就可以定义 它们之间的逻辑关系。比如，将一组设为数字， 一组设为字母，我们就可以将函数定义为：每一个数字的输入 都有相同字母的输出。但这并不能建立一个有趣的关系。或者，我们可以定义一个函数为：每一个数字的输入 都有不同字母的输出。第二个函数确立了一个逻辑关系：对输入执行一系列操作 会对其映射的输出产生相应的影响。小组成员开始根据 函数如何映射输出来对其进行定义。如果一个函数的输出 来源于一个独有的输入，他们便将其定义为内射函数。如果每个输出都可以 被映射到至少一个输入上，那该函数就被称为满射函数。在双射函数中，每个元素 都有一一对应的输入或输出。这就让数学家们得以构建能够在函数域中来回转换的逻辑。他们对于抽象原理的系统性解释与数学是一门直觉科学的普遍看法 形成了鲜明的对比，而且后者认为，对逻辑的 过度依赖限制了创造力。但这组叛逆的学者 毅然拒绝了传统。他们在为这个领域带来革命，并想用一个噱头来纪念它。他们决定将《数学要素》 （Éléments de mathématique）和其余所有的研究成果 用一个集体的化名发表：尼古拉斯·布尔巴基。在接下来的二十年中，在布尔巴基名下 发表的研究变成了标准参考资料。这组数学家也像对待自己的研究一样， 一直非常认真地对待这场恶作剧。他们凭空创造的这个数学家 声称自己是一位隐居的俄罗斯天才，只与他指定的合作人见面。他们还以布尔巴基的名义发送电报， 宣布了他女儿的婚礼，并公开羞辱了所有质疑他存在的人。但到了 1968 年，他们无法 再继续维持这场骗局，于是以唯一可行的方式 结束了这场恶作剧。他们公布了布尔巴基的讣告， 里面包含了许多数学双关语。尽管他已经“去世”，但这个以他的名字 命名的组织至今依然存在。虽然他的成就并不包含 任何重大的发现，但布尔巴基的影响 体现在了很多现代的研究中。现代对形式证明的重视 很大程度上要归功于他严谨的方法。尼古拉斯·布尔巴基可能是虚构的 ——但他对世人的遗赠是真实存在的。

**P873 2020-06-09 What do all languages have in common - Cameron Morin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=873)

Language is endlessly variable. Each of us can come up with an infinite number of sentences in our native language, and we’re able to do so from an early age— almost as soon as we start to communicate in sentences. How is this possible? In the early 1950s, Noam Chomsky proposed a theory based on the observation that the key to this versatility seems to be grammar: the familiar grammatical structure of an unfamiliar sentence points us toward its meaning. He suggested that there are grammatical rules that apply to all languages, and that the rules are innate— the human brain is hardwired to process language according to these rules. He labelled this faculty universal grammar, and it launched lines of inquiry that shaped both the field of linguistics and the emerging field of cognitive science for decades to come. Chomsky and other researchers set out to investigate the two main components of universal grammar: first, whether there are, in fact, grammar rules that are universal to all languages, and, second, whether these rules are hardwired in the brain. In attempts to establish the universal rules of grammar, Chomsky developed an analytical tool known as generative syntax, which represents the order of words in a sentence in hierarchical syntax trees that show what structures are possible. Based on this tree, we could suggest a grammar rule that adverbs must occur in verb phrases. But with more data, it quickly becomes clear that adverbs can appear outside of verb phrases. This simplified example illustrates a major problem: it takes a lot of data from each individual language to establish the rules for that language, before we can even begin to determine which rules all languages might have in common. When Chomsky proposed universal grammar, many languages lacked the volume of recorded samples necessary to analyze them using generative syntax. Even with lots of data, mapping the structure of a language is incredibly complex. After 50 years of analysis, we still haven’t completely figured out English. As more linguist data was gathered and analyzed, it became clear that languages around the world differ widely, challenging the theory that there were universal grammar rules. In the 1980s, Chomsky revised his theory in an attempt to accommodate this variation. According to his new hypothesis of principles and parameters, all languages shared certain grammatical principles, but could vary in their parameters, or the application of these principles. For example, a principle is “every sentence must have a subject," but the parameter of whether the subject must be explicitly stated could vary between languages. The hypothesis of principles and parameters still didn’t answer the question of which grammatical principles are universal. In the early 2000s, Chomsky suggested that there’s just one shared principle, called recursion, which means structures can be nested inside each other. Take this sentence, which embeds a sentence within a sentence within a sentence. Or this sentence, which embeds a noun phrase in a noun phrase in a noun phrase. Recursion was a good candidate for a universal grammar rule because it can take many forms. However, in 2005 linguists published findings on an Amazonian language called Piraha, which doesn’t appear to have any recursive structures. So what about the other part of Chomsky’s theory, that our language faculty is innate? When he first proposed universal grammar, the idea that there was a genetically determined aspect of language acquisition had a profound, revolutionary impact. It challenged the dominant paradigm, called behaviorism. Behaviorists argued that all animal and human behaviors, including language, were acquired from the outside by the mind, which starts out as a blank slate. Today, scientists agree that behaviorism was wrong, and there is underlying, genetically encoded biological machinery for language learning. Many think the same biology responsible for language is also responsible for other aspects of cognition. So they disagree with Chomsky’s idea that there is a specific, isolated, innate language faculty in the brain. The theory of universal grammar prompted the documentation and study of many languages that hadn’t been studied before. It also caused an old idea to be reevaluated and eventually overthrown to make room for our growing understanding of the human brain.

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翻译人员: Yanyan Hong 校对人员: Yolanda Zhang语言是千变万化的。每个人都可以用我们的母语想出无数个句子，而且我们从小就可以做到这一点——几乎是早在我们会使用 句子进行交流时就会了。这怎么可能呢？在 1950 年代初期，诺姆·乔姆斯基 （Noam Chomsky）提出了一种基于观察结果的理论， 即这种多变性似乎要归功于语法：即使我们并不熟悉某个句子， 只要我们熟悉其语法结构，就能明白它的意思。他指出，有些语法规则适用于所有语言， 而且那些规则是与生俱来的——人类大脑天生就会 根据这些规则处理语言。他把这种功能称为“普遍语法”，这一概念随即引发了一系列相关探索， 并在未来几十年里塑造了语言学领域和新兴的认知科学领域。乔姆斯基和其他研究员们探究了普遍语法的两个重要组成部分：首先，是否有一些语言规则是适用于所有语言的，其次，这些规则 是否是大脑与生俱来的。在尝试建立通用语法规则的过程中，乔姆斯基开发了一种分析工具， 也就是所谓的“生成语法”，它代表在层次语法树上 一个句子中的词序，以显示哪些结构可行。根据语法树，我们就可以 提出一条语法规则，那就是副词一定出现在动词短语中。但有了更多数据后， 很快就能更清楚地了解到，副词也会出现在动词短语之外。这个简单的例子 说明了一个主要问题：每种语言都需要获得大量的数据才能为那种语言建立语法规则，甚至早于我们可以开始判断所有语言拥有的共同规则。当乔姆斯基提出普遍语法的概念时，许多语言还缺少记录在案的样本，以至于无法使用生成语法来分析它们。就算有很多数据，描绘出语言结构的过程也相当复杂。在经过了长达 50 年的认真分析之后， 我们仍然难以完全理解英语规则。在搜集和分析了更多的语言数据后，我们发现世界各地的 语言差异越来越明显，从而对存在通用语法规则的理论 提出了挑战。在 1980 年代， 乔姆斯基修改了他的理论，试图将这些多样性纳入思考。根据他对规则和参数的假设，所有的语言都具有 某种共同的语法规则，但在它们的参数 或者应用上有所差异。比如说，一个原则是 “所有的句子必须要有主语，”但是是否需要 明确与主语有关的参数就会因语言而异。对规则和参数的假设仍然无法解答哪种语言规则是共通的。在 2000 年初， 乔姆斯基认为只有一条共通的规则，叫做“递归”，意思就是 结构可以互相套用。比如这句话，一个句子套在一个句子中， 然后又套在另一个句子中。或者这个句子， 名词短语套着名词短语，再套着另一个名词短语。递归是普遍语法的最优规则，因为它有很多形式。然而，在 2005 年， 语言学家们发表了他们关于一种亚马逊河流域语言的发现， 这种语言叫毗拉哈语（Piraha），它没有任何递归式的结构。再来看看乔姆斯基理论的另一部分，我们的语言规则是与生俱来的吗？当他初次提出普遍语法的时候，关于语言获取的能力 部分决于基因的观点产生了深远的、革命性的影响。它挑战了主流的范式，即“行为主义”。行为学家们认为 所有生物的行为，包括语言，都是大脑后天习得的，而最初的大脑是一张白纸。而今，科学家们普遍赞成 行为主义的想法是错误的这一观点，并认为语言学习背后的确存在基因编码的生物机制。许多人认为语言背后的生物学同时也负责认知的其它方面。所以，他们反对乔姆斯基的想法，即大脑中有一种明确的、 独立的、与生俱来的语言机能，普遍语法理论促成了许多从未被研究的语言 开始被记录、研究。它也让一个老旧的观点 被不断重新评估，甚至推翻，为我们进一步理解人类大脑腾出空间。

**P874 2020-06-10 The Factory \_ Think Like A Coder, Ep 9**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=874)

After a harrowing chase, Ethic, Hedge, and their new ally Lemma find themselves in a cavernous control room. Here the last artifact— the Node of Memory— is suspended within a force field and powering a supercomputer. Ethic is about to deactivate the force field when Lemma stops her. She explains, a decade ago, she was assigned a research task: to use the world machine to create something that would make everyone happy. After many failed attempts, Lemma discovered a compound that, when ingested, made people motivated, happy, creative, loving… in short, their best selves. It was rushed into production. Soon, the entire nation’s food supply came from Huxenborg, with the compound mixed in. The first year was paradise. The second, not so much. Side-effects began to emerge: memory-loss, listlessness, and self-absorption. In the third year, the government dissolved, leaving the robots running everything in a self-sustaining loop. By this point things were too far gone for Lemma to reverse. People had become dependent on the compound, and the few who refused it formed a resistance to try to fix things. It took 10 years for Lemma to find a cure. This factory contains everything she’ll need to make it, but the second they take the Node of Memory, the security system will alert the robots, and they’ll have to run. If, instead, they first reconfigure the factory to manufacture the cure, the people can be saved. Lemma has the whole factory redesign planned out. The problem is… it’s a little hard to read. Her schematic shows all the steps in the manufacturing process needed to make the cure. An arrow from “add nitric acid” to “shake vigorously” means that the acid addition has to happen before shaking. If a single step is performed out of order, the cure won’t work, or worse. There aren’t any circular references, where step A requires step B and step B eventually requires step A. Here’s where Ethic and Hedge come in. Lemma needs Hedge to translate the tangled diagram into a sequence of steps. That’ll be the order that things happen in the factory. Once input into the central computer, the factory will reassemble itself as instructed. Hedge’s ability to store information in a table will help here. So how does Ethic program Hedge to turn out a correct sequence that can reconfigure the factory? Pause now to figure it out yourself. Rules in 3 Rules in 2 Rules in 1 Hint in 3 Hint in 2 Hint in 1 It may help to first think about this problem as a human, rather than a machine. Given this diagram, it’s clear to start with getting a bowl, since no arrows point to it. How might you mark up the diagram to figure out what to do next? Pause now to figure it out yourself. Solution in 3 Solution in 2 Solution in 1 Diagrams like the one Lemma has drawn are called directed acyclic graphs. A graph is a representation of data that shows different elements and how they’re related to each other. Directed means that direction matters— as indicated by the arrows. Here A leads to B, but B doesn’t lead to A. And acyclic means that there aren’t any loops. Which is fortunate, because if there were, this problem wouldn’t be solvable. There’s a simple way to navigate the graph as a human: start with a step that doesn’t have any arrows pointing to it. Once you do that, cross out that step and all arrows leading from it. Choose another step with no arrows pointing to it, and repeat until you’ve hit every step. There are two things here that are tricky to translate for a robot. First, how do you keep track of the information? And second, what do you do if there are multiple options at the same time? For the first challenge, a convenient way for machines to store information is in a table. In this case, you can have Hedge list every step in the headers of both the rows and columns. Then he can go through the rows one at a time. On the schematic, what points to mix? Both shake and titrate. So Hedge should make a mark in both of their columns. He can do the same for every row, one at a time, to make a table like this. Of course the full table will be much bigger. Like a human, Hedge will also want to start from one of the steps that has no arrows pointing to it— which is the same as having no marks in its row. If there’s more than one, a convenient way to choose is to pick the one that’s alphabetically earliest, though other selection methods can work just as well. Next, Hedge can add that step to his running-order list, delete its entire column from the table— thus removing all the times it was a dependency–– and loop back to the start. Because there are no circular references in the graph, each time we get here there’ll be at least one step with no remaining dependencies. Hedge can add the alphabetically earliest to his running-order list, remove it from the table, and loop back to the start again. So now we have a working loop, and it’ll run through all the elements in our table until none are left. Hedge drifts back and forth over the schematics, and soon he starts spitting out instructions, which Ethic uses to configure the assembly lines. With the three working together, they churn out thousands of doses of the cure in no time. Ethic finally plucks the Node of Memory from its holding field and trips the alarm. Within seconds bots are everywhere. As Ethic falls in shock, the Node restores not only her own memories, but reveals the last, missing pieces of the puzzle. Ethic built Hedge with a singular purpose: to construct a maze that would protect the world machine from a corrupt government. But in her haste, she made a critical mistake. She forgot to set the condition that would end the loop which told Hedge how large the maze should be. So Hedge built and built until he could build no longer. And then he was conflicted. He had to build a maze. But he couldn’t build further without hurting people or flying over the Bradbarrier, both forbidden by his programming. So he wandered the land and searched for a solution, until he happened upon the Node of Power, the Node of Creation, and the Node of Memory. He recognized their true, collective power to grant self-awareness to those who lack it. With all three he’d be able to change his programming and fulfill his drive to transform the entire world into a giant maze. It wouldn’t be easy: the Nodes had safeguards to prevent robots from taking and using them. But if Hedge could find the right human and manipulate her with the promise of a heroic quest… well that would be a different story. A very different story.

**P874 2020-06-10 The Factory \_ Think Like A Coder, Ep 9**

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翻译人员: YUEYUAN DU在经历了一场艰难的追逐之后，艾西克(Ethic)，赫奇 (Hedge) 和他们的新盟友莱玛 (Lemma)发现他们在似巨穴的的控制室里。在这里最后一件工件—— 记忆节点——就悬浮在力场内， 为超级计算机供电。艾西克正要解除力场时， 莱玛阻止了她。她解释说，十年前， 她被指派了一项研究任务:用世界机器来创造出 能让每个人都开心的东西。在经过多次失败的尝试后， 莱玛发现了一种化合物，服用后会让人变得有动力、 快乐，富有创造力和爱心……简而言之，会成为最好的自己。研发成功后，迅速投入了生产。很快，整个国家的食物供应 都来自胡森堡，混合着这种化合物。第一年，像天堂一样好。第二年，就没那么好了，副作用开始显现： 记忆缺失，无精打采和自我陶醉。在第三年，政府瓦解了，让机器人在一个 自我维持的循环中来运行一切。事到如今，以至于莱玛无法扭转局面。人们开始变得依赖这种化合物，少数人奋力抵抗并试图去解决问题。莱玛花了十年找到了解药。这个工厂包含了 她制造解药所需的一切东西。但是当她们拿到记忆节点的瞬间，安全系统就会启动机器人， 她们就不得不离开。相反，如果她们先重新配置工厂 制造治疗药物，人们就可以得救了。莱玛已经计划好了 整个工厂的设计图。问题是……它有点难读。她的示意图显示了 生产过程中的所有步骤来制造解药。一个从 “添加硝酸” 到 "剧烈摇动" 的箭头，意味着硝酸需要在摇晃之前加入。如果一个步骤的顺序乱了，解药就不会起作用，甚至更糟。没有任何循环引用， 步骤 A 对应步骤 B ，和步骤 B 最终需要对应步骤 A 。这是艾西克和赫奇进来的地方，莱玛需要赫奇把这个复杂的图表转变为一系列的步骤。这就是工厂里工序的顺序。一旦输入中央计算机，工厂将会根据指示自我重新组装。赫奇在表中储存信息的能力 将在这里有所帮助。那么艾西克如何指导 赫奇完成正确的顺序才可以重新配置工厂呢？【现在请停下来自己想想。】【规则将在 3 秒后显示】【2 秒】【1 秒】【提示将在 3 秒后显示】【2 秒】【1 秒】首先，从人类的角度考虑 可能会有所帮助，而不是机器的角度。根据这个图表， 很清楚由 “借碗” 开始，这是因为没有箭头指向它。那么如何标记图表 弄清楚接下来做什么？【现在请停下来自己想想。】【3 秒后答案揭晓】【2 秒后答案揭晓】【1 秒后答案揭晓】像莱玛所画的的图称为有向非循环图。图是显示不同元素数据的一种表示以及它们之间的关系。有向是指箭头所表示的方向。这里从 A 到 B ，但是 B 不到 A 。无环意味着这里没有任何的循环。这很幸运，因为如果是循环的， 这个问题就没有办法解决。有一个简单的方法把图当作人：从没有任何箭头指向的地方开始，一旦你这样做了，划掉这一步， 和所有从它开始的箭头。选择另一个没有箭头指向的步骤，然后重复，直到你完成了每一步。对于机器人来说， 这里有两件事很难解决。第一，如何跟踪这些信息？第二，如果同时有多个选择， 你会怎么做？对于第一个问题，机器存储信息的 一种简便方法是在表中。在这种情况下，你可以让赫奇 在脑海里列出每一步，同时包括行和列。然后他就可以每次通过一行。在示意图上，哪些点应该混合？同时摇晃和滴定。所以赫奇应该在两栏同时都做标记。他可以对每一行都做一样的操作， 一次一个来创建这样的表。当然，整个表会更大。就像人一样，赫奇也会从没有箭头指向的地方开始，这和行中没有标记是一样的。如果不止一个，一个方便的选择方法 是选择字母顺序最早的那个。虽然其他的选择方法 也能起到同样效果。接下来，赫奇可以将 这一步添加到他的运行顺序列表里，从表里删除整个列——这样就消除了所有依赖项，然后循环回到开始。因为图中没有循环引用，所以每一次到达这里时， 至少有一个步骤没有剩余的依赖项。赫奇可以把最早的字母顺序 加到他的运行顺序列表中，从表里删除，然后循环回到开始。所以现在我们有一个工作循环。并且它会经过表中的所有元素， 直到没有剩下。赫奇在原理图上来回漂移，很快他就会吐出指令，艾西克可以借此来配置装配线。随着三个工作的同时进行，他们很快生产出成千上万的治疗药物。艾西克最终从力场中摘除了记忆节点，并且同时触发了警报。一瞬间到处都是机器人。让艾西克震惊的是， 记忆节点不仅仅恢复了她的记忆。而且揭示了最后一块拼图的碎片。艾西克因为单一的目的创造了赫奇：制造一个迷宫来保护世界机器，来抵抗一个腐败的政府。但在匆忙之中， 她犯了一个严重的错误。她忘记设立一个条件来结束循环来告诉赫奇迷宫应该多大。所以赫奇建了又建， 直到他不能再建为止。然后他就矛盾了。他必须建造一个迷宫。但是他不能在不伤害 人类的情况下继续建造也不能飞过布拉德屏障。这些都被他的程序所禁止。所以他在这片土地上游荡 并寻找解决方法。直到他偶然发现了力量节点、 创造节点，以及记忆节点。他认识到了真正的集体力量。赋予那些缺乏自我意识的人以力量。有了这三样他就可以改变自己的程序完成把整个世界变成一个迷宫的壮举。这并不简单：这些节点有阻止机器人 取走和使用它们的保护措施。但是如果赫奇能够找到真正的人类，并且以英勇追求的承诺来瞒过她……那就另当别论了，就会是一个完全不同的故事。

**P875 2020-06-10 What yoga does to your body and brain - Krishna Sudhir**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=875)

At some point between the 1st and 5th century CE, the Hindu sage Patañjali began to codify the ancient, meditative traditions practiced throughout India. He recorded techniques nearly as old as Indian civilization itself in 196 manuals called the Yoga Sutras. These texts defined yoga as the ‘yoking’ or restraining of the mind from focusing on external objects in efforts to reach a state of pure consciousness. Over time, yoga came to incorporate physical elements from gymnastics and wrestling. Today, there are a multitude of approaches to modern yoga— though most still maintain the three core elements of Patañjali’s practice: physical postures, breathing exercises, and spiritual contemplation. This blend of physical and mental exercise is widely believed to have a unique set of health advantages. Such as improving strength and flexibility, boosting heart and lung function, and enhancing psychological well-being. But what have contemporary studies shown regarding the benefits of this ancient tradition? Despite attempts by many researchers, it's tough to make specific claims about yoga's advantages. Its unique combination of activities makes it difficult to determine which component is producing a specific health benefit. Additionally, yoga studies are often made up of small sample sizes that lack diversity, and the heavy reliance on self-reporting makes results subjective. However, there are some health benefits that have more robust scientific support than others. Let’s start with flexibility and strength. Twisting your body into yoga’s physical postures stretches multiple muscle groups. In the short term, stretching can change the water content of these muscles, ligaments, and tendons to make them more elastic. Over time, regular stretching stimulates stem cells which then differentiate into new muscle tissue and other cells that generate elastic collagen. Frequent stretching also reduces the body’s natural reflex to constrict muscles, improving your pain tolerance for feats of flexibility. Researchers haven’t found that any one form of yoga improves flexibility more than another, so the impact of specific postures is unclear. But like other low-impact exercises, yoga reliably improves fitness and flexibility in healthy populations. The practice has also been shown to be a potentially powerful therapeutic tool. In studies involving patients with a variety of musculo-skeletal disorders, yoga was more helpful at reducing pain and improving mobility than other forms of low-impact exercise. Adding yoga to an existing exercise routine can improve strength and flexibility for hard to treat conditions like chronic lower back pain, rheumatoid arthritis, and osteoporosis. Yoga’s mix of physical exercise and regimented breathing has proven similarly therapeutic for lung health. Lung diseases like chronic bronchitis, emphysema, and asthma shrink the passageways that carry oxygen, while weakening the membrane that brings oxygen into the blood. But breathing exercises like those found in yoga relax the muscles constricting those passageways and improve oxygen diffusion. Increasing the blood’s oxygen content is especially helpful for those with weak heart muscles who have difficulty pumping enough oxygen throughout the body. And for those with healthy hearts, this practice can lower blood pressure and reduce risk factors for cardiovascular disease. Yoga’s most widely celebrated benefit may be the most difficult to prove: its psychological effects. Despite the longstanding association between yoga and psychological wellbeing, there’s little conclusive evidence on how the practice affects mental health. One of the biggest claims is that yoga improves symptoms of depression and anxiety disorders. Since diagnosis of these conditions varies widely as do their origin and severity, it’s difficult to quantify yoga’s impact. However, there is evidence to suggest that yoga can help reduce the symptoms of stress, as well as meditation or relaxation. Research on the effects of yoga is still evolving. In the future, we’ll need larger studies, incorporating diverse participants, which can measure yoga’s impact on heart attacks, cancer rates, cognitive function and more. But for now, yoga can continue its ancient tradition as a way to exercise, reflect, and relax.

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翻译人员: Zizhuo Liang在公元一世纪和五世纪间，印度智者帕坦伽利 （Patañjali）开始整理编纂在整个印度施行的 古老的冥想传统做法。他在 196 颂的著作《瑜伽经》中记录了几乎与印度文明 一样古老的技术。这些经文将瑜伽定义为 “控制”，或是限制大脑对外部事物的关注，以达到一种纯粹的意识状态。随着时间的推移，瑜伽融入了源于体操和摔跤的体育元素。如今，现代瑜伽 有很多种不同的练习方式，然而，大多数仍保留了帕坦伽利所提出的的三个核心要素：身体姿势，呼吸练习， 和精神冥思。很多人认为这种身心结合的练习有着独特的健康效益。比如提高机体的力量和柔韧性，增强心肺功能，和改善心理健康。但是对于这项古老的传统所带来的益处，当代研究到底为我们展现了什么呢？尽管很多科学家都尝试过，但仍然很难明确瑜伽的优点。瑜伽将不同动作做了独特组合，因此，判断哪方面 让健康获益变得颇有难度。此外，瑜伽方面的研究 通常由缺乏多样性的小样本组成，以及过于依赖参与者主观感受 都使研究结果缺乏客观性。然而，有些瑜伽对身体的好处 和其他可能带来的好处相比有着更有力的科学依据作为支持。让我们从柔韧性和力量说起。将你的身体扭转成瑜伽的姿势可以拉伸多个肌肉群拉伸在短期内可以改变被拉伸的 肌肉，韧带，以及肌腱中的含水量，让它们变得更有弹性。一段时间后， 定期拉伸会刺激干细胞，使其分化形成新的肌肉组织和其他的会生成弹性胶原纤维的细胞。频繁拉伸也会减少 人体肌肉收缩的自然反射，从而提高你对疼痛的耐受力 并以此获得更好的柔韧性。研究人员还没有发现 有某种瑜伽形式比其他的瑜伽形式可以更好的提高身体的柔韧性，因此具体瑜伽姿势 对柔韧性的影响还不明确。但是像其他低强度的运动一样，瑜伽能以可靠的方式提高 健康人的身体素质和柔韧性。瑜伽练习也被证实 有可能成为强大的治疗工具，在针对各种骨骼肌肉疾病患者的研究中，与其他低强度运动相比，瑜伽在减轻疼痛 和增强运动能力方面更胜一筹。将瑜伽加入日常锻炼计划中可以增强机体力量和柔韧性，从而帮助人们应对慢性腰痛，类风湿性关节炎， 以及骨质疏松等难以治愈的疾病。瑜伽中体育锻炼与 有规律呼吸的结合被证实对肺部健康 也有同样的保健作用。如慢性支气管炎， 肺气肿和哮喘等肺部疾病，会使气道缩紧， 也让肺泡薄变得脆弱。但是瑜伽中针对呼吸的锻炼，让本来使气道收缩的肌肉放松从而提高氧气的透过率。增加血液中氧气的含量，对那些心肌薄弱难以为身体 泵入足够氧气的人们特别有帮助。对于那些拥有健康心脏的人们来说，这项练习可以降低血压，以及降低使心血管疾病 发生的危险因素。瑜伽最广为人知的好处可能是最难被证实的：是它对心理的影响。尽管瑜伽和心理健康方面 有着长期的联系但是很少有确凿的证据证明瑜伽练习是 如何影响心理健康的。其中最大的一种说法是瑜伽可以改善由抑郁症和 焦虑症所引起的症状。由于这些病的诊断，起源， 和严重程度都有着很大的差异，因此，瑜伽对其的影响 是很难被量化的。然而，有证据表明 瑜伽可以帮助人们减轻压力，以及帮助人们冥想和放松。对于瑜伽的研究仍在继续，将来，我们需要更大规模的研究， 并纳入不同的参与者，来衡量瑜伽对于 心脏病，癌症发病率，以及认知功能等多方面的影响。但目前，瑜伽可以继续其古老的传统，作为一种供人们 锻炼、反思和放松的方式。

**P876 2020-06-11 Can steroids save your life - Anees Bahji**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=876)

Steroids: they’re infamous for their use in sports. But they’re also found in inhalers, creams to treat poison ivy and eczema, and shots to ease inflammation. The steroids in these medicines aren’t the same as the ones used to build muscle. In fact, they’re all based on yet another steroid— one our body produces naturally, and we can’t live without. Taking a step back, the reason there are so many different steroids is because the term refers to substances with a shared molecular structure, rather than shared effects on the body. Steroids can be naturally occurring or synthetic, but what all steroids have in common is a molecular structure that consists of a base of four rings made of 17 carbon atoms arranged in three hexagons and one pentagon. A molecule must contain this exact arrangement to be a steroid, though most also have side chains— additional atoms that can dramatically impact the molecule’s function. Steroids get their name from the fatty molecule cholesterol. In fact, our bodies make steroids out of cholesterol. That fatty cholesterol base means that steroids are able to cross fatty cell membranes and enter cells. Within the cell, they can directly influence gene expression and protein synthesis. This is different from many other types of signaling molecules, which can’t cross the cell membrane and have to create their effects from outside the cell, through more complicated pathways. So steroids can create their effects faster than those other molecules. Back to the steroids in anti-inflammatory medications: all of these are based on a naturally occurring steroid called cortisol. Cortisol is the body’s primary stress signal, and it has a huge range of functions. When we experience a stressor— anything from a fight with a friend, to spotting a bear, to an infection or low blood sugar— the brain reacts by sending a signal from the hypothalamus to the pituitary gland. The pituitary gland then sends a signal to the adrenal glands. The adrenal glands produce cortisol, and release some constantly. But when they receive the signal from the pituitary gland, they release a burst of cortisol, which spurs the body to generate more glucose for energy, decrease functions not immediately related to survival, like digestion, and can activate a fight-flight-or-freeze response. This is helpful in the short term, but can cause undesirable side effects like insomnia and lowered mood if they last too long. Cortisol also interacts with the immune system in complex ways— depending on the situation, it can increase or decrease certain immune functions. In the process of fighting infection, the immune system often creates inflammation. Cortisol suppresses the immune system’s ability to produce inflammation, which, again, can be useful in the short term. But too much cortisol can have negative impacts, like reducing the immune system’s ability to regenerate bone marrow and lymph nodes. To prevent levels from staying high for too long, cortisol suppresses the signal that causes the adrenal glands to release more cortisol. Medicinal corticosteroids channel cortisol’s effects on the immune system to fight allergic reactions, rashes, and asthma. All these things are forms of inflammation. There are many synthetic steroids that share the same basic mechanism: they enhance the body’s cortisol supply, which in turn shuts down the hyperactive immune responses that cause inflammation. These corticosteroids sneak into cells and can turn off the “fire alarm” by suppressing gene expression of inflammatory signals. The steroids in inhalers and creams impact only the affected organ— the skin, or the lungs. Intravenous or oral versions, used to treat chronic autoimmune conditions like lupus or inflammatory bowel disease, impact the whole body. With these conditions, the body’s immune system attacks its own cells, a process analogous to a constant asthma attack or rash. A constant low dose of steroids can help keep this renegade immune response under control— but because of the negative psychological and physiological effects of longterm exposure, higher doses are reserved for emergencies and flare-ups. While an asthma attack, poison ivy welts, and irritable bowel syndrome might seem totally unrelated, they all have something in common: an immune response that’s doing more harm than good. And while corticosteroids won’t give you giant muscles, they can be the body’s best defense against itself.

**P876 2020-06-11 Can steroids save your life - Anees Bahji**

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翻译人员: Jiasi Hao 校对人员: Yolanda Zhang类固醇：这类物质在体育赛事中的 使用早已臭名昭著。但它们也常见于吸入器， 治疗藤毒和湿疹的药膏，以及缓解炎症的注射液中。这些药物中的类固醇 和用于促进肌肉生长的类固醇不同。实际上，它们都是基于 另一种类固醇物质——我们人体可以自然合成， 且维持生命所必需的类固醇。退一步说， 类固醇种类繁多的原因是类固醇这一专有名词 泛指具有共同分子结构，而非对人体造成相同影响的物质。类固醇可以天然存在 或是通过人工合成，但所有类固醇物质的共同特性 是它们的分子结构。这种分子结构由 4 个环 （共 17 个碳原子）组成：3 个六碳环和 1 个五碳环。一个分子必须具有这样精确的排列 才能被称作为固醇类物质，尽管大多数分子也含有侧链——这些额外的原子 可以极大改变分子的功能。类固醇的命名 源于脂肪分子胆固醇。实际上，我们人体 会从胆固醇中生成类固醇。脂肪胆固醇基底能够 让类固醇物质穿过脂肪细胞膜并进入细胞。在细胞内， 它们可以直接影响基因表达和蛋白合成。这和许多其它的信号分子不同，因为后者无法穿过细胞膜，只能通过更加复杂的方式在细胞外产生作用。所以相比其它分子， 类固醇可以更快的产生作用。说回消炎药中的类固醇：这类类固醇都是基于一种 天然存在的类固醇，即皮质醇。皮质醇是人体的主要压力信号，并且具有很多功能。每当我们经历一种应激源——比如和朋友的一场争执， 突然发现一头熊，感染或低血糖——大脑就会通过下丘脑向脑垂体 发出信号来做出反应，随后，脑垂体向肾上腺发送信号，最终肾上腺产生皮质醇， 并不断进行释放。但是当肾上腺 从脑垂体接收到信号时，它们所释放的大量皮质醇会刺激人体产生 更多的葡萄糖作为能量来源，降低与生存没有直接关系的 功能运作，比如消化，并且能激活人体的 “战斗、逃跑或原地不动”反应机制。这在短期内很有帮助， 但如果持续时间太长，将可能导致一些副作用， 诸如失眠症和情绪低落。皮质醇同样也和免疫系统 有着复杂的相互作用——根据实际情况，皮质醇可以加强或降低 一定的免疫功能。在人体抵抗感染的过程中，免疫系统通常会产生炎症。皮质醇能够抑制 免疫系统产生炎症的能力，但同样仅在短期内有效。过多的皮质醇对人体 具有负面影响，例如降低免疫系统 再生骨髓和淋巴结的能力。为了防止皮质醇的含量 长时间处于过高水平，皮质醇会抑制引起肾上腺释放 更多皮质醇的信号。药用皮质类固醇可通过引导 皮质醇对免疫系用的作用来对抗过敏反应、 皮疹和哮喘。所有这些都是 炎症的不同表现形式。很多合成类固醇 也有着相同的基础作用机理：它们促进人体的皮质醇供应，进而阻止了引发炎症的过度免疫反应。这些皮质类固醇潜入细胞中， 通过抑制炎症信号的基因表达来关闭细胞的“警报”。吸入器和药膏中的类固醇 仅影响着一个器官——皮肤或是肺部。常用于治疗慢性自身免疫性疾病 （例如狼疮或炎症性肠病）的静脉注射或口服形式的类固醇 则能对全身造成影响。在患有此类疾病的情况下， 人体免疫系统会攻击自身细胞，这是一个类似于哮喘频繁发作 或皮疹不断复发的过程。恒定低剂量的类固醇能有助于控制 上述叛逆的免疫反应——但对于因长期暴露于 高剂量所产生的负面身心影响，较高剂量的类固醇通常 只被用于应对紧急和突发事件。尽管哮喘发作、藤毒红肿， 以及肠易激综合症可能看似毫不相关， 但它们实际有着共性：都是一种弊大于利的免疫反应。虽然皮质类固醇 无法赐予你健硕的肌肉，但它们却是人体 抵抗自身伤害的最佳防御工具。

**P877 2020-06-12 Prohibition - Banning alcohol was a bad idea... - Rod Phillips**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=877)

On January 17, 1920, six armed men robbed a Chicago freight train. But it wasn’t money they were after. Less than one hour after spirits had become illegal throughout the United States, the robbers made off with thousands of dollars worth of whiskey. It was a first taste of the unintended consequences of Prohibition. The nationwide ban on the production and sale of alcohol in the United States came on the heels of a similar ban in Russia that started as a wartime measure during World War I. But the view in the Western world of alcohol as a primary cause of social ills was much older. It first gained traction during the Industrial Revolution as new populations of workers poured into cities and men gathered in saloons to drink. By the 19th century, anti-drinking groups called temperance movements began to appear in the United States and parts of Europe. Temperance groups believed that alcohol was the fundamental driver behind problems like poverty and domestic violence, and set out to convince governments of this. While some simply advocated moderate drinking, many believed alcohol should be banned entirely. These movements drew support from broad sectors of society. Women’s organizations were active participants from the beginning, arguing that alcohol made men neglect their families and abuse their wives. Religious authorities, especially Protestants, denounced alcohol as leading to temptation and sin. Progressive labor activists believed alcohol consumption harmed workers’ ability to organize. Governments weren’t strangers to the idea of prohibition, either. In the United States and Canada, white settlers introduced hard liquors like rum to Native communities, then blamed alcohol for disrupting these communities— though there were many other destructive aspects of their interactions. The American and Canadian governments banned the sale of alcohol to Native populations and on reservation land. American temperance movements gained their first victories at the state and local levels, with Maine and several other states banning the sale and production of liquor in the 1850s. In 1919 the 18th Amendment to the US Constitution banned the manufacture, sale, and transportation of all alcoholic beverages. The amendment took effect a year later under the Volstead Act. Since the act did not ban personal consumption, wealthy people took the opportunity to stock up while restaurants and bars rushed to sell their remaining supply. Workers lost their jobs as distilleries, breweries, and wineries closed down. Meanwhile, organized crime groups rushed to meet the demand for alcohol, establishing a lucrative black market in producing, smuggling, and selling illicit liquor. Often they worked side-by side with corrupt policemen and government officials, even bombing the 1928 primary election for Illinois state attorney in support of a particular political faction. Tens of thousands of illegal bars, known as "speakeasies," began serving alcohol. They ranged from dingy basement bars to elaborate dance-halls. People could also make alcohol at home for their own consumption, or obtain it legally with a doctor’s prescription or for religious purposes. To prevent industrial alcohol from being consumed, the government required manufacturers to add harmful chemicals, leading to thousands of poisoning deaths. We don’t know exactly how much people were drinking during Prohibition because illegal alcohol wasn’t regulated or taxed. But by the late 1920s, it was clear that Prohibition had not brought the social improvements it had promised. Instead it contributed to political corruption and organized crime and was flouted by millions of citizens. At one raid on an Detroit beer hall, the local sheriff, mayor and a congressman were arrested for drinking. With the start of the Great Depression in 1929, the government sorely needed the tax revenue from alcohol sales, and believed that lifting Prohibition would stimulate the economy. In 1933, Congress passed the 21st Amendment repealing the 18th— the only amendment to be fully repealed. Members of the temperance movements believed that alcohol was the root of society’s problems, but the reality is more complicated. And while banning it completely didn’t work, the health and social impacts of alcohol remain concerns today.

**P877 2020-06-12 Prohibition - Banning alcohol was a bad idea... - Rod Phillips**

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翻译人员: Yanyan Hong 校对人员: Anqi Zhao1920 年 1 月 17 日，六个全副武装的男性 抢劫了一辆芝加哥的货运火车，他们的目标却不是为了钱。当烈酒在美国全境被禁的一小时之内，价值数千美金的威士忌被劫走。这是禁酒令颁布后带来的 第一个出人意料的后果。这个在美国全境 禁绝酒精生产和销售的决定可以追溯到一战期间，作为战时措施， 苏联颁布过的一个类似的禁令。但在西方世界里，酒精早已被视为社会弊病的源头。这种论调在第一次工业革命期间 开始日渐风靡。当时成群的劳工涌进城市，聚众饮酒。到了 19 世纪，反饮酒组织的 “禁酒运动”（temperance movements）开始在美国和欧洲部分地区萌芽。禁酒组织相信酒精是贫穷、家庭暴力等问题的元凶，并致力于向政府传达这一信息。尽管一部分人倡导适量饮酒，但多数人深信酒精应该被彻底禁止。这些运动受到社会各界领袖 广泛的支持和资助。女性组织从一开始 就活跃地参与其中，声称酒精让男人 无视家庭并虐待配偶。宗教领袖，特别是基督新教教徒，还曾公开发声，认定酒精 是诱惑和罪恶之源。进步劳工活动家相信饮酒有损工人的组织能力。政府对这种禁令同样不陌生。在美国和加拿大， 白人殖民者为当地原住民引进了朗姆酒等烈酒，然后将这些社区 受到的破坏归罪于酒精——尽管这些毁灭性打击 是由殖民者的其他行为造成的。美国和加拿大政府 禁止了向美国原住民、以及在原住民保留地内卖酒的行为。美国禁酒运动在各州政府与各个社区内初战告捷：缅因州等其他几个州 在 19 世纪 50 年代禁止了酒精的生产与销售。1919 年，美国第 18 次宪法修正案禁止了对所有酒类饮品的生产、销售，以及运输。一年后，修正案的沃尔斯泰德法 （Volstead Act 又称 “禁酒法” ）生效。由于法令并没有禁止个人饮酒，一些富人趁此机会大量买入饭店和酒吧急于出售的存酒。劳工们随着烈酒场，啤酒厂 和红酒厂的倒闭而纷纷失业。同时，有组织的犯罪激增， 以满足人们对酒精的需求，生产、走私、贩卖非法酒精以获取暴利的黑市渐渐成型。他们常常与腐败的警察以及政府官员合作，甚至出于对某政治派系的支持，用炸弹袭击了1928 年 伊利诺伊州首席检察官的选举活动。成千上万的非法酒馆， 俗称 ”speakeasies“,开始卖酒。他们存在于狭窄的地下室， 也出现在装饰考究的舞蹈大厅。人们还会在家自己酿酒饮用，也能凭医生处方 或出于宗教原因而合法获取。为了防止人们饮用工业酒精，政府要求制造商在酒精中 添加有害的化学物质，由此被毒死的人数以千计。我们无法获取人们在禁酒期间 饮酒量的具体数据，因为非法酒精交易 无人监督，也无需上税。但到了 20 世纪 20 年代末，显而易见的是，禁酒运动并没有带来预想中的社会进步。恰恰相反，它变成了腐败政客 以及犯罪组织的温床，并遭到几百万群众的漠视。在一次底特律啤酒馆的突击检查中，当地警长、市长， 还有一位国会议员因饮酒被捕。1929 年大萧条开始后，政府急需酒精交易带来的税收，相信取消禁酒令会有刺激经济的作用。1933 年，国会通过了第二十一条修正案， 同时废除了第十八条修正案——这是唯一一个 被彻底否决的宪法修正案。禁酒运动的倡导者曾经相信酒精是社会问题的根源所在，但现实比那复杂得多。彻底禁绝酒类 并未取得预期的效果，饮酒对健康以及社会的影响 直至今天仍在继续。

**P878 2020-06-15 Can you solve the Ragnarok riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=878)

Ragnarok. The fabled end of the world, when giants, monsters, and Norse gods battle for the future. The gods were winning handily until the great serpent Jörmungandr emerged. It swallowed Valhalla, contorted itself across the land, and then merged into one continuous body with no head and no tail. As it begins to digest Valhalla, an exhausted Odin explains that he has just enough power to strike the creature with one final bolt of lightning. If you magnify his blast with your fabled hammer, Mjölnir, it should pierce the massive serpent. You’ll run with super-speed along the serpent’s body. When you hold your hammer high, Odin will strike it with lightning and split Jörmungandr open at that point. Then, you’ll need to continue running along its body until every part of it is destroyed. You can’t run over the same section twice or you’ll fall into the already blasted part of the snake. But you can make multiple passes through points where the creature intersects its own body. If you leave any portion un-zapped, Jörmungandr will magically regenerate, Odin’s last power will be spent, and Valhalla will fall forever. What path can you take to destroy the serpent? Pause now to figure it out yourself! Answer in 3 2 1 One powerful way to solve problems is to simplify. And in this case, we can focus our attention on the two things that are important for our path: intersections and the stretches of snake between them. Or, as they’re referred to in graph theory, nodes and edges. The edges are important because they’re what we need to travel. And the nodes matter because they connect the edges, and are where we may need to make choices as we run from edge to edge. This simplification into nodes and edges leaves us with a ubiquitous and important mathematical object known as a graph, or network. We just need to figure out how to travel what mathematicians call an Eulerian path, which traces every edge exactly once. Instead of looking at the path as a whole, let’s zoom in on a single node. During some moment in your run, you’ll enter that node, and then exit it. That takes care of two edges. If you enter again, you’ll need to exit again too, which requires another pair of edges. So every point along your path will have edges that come in pairs. One edge in each pair will function as entrance; the other as exit. And that means that the number of edges coming out of every node must be even. There are just two exceptions: the start and end points, where you can exit without entering, or vice versa. If we look at the network formed by the serpent again, and number how many edges emerge from each node, a pattern jumps out that fits what we just saw. Every node has an even number of edges emerging from it, except two. So one of these must be the start of your route, and the other the end. Interestingly enough, any connected network that has exactly 2 nodes with an odd number of edges will also contain an Eulerian path. The same is true if there are no nodes with an odd number of edges— in that case the path starts and ends in the same spot. So knowing that, let’s return to our full graph. We can begin by taking care of this edge here. Now we can zig-zag back and forth across the whole snake until we reach the end. And that's just one solution— it helps to be systematic, but you’re likely to happen upon many others once you know where to begin and end your run. You hold your hammer high at the opportune moment, and Odin sends the world-saving surge of lightning at you. Then you run like you’ve never run before. If you can pull this off, surely nothing could stop the might of the Norse Gods. And if something like that were out there, slouching its way towards you… well, that would be a story for another day.

**P878 2020-06-15 Can you solve the Ragnarok riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=878)

翻译人员: Wanting Zhong 校对人员: Yanyan Hong诸神黄昏（Ragnarok）。 传说中的世界末日。巨人、怪物和北欧诸神 为了未来而战。众神胜券在握，直到巨蛇 耶梦加得（Jörmungandr）现身。它吞掉了英灵神殿瓦尔哈拉（Valhalla）， 用身体盘绕着大地，化为了一具连绵不绝、 无头无尾的躯体。当巨蛇开始消化瓦尔哈拉时，筋疲力竭的众神之王 奥丁（Odin）解释说，他只剩下朝那怪物 击出最后一道闪电的力气了。如果用你举世闻名的雷神之锤 （Mjölnir）将他的闪电攻击增倍，应该就足以贯穿巨蟒的身体。你可以用超人的速度沿着蛇身疾驰。当你高高举起锤子时， 奥丁就会朝它掷出闪电，将耶梦加得从那一处劈开。然后，你要继续沿着巨蛇的身体奔跑，直到将它的每一寸都摧毁。你不能重复踏过同一段区域，否则你会掉入巨蛇 已经劈裂的身体中。但你可以反复经过巨蛇自身相互交错的节点。如果漏过任何一处未加电灼， 耶梦加得就会藉由魔力重生，奥丁将耗尽最后的力量， 瓦尔哈拉也将堕入永恒的黑暗。你该选择怎样的路径 才能彻底摧毁巨蛇呢？暂停视频，试着解答吧！答案将在 3 秒后公布2 秒1 秒要解决问题， 一种有效方法是进行简化。在这个问题中， 我们可以着重关注对于要寻找的路径相当重要的两点：交叉点，以及交点之间的 “蛇身” 。在图论中，它们分别被称作 “节点（node）” 和 “边（edge）” 。边很重要，因为我们要走的就是边。而顶点也不可小觑， 因为边与边是通过节点相连的，而且当我们决定要跑向哪一条边时， 我们需要在节点处做出决定。将问题简化成节点与边， 我们就得到了一个无处不在的重要的 数学对象，叫做 “图（graph）”，或者 “网（network）”。我们只需要找出一条数学家所说的 “欧拉路径（Eulerian path）”，将每条边恰好走一次 （即一笔画问题）。我们先不去看整体的路径， 而是放大到一个节点上。在你奔跑途中的某一刻， 你会进入这个节点，然后离开。这就让你经过了两条边。如果你再次进入这个节点， 你也必须再离开一次，这就需要经过另一对边。因此，你的路径中的每一个点 都会有成对的边。每对中的一条边是“入点”， 另一条边则是“出点”。这也意味着从每个节点 出来的边数必须是偶数。只有两个例外：起点和终点，你可以只离开不进入， 也可以只进入不离开。如果我们再看看由巨蛇形成的网，并数数从每个节点发出了多少条边，一个与刚刚所见 相符的图案便跃然而出。除了两个节点，其它每个节点 所连接的边数都是偶数，这两个例外中的一个肯定是起点， 另一个肯定是终点。有意思的是，任何一个连通图 如果恰好有两个节点具有奇数条边，那么这个连通图肯定可以被一笔画。如果图中没有节点连接了奇数条边， 这个图同样能被一笔画——这种情况下，欧拉路径 将在同一个点开始并结束。知道这些之后，让我们回到完整的图。我们可以先途经这条边，然后就可以按 “之” 字形 来回绕完整条蛇，直到抵达终点。这只是一种解法—— 保持条理性会让一笔画更容易，但只要知道了路径的起点和终点，你或许能发现许多条可行的路径。你抓准时机，将锤子高高举起，奥丁便将拯救世界的 一道闪电朝你掷来。然后你就拼了老命地撒腿狂奔，如果你能成功，想必再无他物 能阻止北欧众神的威势。而假如还有像那样的家伙 慢悠悠地拖着步子朝你走来……嗯，那就是后话了。

**P879 2020-06-18 A day in the life of a teenage samurai - Constantine N. Vaporis**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=879)

It’s just after sunrise, and 16-year-old Mori Banshirô is already hard at work practicing drills with his long sword. Banshirô is an ambitious samurai in training, and today he must impress his teachers more than ever. Today he’ll make his request to travel to the capital city of Edo for a year of martial and scholarly studies, and he needs their support, along with his father’s. The year is 1800 in the castle town of Kôchi, capital of the Tosa domain in Japan. The daimyo rules the domain, and about 1,500 samurai retainers serve him. For 200 years, Japan has been at peace, and the samurai, once primarily warriors, now play a much wider range of roles— they are also government officials, scholars, teachers, and even masters of the tea ceremony or artists. To prepare for these diverse responsibilities, young samurai like Banshirô study the “twin paths” of literary learning and the martial arts. At 15, he went through the rites of adulthood and received the daishô— a pair of swords. The long sword is for training and combat, while the short sword has a sole, solemn purpose— to commit ritual suicide, or seppuku, if he dishonors himself, his family, or the daimyo. Banshirô idolizes the legendary samurai Miyamoto Musashi, a renowned swordsman who lived 150 years earlier. But Banshirô doesn’t admire his swordsmanship alone. Miyamoto Musashi was also a master calligrapher and painter. That’s the real reason Banshirô wants to go to Edo— he secretly wants to be a painter, too. After finishing his practice at home, he bids his father goodbye and walks to school. His father is preparing to accompany the daimyo to the capital. The Tokugawa shogun, head of the Japanese military government, requires all the regional rulers to alternate years between their castle town in the home domain and the capital city. The costly treks back and forth keep the daimyo subordinate and prevent them from building up their own military forces to challenge the shogunate. The daimyo’s wife and children live in the capital full time, where they serve as hostages to ensure his loyalty. But the practice doesn’t just affect the daimyo— it determines much of the rhythm of life in Japan. Samurai must accompany the daimyo to Edo. This year it’s Banshirô’s father’s turn to go, and Banshirô is desperate to go with him; but given that he’s still in training, he’ll need permission from both his father and the domain. At school, Banshirô’s first lesson is in swordfighting. Under his teacher’s stern eye, he pairs up with his classmates and goes through the routines he’s been practicing. At the end of the lesson, he reminds the instructor of his request to go to Edo. The instructor cracks his first smile of the day, and Banshirô feels confident he will gain his support. Next, Banshirô practices archery, horsemanship, and swimming before his academic courses in the afternoon. Courses cover Confucian philosophy, morality, and history. When the instructor calls on him, he has the response on the tip of his tongue, ensuring another supporter for his campaign. By the end of the day, Banshirô feels confident that his formal request will be approved, but the greatest challenge is still ahead of him: convincing his father. His father believes the martial arts are more important than the literary arts, so Banshirô doesn’t mention his artistic ambitions. Instead, he talks about renowned sword instructors he can train with, and teaching certifications he can earn to improve his professional prospects back in Kôchi. Then, he makes his final, strongest argument: if he goes this time and succeeds, his father can retire and send him instead in the future. It’s this last point that finally sells him— Banshirô’s father agrees to take him on his tour of duty. In the bustle of the capital city, Banshirô will finally have the opportunity to pursue his secret ambition to become a painter.

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翻译人员: Ethan Huang 校对人员: Wanting Zhong太阳才刚升起， 16 岁的森伴四郎（Mori Banshirô）就已经在用武士刀 刻苦地练习招式了。伴四郎是一名雄心勃勃的见习武士，今天他必须给老师们 留下前所未有的出色印象。因为今天他将会请求前往首府江户，进行为期一年的武术和文化修行，而他需要老师们以及父亲的支持。这一年是 1800 年， 地点是高知城，日本土佐藩的藩厅（首府）。藩地由大名（诸侯）管辖， 其手下有约 1500 名武士家臣效力。日本已维持了 200 年的和平，曾经以征战沙场为生的武士， 如今则扮演了更加广泛的角色——他们也担任幕府官员、学者、教师，甚至是茶道大师或是艺术家。为了履行这些不同的职责，像伴四郎这样的年轻武士 会进行 “文武两道” 的修行，不仅要修炼武学，也要研习文艺。在 15 岁时，他行过元服之礼， 获赠了被称作 “大小” 的——一对佩刀。长刀用于训练与战斗，短刀则有着唯一的庄严目的——如果他使自己、家人或大名蒙羞的话，就要用短刀切腹自尽。伴四郎十分崇拜 活跃于 150 年前的著名剑术家，传奇武士宫本武藏 （Miyamoto Musashi）。令伴四郎钦佩的不止是他的剑法。宫本武藏同时也是 一名书法和绘画大师。这也是伴四郎 想前往江户的真正原因——他暗中也想成为一名画家。在结束了家中的锻炼后， 他向父亲道别，走去了学校。他的父亲正在为陪同大名 前往首府做准备。日本武家政府的 最高领导者徳川将军要求所有地区的领主 轮流往返领地与首府执行政务，进行 “参勤交代”。成本高昂的来回跋涉 能使大名保持服从，并阻止他们累积军事力量对幕府进行谋反。大名的妻子和孩子 会在江户长期居住，作为幕府的人质， 确保大名的忠诚。但是这样的制度 不仅会影响到大名——也决定了日本多数人的生活节奏。武士必须跟随大名前往江户。这一年轮到伴四郎的父亲陪同参勤，伴四郎渴望与他同行；但是鉴于他仍在见习，他需要得到父亲和领地双方的许可。在学校，伴四郎的第一堂课是剑术。在老师严厉的目光下， 他与同学们结对演练他一直在练习的整套招式。课程结束时，他再次向导师 提起了前往江户的请求。导师当天首次展颜微笑，伴四郎相信自己将得到他的支持。接下来，在他下午的学术课程之前，伴四郎还练习了 射箭、骑马以及游泳。下午的学术课程包括 儒家哲学、伦理和历史。当导师点到他时， 他早已酝酿好了答案，这为他的旅程赢得了另一位支持者。一日将尽，伴四郎很自信 自己的正式申请会得到批准，但最大的挑战仍在前方：说服他的父亲。他父亲认为武道比文道更加重要，因此伴四郎没有提及他的艺术追求，而是谈到了自己 能有机会师从知名的剑术家，还可以考取教学资格证书， 让他返回高知时有更好的职业前景。然后，他提出了 最后也是最有力的论点：如果他这次同去且万事顺利， 父亲就可以退休，未来能派遣他跟随大名参勤。正是最后这一点说服了他父亲。伴四郎的父亲同意 在勤务之旅中带上伴四郎。在首府的喧嚣中， 伴四郎终于能有机会去追求他心底想成为画家的理想。

**P880 2020-06-18 The tale of the boy who tricked the Devil - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=880)

In the sun-dappled streets of a small town, a proud mother showed off her newborn son. Upon noticing his lucky birthmark, townsfolk predicted he would marry a princess. But soon, these rumors reached the ears of the wicked king. Enraged, the king stole the child away, and sent him hurtling down the river. But the infant’s luck proved greater than the king’s plan. Years later, the king was traveling his realm, when he spotted a strapping young man with an uncanny birthmark. After confirming the child’s origins, the sly king entrusted the boy with a letter for the queen. The youth eagerly set out to deliver the message— not knowing he was carrying his own death sentence. That night, roaming bandits stumbled upon his camp. Yet when they read the brutal letter, they were filled with pity. Deciding to make trouble for the king instead, they scribbled a new note. As soon as the youth arrived at the palace, he locked eyes with the princess. The two felt destined for each other. And when the queen read that the king approved this union, she joyfully organized a whirlwind wedding. When the king returned, he was furious. But he couldn’t execute his daughter’s beloved without reason. So he devised a diabolical trial. He ordered the youth to travel to Hell itself, and return with three golden hairs freshly plucked from the Devil’s head. Only upon succeeding could he return to his bride. The youth searched across the land for the entrance to Hell, until he finally reached an eerie village. Here, he saw some villagers gathered around a well. They closed in on the youth, refusing to let him pass until he answered their question: why was the well dry? The youth replied, “I will answer when I return.” They directed him further into town, where he came across another set of villagers contemplating a gnarled tree. They refused to let him pass until he answered their question: why was the tree barren? Again, the youth responded, “I will answer when I return." These villagers guided him to the dock, where an elderly ferryman awaited. As he paddled through the black water, the ferryman rasped a third question: how can I escape my interminable task? Once more, the youth promised, “I will answer when I return.” At last, they reached a hut sinking into the swampy banks of Hell. Reluctantly, the youth knocked on the rotting door. The devil’s grandmother answered his call. She was known to help some visiting souls, and harm others. The youth had just finished his story when they heard the devil’s footsteps. Without warning, the boy’s world appeared to shrink. The devil’s grandmother lifted him into the folds of her sleeve, and welcomed her grandson. The old woman set to work, lavishing the devil with food and drink. When he fell asleep, she deftly plucked three gleaming hairs from his head. With each plucked hair, the Devil briefly awoke and complained about his dreams, full of nearby villagers and their problems. The next morning, the youth departed— armed with three golden hairs, and three pieces of information. He shared the devil’s first dream with the ferryman. If the boatman could hand his oars to a willing passenger, he would be free from his task. Back at the village, the youth declared that there was a mouse gnawing at the root of the tree, and an enormous toad blocking the well. The villagers rewarded him handsomely for his help. Back from his journey, the youth thrust the devil’s hairs at the king— but his greedy father-in-law only had eyes for the gold. The sly youth told the king that even greater wealth awaited him across the river. Immediately, the king hastened to the riverbank. Eager to claim his riches, he held out his hands impatiently to the grinning ferryman— who happily handed over his oars.

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翻译人员: Karen Xu 校对人员: Yolanda Zhang在一个日照斑驳的小镇街道上，一个骄傲的妈妈在炫耀 她刚出生的儿子。乡亲们注意到了他的幸运胎记，并预言他将来会迎娶一位公主。但是不久之后，这些谣言 传到了邪恶的国王耳朵里。他愤怒地把这个孩子偷走， 并让他顺着河流漂走了。但事实证明，这个婴儿的运气 比国王的计划更好。若干年后，国王在巡视他的领地时，见到了一位有着离奇胎记的 魁梧的年轻人。在确认了这个孩子的由来之后，狡猾的国王于是委托他 给皇后送一封信。小伙急着出发去送信，却并不知道他手中拿着的， 其实是自己的死刑书。那天晚上，游荡的土匪 偶然发现了他露宿的帐篷。但当他们读了那封残忍的信， 心中却突然充满了怜悯。他们决定给国王找点麻烦， 于是随即伪造了一张新的纸条。当小伙抵达王宫的时候，他的目光锁定在了公主身上。他们两人都觉得 对方是自己命中注定的另一半。当皇后读到国王允许 这一对的结合之后，她马上开心地组织了盛大的婚礼。当国王回来后，简直怒不可遏。但他不能无理由地处决女儿的挚爱。所以他设计了一个邪恶的计划。他命令小伙去地狱一趟，并且要拔下恶魔头上的 三根金头发带回来。只有成功了， 他才能回到他的新娘身边。小伙在大陆上寻遍了 进入地狱的入口，直到他终于到达了一个诡异的村庄。在这里，他看见一些村民 聚集在一口水井旁。他们把小伙拦住，不让他通过，直到回答出他们的问题： 为什么水井里没水？小伙回答道： “我会在回来时告诉你们。”于是他们指引他走进城里。小伙又遇到了另一些村民， 盯着一棵饱经风霜的树。他们不让他通过， 直到回答出他们的问题：为什么这棵树死气沉沉？小伙同样回答道， “我会在回来时告诉你们。”这些村民指引他到了码头， 那里等待着一个年老的摆渡人。在他划着桨度过这片黑水的时候， 摆渡人用刺耳的声音问出了第三个问题：我怎么才能逃出这无休无止的工作？再一次，小伙承诺道： “我会在回来时告诉你。”最后，他们到达了 一间陷入地狱沼泽的小屋。小伙不情愿地敲了敲腐烂的门。恶魔的奶奶来应门了。众所周知，她会帮助一些 前来拜访的灵魂，但也会伤害其他的。当他们听到恶魔的脚步声时， 小伙刚讲完他的故事。没有一点征兆，小伙的世界开始缩小。恶魔的奶奶把他提起， 放进她袖子的褶皱里，然后迎上了她的孙子。这个老妇人开始行动了， 她塞给恶魔一大堆吃的喝的。当他终于睡着时，她敏捷地 从他的脑袋上拔下了三根亮闪闪的头发。每拔一根头发，恶魔便短暂地醒来， 抱怨起他做的梦，都是关于附近的村民 和他们遇到的问题。第二天早晨，小伙怀揣着三根金头发和三条信息离开了。他和摆渡人分享了恶魔的第一个梦。如果他能把船桨递给一个 愿意接替他的乘客，那么他就能从工作中解脱了。回到村里，小伙宣称有一只老鼠在不断地咬树根，并且还有 一只巨大的癞蛤蟆堵住了水井。村民们慷慨地回报了他的帮助。在结束了他的旅程后， 小伙把恶魔的头发献给了国王——但他贪婪的岳父 却死死盯着村民赠予的金子。机智的小伙告诉他，在河对岸有更多的财富等着他。于是国王急忙去了河边。他迫切地想得到他的财富，于是不耐烦地把手伸向了 笑嘻嘻的摆渡人——而摆渡人则开心地把桨递给了他。

**P881 2020-06-24 The race to decode a mysterious language - Susan Lupack**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=881)

In the early 1900s on the island of Crete, British archaeologist Sir Arthur Evans uncovered nearly 3,000 tablets inscribed with strange symbols. He thought these symbols represented the language spoken by Europe’s oldest civilization. Their meaning would elude scholars for 50 years. Evans discovered these tablets amid the colorful frescoes and maze-like hallways of the palace of Knossos. He called the civilization Minoan— after the mythical Cretan ruler, King Minos. He thought the script, dubbed Linear B, represented the Minoan language, and scholars all over the world came up with their own theories. Was it the lost language of the Etruscans? Or perhaps it represented an early form of Basque? The mystery intensified because Evans guarded the tablets closely–– only 200 of the inscriptions were published during his lifetime–– but he couldn’t decipher the script. However, he did make two accurate observations: the tablets were administrative records, and the script was a syllabary, where each symbol represented both a consonant and a vowel, mixed with characters that each represented a whole word. Evans worked on Linear B for three decades before a scholar from Brooklyn, New York, named Alice Kober set out to solve the mystery. Kober was a professor of Classics at Brooklyn College when few women held such positions. To help in her quest, she taught herself many languages–– knowledge she knew she would need to decipher Linear B. For the next two decades, she analyzed the symbols. Working from the few available inscriptions, she recorded how often each symbol appeared. Then she recorded how frequently each symbol appeared next to another. She stored her findings on scrap paper in cigarette cartons because writing supplies were scarce during the Second World War. By analyzing these frequencies, she discovered that Linear B relied on word endings to give its sentences grammar. From this she began to build a chart of the relations between the signs, coming closer than anyone before to deciphering Linear B. But she died, probably of cancer, in 1950 at the age of 43. While Kober was analyzing the Knossos tablets, an architect named Michael Ventris was also working to crack Linear B. He had become obsessed with Linear B as a schoolboy after hearing Evans speak. He even worked on deciphering the script while serving in World War II. After the war, Ventris built on Kober’s grid using a newly published cache of Linear B inscriptions excavated from a different archeological site called Pylos, on mainland Greece. His real breakthrough came when he compared the tablets from Pylos with those from Knossos and saw that certain words appeared on tablets from one site but not the other. He wondered if those words represented the names of places specific to each location. He knew that over centuries, place names tend to remain constant, and decided to compare Linear B to an ancient syllabary from the island of Cyprus. The Cypriot script was used hundreds of years after Linear B, but some of the symbols were similar— he wondered if the sounds would be similar, too. When Ventris plugged some of the sounds of the Cypriot syllabary into the Linear B inscriptions, he came up with the word Knossos, the name of the city where Evans had discovered his tablets. In a domino effect, Ventris unraveled Linear B, with each word revealing more clearly that the language of Linear B was not Minoan, but Greek. Ventris died in a car crash four years later, at the age of 34. But his discovery rewrote a chapter of history. Evans had insisted that the Minoans conquered the mainland Greeks, and that was why examples of Linear B were found on the mainland. But the discovery that Linear B represented Greek, and not Minoan, showed that the opposite had happened: mainland Greeks invaded Crete and adopted the Minoan script for their own language. But the story isn’t over yet. The actual language of the Minoans, represented by another script called Linear A, has yet to be deciphered. It remains a mystery— at least for now.

**P881 2020-06-24 The race to decode a mysterious language - Susan Lupack**

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翻译人员: Lark Yu 校对人员: Wanting Zhong在 20 世纪初的克里特岛上，英国考古学家亚瑟·伊文斯爵士 （Arthur Evans）发现了将近 3000 块刻写着奇怪符号的泥板。他猜测这些符号代表着 欧洲最古老的文明所使用的语言。这些符号的含义让学者们 摸索了整整五十年。伊文斯是在克诺索斯宫殿 色彩绚丽的壁画和迷宫般的走廊中 发现这些泥板的。他把这个文明叫做米诺斯文明——这个名称出自神话中 克里特的统治者，米诺斯国王。他猜想这种被称作“线形文字 B”的文本 代表了米诺斯文明的语言，而全世界的学者则众说纷纭。这是伊特鲁里亚人失落的语言吗？还是巴斯克语的一种早期形态？由于伊文斯对那些泥板戒备森严， 这些文字愈发显得神秘莫测——在他生前，仅有两百块 刻字泥板公诸于众——而他却无法破解这种文字。不过，他的确做出了 两项准确的观察：这些泥板是行政记录； 文字是音节文字，其中的每个符号 都代表了一个辅音加元音，并融进了一些代表整词的字符。在伊文斯对线形文字 B 研究到第三十个年头时，一位来自纽约布鲁克林的学者，爱丽丝 · 科博（Alice Kober） 决心揭开这个未解之谜。科博是布鲁克林学院的古典学教授， 当时仅有极少数女性能位居这样的职位。为了她的理想追求， 她自学了很多门外语——她知道在破解线形文字 B 时 需要用到这些知识储备。在接下来的二十多年里， 她对那些符号进行了分析。她钻研了为数不多的铭文，记录了每个字符出现的频率，以及每对字符彼此相邻的频率。她把自己的发现记录在碎纸片上， 保存在香烟盒里，因为在二战期间， 书写用品非常稀缺。通过分析这些字符的出现频率，她发现线形文字 B 是通过单词词尾的变化来改变句子的语法。由此，她开始制作一份符号关系表，比之前的任何人都更接近 对线形文字 B 的破译。但她却在 1950 年 疑似死于癌症，享年 43 岁。在科博研究克诺索斯泥板的期间，一名叫迈克·文特里斯（Michael Ventris）的 建筑师也在试图破解线形文字 B。他在孩提时听过伊文斯的演讲， 由此对线形文字 B 产生了浓厚的兴趣。他甚至在二战服役期间 还在对铭文进行解读。战后，文特里斯进一步完善了 科博的字符关系表，他参照了新公布的 一批线形文字 B 铭文，这批泥板是在希腊大陆上的 另一处遗迹皮洛斯出土的。他在对比皮洛斯和 克诺索斯两地的泥板时取得了关键突破：他发现某些词只出现在 其中一处遗址的泥板上。他猜想那些词语是否代表了两个地点各自特有的地名。他知道，即使历经数个世纪， 地名也大多保持不变，于是他决定将线形文字 B和塞浦路斯岛上的 古代音节文字进行对比。塞浦路斯文字比线形文字 B 晚诞生了几百年，但其中一些字符比较相似——他猜想它们的发音是否也会相似。当文特里斯将塞浦路斯 音节文字的某些发音代入到线形文字 B 中时，他得到了“克诺索斯”这个词，也就是伊文斯发现泥板的 城市的名字。如多米诺骨牌一般，文特里斯 环环相扣地破译了线形文字 B，每个词都愈发清晰地表明 线形文字 B并不是米诺斯语，而是希腊语。文特里斯在四年后的 一场车祸中丧生，终年 34 岁。但他的发现重写了历史的篇章。伊文斯曾坚持认为， 米诺斯人征服了希腊大陆，因此才能在大陆上 发现线形文字 B 的范本。但线形文字 B 属于希腊语， 而非米诺斯语这一发现揭示了事实恰恰相反：大陆上的希腊人入侵了克里特岛， 并借用了米诺斯文字作为自己的语言。然而故事尚未结束。米诺斯人实际使用的语言——另一种叫做线形文字 A 的文本，还尚未被破解。它依然是未解之谜—— 至少到目前为止。

**P882 2020-06-25 The rise and fall of the Celtic warriors - Philip Freeman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=882)

One summer evening in 335 BCE, Alexander the Great was resting by the Danube River after a day of fighting the Scythian tribes when a band of strangers approached his camp. Alexander had never seen anything like these tall, fierce-looking warriors with huge golden neck rings and colorful cloaks— so he invited them to feast with him. They proudly said they were Keltoi or Celts who came from the far-away Alps. Alexander asked what they feared the most in the world, hoping they would say him. They laughed and said they feared nothing at all. This is one of the earliest stories about the ancient Celts. While we don’t know where the first Celts came from, by Alexander’s time they had spread across Europe from Asia Minor in the east to Spain and the Atlantic islands of Britain and Ireland in the west. The Celts were never one unified empire, and they didn’t build cities or monuments. Instead, they were hundreds of independent tribes who spoke the same language. Each had its own warrior-king and religious center. The tribes fought each other as enthusiastically as they fought their enemies. Few armies could stand up to them. Somewhat unusually for the time, the Celts believed in reincarnation— that they would be reborn on Earth to live and feast and fight again, which may have contributed to their fearlessness in battle. Some of them fought naked, scoffing at their enemies’ armor. The greatest trophy a Celtic warrior could possess was the severed head of a foe. They preserved these heads in jars of cedar oil and showed them to guests who visited their homes. Celtic warriors were so valued in the ancient world that foreign kings often hired them as mercenary soldiers to serve in their armies. But the Celts were much more than just warriors. Among them were many skilled craftsmen, artists, and great poets called bards. The bards sang of the brave deeds of their ancestors and praised the accomplishments of warrior kings— and composed biting satires about cowardly or selfish leaders. The Celts worshipped many gods, and priests known as druids oversaw this worship. Anyone could become a druid, but the training required many years of study and memorization— the druids were not allowed to record any of their teachings in writing. Druids supervised religious practices and sacrifices to the gods, but they were also teachers, healers, judges, and scientists. They were so respected that they could step between warring tribes in the middle of a battle and call an end to the fighting. No Celt would dare to harm a druid, or question their decisions. In the 2nd century BCE, the Romans began to encroach on Celtic territory, conquering the tribes of northern Italy. Rather than unite against the Roman legions in response to this defeat, the Celts maintained their tribal divisions. The tribes of Spain fell soon after. In the 1st century BCE, Julius Caesar marched his armies across France, using bribery, threats, and lies to turn tribes against each other. Only in the closing days of this great war did the Celts unite against their common enemy under the leadership of king Vercingetorix, but it was too late. Countless warriors and their families died or were enslaved as the Romans conquered France. Protected by the surrounding waters, the Celtic tribes of Britain and Ireland were the last holdouts. When the Romans finally invaded Britain, the queen Boudicca united her tribe in a revolt after her husband was killed. She almost succeeded in driving the Roman legions out of Britain before dying as she led a final battle against the enemy. By the end of the 1st century CE, Ireland alone, far out at sea, remained unconquered by Rome. There, the ways of the ancient Celts survived untouched by the outside world long after Rome itself lay in ruins.

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翻译人员: Wanting Zhong 校对人员: Su Wang公元前 335 年的一个夏夜， 和斯基泰部落酣战了一天的亚历山大大帝正在多瑙河边休憩时，一帮陌生人接近了他的营寨。亚历山大从没有见过像这样的人—— 这群高大威猛的战士戴着巨大的金颈环， 披着色彩斑斓的斗篷——于是他便邀请他们和自己一同饮宴。他们自豪地说自己是来自遥远的 阿尔卑斯山的 “Keltoi”，凯尔特人。亚历山大问他们 在世上最恐惧的是什么，满心以为会听到自己的名字。他们大笑着说， 他们对任何事情都毫无畏惧。这就是有关古凯尔特人的 最早的故事之一。虽然我们并不知道 最初的凯尔特人来自何方，但到了亚历山大的年代， 他们已经散居到了欧洲各地，东至小亚细亚，西至西班牙 及不列颠大西洋群岛与爱尔兰诸岛。凯尔特人从未形成过统一的帝国， 也不曾修筑城池、树立石碑。他们是数百个 讲同种语言的独立部族。每个部落都有自己的 战士国王和宗教中心。部落之间会刀戈相向，狂热得就如与外敌作战一般。鲜有军队能敌得过他们。在当时多少有点格格不入的是， 凯尔特人信奉灵魂转世——他们相信自己会再度降生到世界上， 再次生活、宴饮、战斗，这或许也是他们在战斗中 无畏无惧的部分原因。有些战士赤裸着身体战斗， 对敌人的甲胄报以嗤笑。一名凯尔特战士最显赫的奖杯是敌人被割下的首级。他们把这些头颅 保存在香柏油罐子里，并在来访的客人们面前炫耀。凯尔特战士在古典世界深受青睐，异国国王也常常 将他们招募为雇佣军，为自己的军队效力。但是凯尔特人远远不只是战士。他们之中还有许多出色的工匠、 艺术家，和伟大的吟游诗人。吟游诗人会歌颂祖先们的英勇事迹，赞颂战士国王的光辉伟业——也会谱写辛辣的讽刺诗， 讥诮怯懦或自私的首领。凯尔特人崇拜许多神祗，被称作“德鲁伊”的祭司 负责主持宗教信仰仪式。任何人都能成为德鲁伊，但需要经过多年 学习和背诵的训练——德鲁伊不得以书面形式 记录他们的任何教谕。德鲁伊主持宗教活动和牺牲祭祀，但他们同时也是教师、 医师、法官和科学家。他们德高望重， 甚至能在战斗中介入兵戎相向的部族之间， 令他们握手言和。凯尔特人中无人胆敢伤害德鲁伊， 或是质疑他们的决定。公元前 2 世纪时， 罗马开始侵占凯尔特领土，并征服了意大利北部的部族。面对这次进犯，凯尔特人 并没有联合起来抵御罗马军团，而是仍维持着独立部落的划分。很快，西班牙的部族也沦陷了。公元前 1 世纪， 凯撒指挥军队进军法国，用贿赂、威胁和谎言 让凯尔特各部落反目成仇。直到这场旷世战争接近尾声时，凯尔特人才团结起来，在维钦托利王的领导下 一起对抗共同的敌人，可已为时晚矣。罗马征服了法国，无数战士和他们的家人 惨遭杀害或沦为奴隶。只有四面环海的不列颠和爱尔兰岛上的 凯尔特部落得以幸存。当罗马人终于入侵了不列颠时，布狄卡女王在丈夫被杀后 团结起部落，发起了起义。她差点就能 成功将罗马军队赶出不列颠，可惜她在指挥的最后一场战役中 壮志未酬身先死。到了公元 1 世纪末， 只有隔海相望的爱尔兰幸免于罗马的铁蹄。于是，即使在罗马帝国 早已化为废墟的若干世纪之后，古凯尔特人的习俗依然 在这远离尘世的角落留存了下来。

**P883 2020-06-26 The Egyptian myth of the death of Osiris - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=883)

It was a feast like Egypt had never seen before. The warrior god Set and his wife, the goddess Nephtys, decorated an extravagant hall for the occasion, with a beautiful wooden chest as the centerpiece. They invited all the most important gods, dozens of lesser deities, and foreign monarchs. But no one caused as big a stir as Set and Nephtys’s older brother Osiris, the god who ruled all of Egypt and had brought prosperity to everyone. Set announced a game— whoever could fit perfectly in the chest could have it as a gift. One by one, the guests clambered in, but no one fit. Finally, it was Osiris’s turn. As he lay down, everyone could see it was a perfect fit— another win for the god who could do no wrong. Then Set slammed the lid down with Osiris still inside, sealed it shut, and tossed it into the Nile. The chest was a coffin. Set had constructed it specifically to trap his brother and planned the party to lure him into it. Set had long been jealous of his brother’s successful reign, and hoped to replace him as the ruler of all Egypt. The Nile bore the coffin out to sea and it drifted for many days before washing ashore near Byblos, where a great cedar grew around it. The essence of the god within gave the tree a divine aura, and when the king of Byblos noticed it, he ordered the tree cut down and brought to his palace. Unbeknownst to him, the coffin containing Egypt’s most powerful god was still inside. Set’s victory seemed complete, but he hadn’t counted on his sisters. Set’s wife Nephtys was also his sister, while their other sister, the goddess Isis, was married to their brother Osiris. Isis was determined to find Osiris, and enlisted Nephtys’s help behind Set’s back. The two sisters took the shape of falcons and travelled far and wide. Some children who had seen the coffin float by pointed them to the palace of Byblos. Isis adopted a new disguise and approached the palace. The queen was so charmed by the disguised goddess that she entrusted her with nursing the baby prince. Isis decided to make the child immortal by bathing him in flame. When the horrified queen came upon this scene, Isis revealed herself and demanded the tree. When she cut the coffin from the trunk and opened it, Osiris was dead inside. Weeping, she carried his body back to Egypt and hid it in a swamp, while she set off in search of a means of resurrecting him. But while she was gone, Set found the body and cut it into many pieces, scattering them throughout Egypt. Isis had lost Osiris for the second time, but she did not give up. She searched all over the land, traveling in a boat of papyrus. One by one, she tracked down the parts of her husband’s dismembered body in every province of Egypt, holding a funeral for each piece. At long last, she had recovered every piece but one— his penis, which a fish in the Nile had eaten. Working with what she had, Isis reconstructed and revived her husband. But without his penis, Osiris was incomplete. He could not remain among the living, could not return to his old position as ruler of Egypt. Instead, he would have to rule over Duat, the realm of the dead. Before he went, though, he and Isis conceived a son to bear Osiris’s legacy— and one day, avenge him.

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翻译人员: Wanting Zhong 校对人员: Yanyan Hong这是埃及一场空前的盛宴。战神赛特（Set）和他的妻子 女神奈芙蒂斯（Nephtys）为这场宴会布置了 一间极尽奢华的大厅，其中最为夺目的是 一个无比华美的木箱。他们邀请了所有位高权重的神祗、 数十位下级神灵，以及外国的君主。但最引人瞩目的莫过于赛特 和奈芙蒂斯的兄长欧西里斯（Osiris），他是埃及的统治者， 为天下苍生带来繁荣的神祗。赛特宣布了一场游戏——谁能完美地躺进箱子， 这个箱子就归谁所有。宾客们一个接一个地爬进箱子里， 但是没有任何人合身。最后，轮到了欧西里斯。当他躺下时，所有人都看到 他刚好合身——这位十全十美的神祗 再次赢得了胜利。然后，当欧西里斯还在箱子里时， 赛特猛地关上箱盖，将其封死，并扔进了尼罗河里。原来这个木箱是一口棺材。赛特为了困住兄长， 特地为他量身订造了这口棺材，并谋划了这次宴会， 将他骗进了陷阱。赛特对兄长的治理功绩嫉妒已久，想取而代之统治埃及。尼罗河载着棺材入海， 它在水上漂流了很多天，才被冲刷到比布鲁斯（Byblos） 附近的海岸上，一棵茁壮的雪松环绕着棺材生长起来，里面神灵的精髓 让这棵树散发出神圣的气息，当比布鲁斯的国王发现它时，他下令砍伐这棵树， 运送到自己的宫殿中。他有所不知的是，埃及最强大神祗的棺柩还藏在树干中。塞特似乎大获全胜， 但他没有考虑到自己的姊妹们。赛特的妻子奈芙蒂斯也是他的姊妹，而他们的另一位姊妹， 女神伊西斯（Isis），是他们兄长欧西里斯的妻子。伊西斯决意要找到欧西里斯，并瞒着赛特寻求了奈芙蒂斯的帮助。两姐妹化身为鹰隼， 在广袤的土地上搜寻。一些看到棺材漂过的孩子将她们指向了比布鲁斯的宫殿。伊西斯化身成别的模样进入宫殿。女神的化身深得王后的欢心，王后甚至把自己的小王子 托付给她照顾。伊西斯决定让这个孩子浴火得永生。当惊骇万分的王后赶到现场，伊西斯现出了真身要求得到那棵雪松。当她从树干中切出棺材打开之后，才发现欧西里斯早已死在了里面。痛哭流涕的伊西斯带着他的尸首 回到埃及，将他藏在了沼泽中，同时开始寻觅让他死而复生的方法。但当她离开的时候，赛特发现了尸体，把它分割成许多块，抛在了埃及各处。伊西斯再度失去了欧西里斯， 但她没有放弃。她乘着纸莎草做的船， 找遍了埃及大陆，一块又一块地， 她在埃及每一个省寻回了丈夫被肢解的碎块，并为每一块尸身举行了葬礼。终于，她找回了所有碎块， 除了一块——他的生殖器， 尼罗河里的一条鱼吞了它。伊西斯还是用找到的碎块 重塑并复活了她的丈夫。但失去阳具的欧西里斯并不完整。他无法继续留在人间，无法再度作为统治者君临埃及。他只能去统治冥界（Duat）， 死者之境。在临行前，他和伊西斯怀上了一个儿子，而他将继承父业——并最终，为父亲报仇雪恨。

**P884 2020-07-01 Volcanic eruption explained - Steven Anderson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=884)

In February of 1942, Mexican farmer Dionisio Pulido thought he heard thunder coming from his cornfield. However, the sound wasn’t coming from the sky. The source was a large, smoking crack emitting gas and ejecting rocks. This fissure would come to be known as the volcano Paricutin, and over the next 9 years, its lava and ash would cover over 200 square km. But where did this new volcano come from, and what triggered its unpredictable eruption? The story of any volcano begins with magma. Often, this molten rock forms in areas where ocean water is able to slip into the Earth’s mantle and lower the layer’s melting point. The resulting magma typically remains under the Earth’s surface thanks to the delicate balance of three geological factors. The first is lithostatic pressure. This is the weight of the Earth’s crust pushing down on the magma below. Magma pushes back with the second factor, magmastatic pressure. The battle between these forces strains the third factor: the rock strength of the Earth’s crust. Usually, the rock is strong enough and heavy enough to keep the magma in place. But when this equilibrium is thrown off, the consequences can be explosive. One of the most common causes of an eruption is an increase in magmastatic pressure. Magma contains various elements and compounds, many of which are dissolved in the molten rock. At high enough concentrations, compounds like water or sulfur no longer dissolve, and instead form high-pressure gas bubbles. When these bubbles reach the surface, they can burst with the force of a gunshot. And when millions of bubbles explode simultaneously, the energy can send plumes of ash into the stratosphere. But before they pop, they act like bubbles of C02 in a shaken soda. Their presence lowers the magma’s density, and increases the buoyant force pushing upward through the crust. Many geologists believe this process was behind the Paricutin eruption in Mexico. There are two known natural causes for these buoyant bubbles. Sometimes, new magma from deeper underground brings additional gassy compounds into the mix. But bubbles can also form when magma begins to cool. In its molten state, magma is a mixture of dissolved gases and melted minerals. As the molten rock hardens, some of those minerals solidify into crystals. This process doesn’t incorporate many of the dissolved gasses, resulting in a higher concentration of the compounds that form explosive bubbles. Not all eruptions are due to rising magmastatic pressure— sometimes the weight of the rock above can become dangerously low. Landslides can remove massive quantities of rock from atop a magma chamber, dropping the lithostatic pressure and instantly triggering an eruption. This process is known as “unloading” and it’s been responsible for numerous eruptions, including the sudden explosion of Mount St. Helens in 1980. But unloading can also happen over longer periods of time due to erosion or melting glaciers. In fact, many geologists are worried that glacial melt caused by climate change could increase volcanic activity. Finally, eruptions can occur when the rock layer is no longer strong enough to hold back the magma below. Acidic gases and heat escaping from magma can corrode rock through a process called hydrothermal alteration, gradually turning hard stone into soft clay. The rock layer could also be weakened by tectonic activity. Earthquakes can create fissures allowing magma to escape to the surface, and the Earth’s crust can be stretched thin as continental plates shift away from each other. Unfortunately, knowing what causes eruptions doesn’t make them easy to predict. While scientists can roughly determine the strength and weight of the Earth’s crust, the depth and heat of magma chambers makes measuring changes in magmastatic pressure very difficult. But volcanologists are constantly exploring new technology to conquer this rocky terrain. Advances in thermal imaging have allowed scientists to detect subterranean hotspots. Spectrometers can analyze gases escaping magma. And lasers can precisely track the impact of rising magma on a volcano’s shape. Hopefully, these tools will help us better understand these volatile vents and their explosive eruptions.

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翻译人员: Yihan Zhang 校对人员: Wanting Zhong1942 年 2 月，墨西哥农民 狄尼西奥 · 普利多（Dionisio Pulido）以为自己听到了 从玉米田里传来的雷声。然而，这声音并非来自于天空。声音的来源是一道巨大的、冒烟的 裂缝，正在喷射出气体和岩石。日后，这条裂缝将被称为 帕里库廷火山（Paricutin），在之后的九年，它的熔岩和火山灰 将会覆盖 200 多平方公里的区域。但是，这座新的火山从何而来？又是什么引起了 它出人意料的喷发呢？任何火山的故事都得从岩浆说起。通常，在形成这些熔融岩石的区域，海水能渗入地幔，降低地幔的熔点。由于三个地质因素之间的微妙平衡，这些生成的岩浆通常 会留在在地表之下。第一个因素是岩石静压力 （lithostatic pressure）。也就是地壳的重量 将岩浆向下推的力。岩浆的反推力就是第二个因素， 岩浆静压力（magmastatic pressure）。这场力的较量 会作用在第三个因素上：地壳的岩石强度。通常，岩石足够坚固、沉重，可以让岩浆保持在原位。但是当这种平衡被打破， 就有可能产生爆炸性的后果。火山喷发最常见的原因之一是岩浆静压力的上升。岩浆里含有各种各样的 元素和化合物，其中许多都溶解在熔融的岩石中。达到足够高的浓度之后， 水或硫这类化合物将不再溶解，而是会形成高压气泡。当这些气泡到达表面，就可能会以枪击般的力度迸裂。当成千上万的气泡同时爆炸，其能量可以将火山灰的烟柱 送入平流层。但在爆裂之前，这些气泡就像是 摇晃过的汽水里的二氧化碳。它们的存在降低了岩浆的密度，增加了向上推动地壳的浮力。许多地质学家相信这就是 墨西哥帕里库廷火山爆发背后的过程。这些上浮的气泡 有两个已知的自然成因。有的时候，从更深的地底 产生的新岩浆会带来额外的气态化合物。不过，当岩浆开始冷却时， 也可能会形成气泡。当处于熔融状态时，岩浆是 溶解的气体与熔化的矿物的混合物。当熔融的岩石变硬， 其中的一些矿物会凝固为结晶。这个过程并不会 吸收多少溶解的气体，这导致了能形成爆炸气泡的化合物的浓度升高。然而并不是所有火山爆发 都是由岩浆静压力的上升引起的——有时候，上方岩石的重量 可能会降低到危险的程度。山体滑坡可能会从 岩浆房的上方带走大量岩石，这降低了岩石静压力， 并会立即触发火山爆发。这个过程被称为 “卸荷”，它是无数火山爆发的原因，其中就包括 1980 年 圣海伦火山的突然爆发。但是由于侵蚀作用或者冰川融化，卸荷也可能长期发生。事实上，许多地质学家正在担心由气候变化导致的冰川融化 可能会增加火山活动。最后，在岩石层强度 不再足以抑制岩浆的地方，火山喷发也有可能发生。从岩浆中逸出的酸性气体和热量可以通过名为 “热液蚀变”的过程侵蚀岩石，逐渐将坚硬的石头 变成软质的粘土。岩石层也可能会被板块运动削弱。地震会制造出裂缝， 令岩浆逃到地表，且当大陆板块彼此远离时，地壳可能会被拉伸变薄。遗憾的是，了解火山爆发的原因并不会使预测火山喷发变得更容易。尽管科学家们可以大致测定地壳的强度和重量，岩浆房的深度和热量 使得测量岩浆静态压的变化变得非常困难。但是火山学家们 在不断探索新的技术，以攻克这种岩石地形。热成像技术的发展已经能让科学家们探测地下热点。光谱仪可以分析 从岩浆逸出的气体。激光可以精确地追踪 上升的岩浆对于火山地形的影响。但愿这些工具能帮助我们更好地理解 这些蠢蠢欲动的火山口以及它们的大爆发。

**P885 2020-07-07 The myth of Jason, Medea, and the Golden Fleece - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=885)

In the center of Colchis in an enchanted garden, the hide of a mystical flying ram hung from the tallest oak, guarded by a dragon who never slept. Jason would have to tread carefully to pry it from King Aeetes’ clutches and win back his promised throne. But diplomacy was hardly one of the Argonauts’ strengths. Jason would have to navigate this difficult task alone. Or so he thought. Leaving most of his bedraggled crew to rest, Jason made for the palace with some of his more even-tempered men. His first instinct was to simply ask the king for his prized possession. But Aeetes was enraged at the hero’s presumption. If this outsider wanted his treasure, he would have to prove his worth by facing three perilous tasks. The trials would begin the following day, and Jason was dismissed to prepare. But another member of the royal family was also plotting something. Thanks to the encouragement of Jason’s guardians on Mount Olympus, Medea, princess of Colchis and priestess of the witch goddess Hecate, had fallen in love with the challenger. She intended to protect her beloved from her father’s tricks — at any cost. After a sleepless night, Jason somberly marched to the castle— but was intercepted. The princess armed him with strange vials and trinkets, in exchange for a promise of eternal devotion. As they whispered and planned their victory, both hero and princess fell deeply under each other’s spell. Unaware of his daughter’s scheming, the king confidently led Jason to face his first task. The hero was brought to a huge field of oxen that lay between him and the fleece, and told that he had to plough the land around the crowds of oxen. A simple task— or so Jason thought. But Medea had concocted a fire-proof ointment, and so he plowed the flickering fields unscathed. For the second task, he was given a box of serpent’s teeth to plant into the scorched earth. As soon as Jason scattered them, each seed sprouted into a bloodthirsty warrior. They burst up around him, barricading his way forward, but Medea had prepared him for this task as well. Hurling a heavy stone she had given him into their midst, the fighters turned on themselves as they scrabbled for it, letting him slip by the fray. For the third task, Jason was finally face to face with the guardian of the Fleece. Dodging sharp claws and singeing breath, Jason scrambled up the tree and sprinkled a sweet-smelling concoction over the dragon. As the strains of Medea’s incantations reached its ears and the potion settled in its eyes, the dragon sank into a deep sleep. Elated, Jason climbed to the top of the tallest oak, where he slipped the gleaming fleece off its branch. When the king saw the hero sprinting away— not only with the fleece, but his daughter in tow— he realized he had been betrayed. Furious, he sent an army led by his son Absyrtus to bring the ill-gotten prize and his conniving daughter home. But all the players in this tale had underestimated the viciousness of these disgraced lovers. To the horror of the Gods, Jason ran his sword through Absyrtus in cold blood. Medea then helped him scatter pieces of the body along the shore, distracting her grieving father while the Argonauts escaped. As Colchis and their pursuers grew smaller on the horizon, a solemn silence fell aboard the Argo. Jason could now return to Thessaly victorious— but his terrible act had tarnished his crew’s honor, and turned the Gods against them. Buffeted by hostile winds, the wretched crew washed up on the island of Circe the sorceress. Medea begged her aunt to absolve them of wrongdoing— but bloody deeds are not so easily forgotten, and fallen heroes not so rapidly redeemed.

**P885 2020-07-07 The myth of Jason, Medea, and the Golden Fleece - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=885)

翻译人员: Wanting Zhong 校对人员: Yolanda Zhang在科尔喀斯王国的中心 有一个魔法花园，一只会飞的神奇公羊的皮毛 悬挂在最高的橡木树上，由一条巨龙不眠不休地守护着。伊阿宋必须步步谨慎， 才能从埃厄忒斯王手中将它夺走，并赢回允诺自己的王座。但交涉手腕绝非阿尔戈英雄的长处，伊阿宋只能独自挑战 这项艰巨的任务。至少他是这么以为的。他让大多数旅途劳顿的船员们休息，自己则带上脾性最好的 几位手下前往宫殿。他的第一反应是直接向国王 索取这件他珍视的宝物。但这放肆的要求 让埃厄忒斯勃然大怒。若是这个外乡人想要自己的宝物，他必须通过三项险恶的考验 以证明自己的价值。试炼将在次日开始， 他命伊阿宋退下，着手准备。但是皇室的另一位成员 也在暗自谋划着什么。多亏了奥林匹斯山上 伊阿宋的守护者们出手相助，科尔喀斯的公主、 女巫守护神赫卡忒的女祭司美狄亚爱上了这位挑战者。她打算从父王的诡计中 解救自己的爱人——不惜任何代价。一夜未眠的伊阿宋 神色阴郁地迈向城堡——却被人拦住了。公主给他装备了奇异的药瓶和饰物，为了换取一个永远倾心的承诺。当他们正在细语谋划胜利时，英雄与公主都深深地迷上了彼此。对女儿的密谋毫不知情的国王信心十足地领着伊阿宋 去接受第一项考验。英雄被带到了一片 横亘在他和金羊毛之间的遍布牛群的广袤田地边，并被要求在牛群中犁完这块地。一项简单的任务—— 至少伊阿宋以为如此。不过美狄亚已调配出了耐火的药膏，于是他毫发无伤地 耕完了火舌肆虐的田地。在第二项考验中，他要将一盒毒蛇的牙齿 播种到烧焦的土地中。伊阿宋刚将毒牙撒下， 每颗牙中便窜出了一名嗜血的战士。他们在他四周暴起， 堵住了他的去路。但美狄亚也帮他 为这项挑战做足了准备。他将她提供的一块巨石 扔到战士们正中，他们便哄抢起石头， 开始自相残杀，伊阿宋则得以从乱斗中脱身。在第三项考验中，伊阿宋终于要和 金羊毛的守护者正面对峙了。他躲过尖锐的爪子和灼热的龙息，匆忙爬上了树，将一瓶芳香的药水洒在龙身上。当美狄亚的魔咒传入耳朵、药水滴进眼睛，巨龙便陷入了沉睡。伊阿宋喜出望外地 爬到了最高的橡树顶端，将闪闪发光的金羊毛 从树枝上摘了下来。当国王看到英雄不仅带着金羊毛，还携着自己女儿远走高飞，他意识到自己遭到了背叛。怒不可遏的国王 派儿子阿布绪尔托斯带领军队去将不义之财和不孝之女追捕回家。可这故事的所有参与者都低估了这对可耻的恋人 能有多么心狠手辣。在众神的震惊之中，伊阿宋无情地 用剑刺穿了阿布绪尔托斯的身体，接着美狄亚帮他碎尸， 并将尸块一路沿岸丢弃，她的父亲悲痛欲绝， 阿尔戈英雄则趁机逃脱。当科尔喀斯和追击者们 逐渐消失在地平线尽头，一阵严肃的沉默 降临在了阿尔戈号上。伊阿宋本可以凯旋， 带着众人回到色萨利——但他可怖的恶行玷污了船员的荣誉，也让众神与他们反目。在遭受风暴重创之后，凄惨的船员们被冲到了 魔女喀尔刻的岛上。美狄亚哀求姑妈帮他们赦免罪孽——但血腥的罪行不会轻易被遗忘，堕落的英雄也无法轻松地赎罪。

**P886 2020-07-10 How do our brains process speech - Gareth Gaskell**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=886)

The average 20 year old knows between 27,000 and 52,000 different words. By age 60, that number averages between 35,000 and 56,000. Spoken out loud, most of these words last less than a second. So with every word, the brain has a quick decision to make: which of those thousands of options matches the signal? About 98% of the time, the brain chooses the correct word. But how? Speech comprehension is different from reading comprehension, but it’s similar to sign language comprehension— though spoken word recognition has been studied more than sign language. The key to our ability to understand speech is the brain’s role as a parallel processor, meaning that it can do multiple different things at the same time. Most theories assume that each word we know is represented by a separate processing unit that has just one job: to assess the likelihood of incoming speech matching that particular word. In the context of the brain, the processing unit that represents a word is likely a pattern of firing activity across a group of neurons in the brain’s cortex. When we hear the beginning of a word, several thousand such units may become active, because with just the beginning of a word, there are many possible matches. Then, as the word goes on, more and more units register that some vital piece of information is missing and lose activity. Possibly well before the end of the word, just one firing pattern remains active, corresponding to one word. This is called the "recognition point." In the process of honing in on one word, the active units suppress the activity of others, saving vital milliseconds. Most people can comprehend up to about 8 syllables per second. Yet, the goal is not only to recognize the word, but also to access its stored meaning. The brain accesses many possible meanings at the same time, before the word has been fully identified. We know this from studies which show that even upon hearing a word fragment— like "cap"— listeners will start to register multiple possible meanings, like captain or capital, before the full word emerges. This suggests that every time we hear a word there’s a brief explosion of meanings in our minds, and by the recognition point the brain has settled on one interpretation. The recognition process moves more rapidly with a sentence that gives us context than in a random string of words. Context also helps guide us towards the intended meaning of words with multiple interpretations, like "bat," or "crane," or in cases of homophones like "no" or "know." For multilingual people, the language they are listening to is another cue, used to eliminate potential words that don’t match the language context. So, what about adding completely new words to this system? Even as adults, we may come across a new word every few days. But if every word is represented as a fine-tuned pattern of activity distributed over many neurons, how do we prevent new words from overwriting old ones? We think that to avoid this problem, new words are initially stored in a part of the brain called the hippocampus, well away from the main store of words in the cortex, so they don’t share neurons with others words. Then, over multiple nights of sleep, the new words gradually transfer over and interweave with old ones. Researchers think this gradual acquisition process helps avoid disrupting existing words. So in the daytime, unconscious activity generates explosions of meaning as we chat away. At night, we rest, but our brains are busy integrating new knowledge into the word network. When we wake up, this process ensures that we’re ready for the ever-changing world of language.

**P886 2020-07-10 How do our brains process speech - Gareth Gaskell**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=886)

翻译人员: Wanting Zhong 校对人员: Yolanda Zhang20 岁的普通人认识 约 27000 到 52000 个单词。60 岁时，这个数字平均会达到 35000 到 56000 之间。大部分这些词讲出来 仅需不到一秒钟的时间。因此每听到一个词时， 大脑都要快速做出决定：在成千上万的选项中， 到底哪个和接收到的信号相符？大约 98% 的情况下， 大脑都能选出正确的词。但它是怎么做到的呢？言语理解与阅读理解不同，却与手语理解相似——尽管与言语辨识相关的研究 比手语要多。我们能够理解言语的关键在于大脑的并行处理能力，也就是说，大脑可以 在同一时间做多件不同事情。大多数理论都假设， 我们所知道的每个词均由各自的处理单元掌管， 每个单元唯一的任务是评估输入语音与该单元负责的词语 相匹配的程度。在大脑中，每个单词的处理单元可能就是大脑皮层中的一群神经元的放电模式。当我们听到词语的开头时，可能会有上千个这样的单元被激活，因为仅知道词语开头的话，是有很多种匹配可能的。随着单词的继续， 越来越多的单元发觉它们缺失了一些关键信息， 随即不再活跃。可能早在单词结束之前，就只剩一种放电模式仍旧活跃， 对应一个单词。这叫做 “识别点”。在逐渐筛选出一个词的过程中，活跃的单元会抑制 其他单元的活动，节省关键的几毫秒时间。大多数人每秒钟能理解 多达 8 个音节。但目标不仅仅是识别出单词，还要提取它储存的意思。在完全辨认出单词之前，大脑已同时提取出 很多可能的词义。这是因为有研究显示， 即使只听到一个单词片段——比如 “cap”——听者都会开始想到 若干可能的词义，比如 “captain” 或 “capital”， 即使完整的单词还没有显现。这表示每次听到一个单词时，我们的脑海中都会短暂地 迸发出许多涵义，而等到了识别点时， 大脑已经确认了一种释义。比起一连串随机词汇，识别过程能更迅速地辨识 提供了语境的句子。语境也能引导我们 正确地理解多义词，比如 “bat（蝙蝠/球棒）” 或 “crane（鹤/起重机）”，或者同音字，比如 “no（不）” 和 “know（知道）”。对于掌握多种语言的人来说， 他们在听的语言也是一种线索，能用来排除 并不符合语言情景的待选单词。那么把完全陌生的词 加到这个系统中会怎样呢？即使作为成人，我们每几天 也可能遇到一个新词。但如果每个词都由 分散在许多神经元中的精准的激活模式所控制，我们该如何避免新词覆盖旧词？我们认为，为了避免这个问题，新词最初是储存在大脑中 一个叫做 “海马体” 的区域，远离大脑皮层中的词汇主存储器，因此它们不会和其他单词 共用神经元。然后，经过几晚睡眠，这些新词会逐渐转移过去， 和旧词交织在一起。研究者们认为， 这种渐进的习得过程能帮助避免扰乱现存的词汇。所以在白天，当我们聊天时，无意识的活动 制造出了词义的礼花；到了晚上，我们进入了睡眠， 而大脑则会开始忙着把新知识整合进词汇网络中。在我们醒来时，这个过程能确保我们为瞬息万变的语言世界做好了准备。

**P887 2020-07-14 No one can figure out how eels have sex - Lucy Cooke**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=887)

From Ancient Greece to the 20th century, Aristotle, Sigmund Freud, and numerous other scholars were all looking for the same thing: eel testicles. Freshwater eels, or Anguilla Anguilla, could be found in rivers across Europe, but no one had ever seen them mate. And despite countless dissections, no researcher could find eel eggs or identify their reproductive organs. Devoid of data, naturalists proposed various eel origin stories. Aristotle suggested that eels spontaneously emerged from mud. Pliny the Elder argued eels rubbed themselves against rocks, and the subsequent scrapings came to life. Eels were said to hatch on rooftops, manifest from the gills of other fish, and even emerge from the bodies of beetles. But the true story of eel reproduction is even more difficult to imagine. And to solve this slippery mystery, scholars would have to rethink centuries of research. Today, we know the freshwater eel lifecycle has five distinct stages: larval leptocepheli, miniscule glass eels, adolescent elvers, older yellow eels, and adult silver eels. Given the radical physical differences between these phases, you’d be forgiven for assuming these are different animals. In fact, that’s exactly what European naturalists thought. Researchers were aware of leptocepheli and glass eels, but no one guessed they were related to the elvers and yellow eels living hundreds of kilometers upstream. Confusing matters more, eels don’t develop sex organs until late in life. And the entirety of their time in the rivers of Europe is essentially eel adolescence. So when do eels reproduce, and where do they do it? Despite its name, the life of a freshwater eel actually begins in the salty waters of the Bermuda Triangle. At the height of the annual cyclone season, thousands of three-millimeter eel larvae drift out of the Sargasso Sea. From here, they follow migration paths to North America and Europe— continents that were much closer when eels established these routes 40 million years ago. Over the next 300 days, Anguilla Anguilla larvae ride the ocean currents 6,500 km to the coast of Europe— making one of the longest known marine migrations. By the time they arrive, they’ve grown approximately 45 mm, and transformed into semi-transparent glass eels. It’s not just their appearance that’s changed. If most marine fish entered brackish coastal waters, their cells would swell with freshwater in a lethal explosion. But when glass eels reach the coast, their kidneys shift to retain more salt and maintain their blood’s salinity levels. Swarms of these newly freshwater fish migrate up streams and rivers, sometimes piling on top of each other to clear obstacles and predators. Those that make it upstream develop into opaque elvers. Having finally arrived in their hunting grounds, elvers begin to eat everything they can fit into their mouths. These omnivores grow in proportion to their diets, and over the next decade they develop into larger yellow eels. In this stage, they grow to be roughly 80 cm, and finally develop sexual organs. But the last phase of eel life— and the secret of their reproduction— remains mysterious. In 1896, researchers identified leptocepheli as larval eels, and deduced that they had come to Europe from somewhere in the Atlantic. However, to find this mysterious breeding ground, someone would have to perform an unthinkable survey of the ocean for larvae no larger than 30mm. Enter Johannes Schmidt. For the next 18 years, this Danish oceanographer trawled the coasts of four continents, hunting down increasingly tiny leptocepheli. Finally, in 1921, he found the smallest larvae yet, on the southern edge of the Sargasso Sea. Despite knowledge of their round trip migration, scientists still haven’t observed mating in the wild, or found a single eel egg. Leading theories suggest that eels reproduce in a flurry of external fertilization, in which clouds of sperm fertilize free-floating eggs. But the powerful currents and tangling seaweed of the Sargasso Sea have made this theory difficult to confirm. Researchers don’t even know where to look, since they’ve yet to successfully track an eel over the course of its return migration. Until these challenges can be met, the eel’s ancient secret will continue to slip through our fingers.

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翻译人员: Carol Wang 校对人员: Candace Hwang从古希腊到 20 世纪，亚里士多德、西格蒙德·弗洛伊德 以及许多其他学者都在寻找同样的东西：鳗鱼睾丸。淡水鳗鱼，又称安圭拉鳗， 在欧洲各地河流中都能见到，但没人见过它们交配。尽管进行了无数次解剖，但没有研究人员能找到鳗鱼卵 或识别出它们的生殖器官。由于缺乏数据，博物学家 提出了各种鳗鱼起源的故事。亚里士多德认为 鳗鱼会自发地从泥里钻出来。老普林尼则认为， 鳗鱼会在岩石上摩擦自己，随后刮下的碎屑就有了生命。据说鳗鱼会在屋顶孵化、 从其他鱼类的鳃中钻出来、甚至从甲虫的身体中出现。但鳗鱼繁殖的真相更难想象。为了解决这个棘手的谜团，学者们必须重新思考 几个世纪以来的研究。如今，已知淡水鳗的生命周期 有五个不同的阶段：细鳞鳗鱼小鱼、 微型玻璃鳗鱼、青少年鳗鱼、老年黄鳗鱼和成年银鳗鱼。考虑到鳗鱼在这些阶段 存在根本的物理差异，把它们当做不同物种 是可以理解的。其实，这正是欧洲博物学者的看法。研究人员知道细叶鳗和玻璃鳗，但没有人猜到 它们与白叶鳗和黄鳗有关，后者生活在上游数百公里处。更令人困惑的是， 鳗鱼到晚年才发育出性器官。它们在欧洲河流中的全部时间基本上都是鳗鱼的青春期。那么鳗鱼什么时候繁殖， 又在哪里繁殖呢？尽管名字叫淡水鳗鱼，但它的生命其实起源于 百慕大三角的咸水海域。在每年气旋季节的高峰期，成千上万条 3 毫米长的鳗鱼鱼苗会从马尾藻海漂流而出。从这里出发，它们沿迁徙路线 到达北美洲和欧洲 ——4 千万年前鳗鱼建立这些路线时，这两大洲的距离要近得多。在接下来的 300 天里， 安圭拉鱼苗顺着洋流漂流 6500 公里 到达欧洲海岸 ——这是已知最长的海洋迁徙之一。它们到达的时候， 已经长到大约 45 毫米长，变成了半透明的玻璃鳗鱼，改变的不仅仅是他们的外表。大多数海鱼如果进入含盐的沿海水域，淡水会令它们的细胞膨胀， 从而导致致命的爆炸。但是当玻璃鳗鱼到达海岸时，它们的肾脏转而会保留更多盐分，并保持血液中的盐分水平。这些新出现的淡水鱼群 向溪流和河流上游迁徙，有时会在彼此身上堆积起来， 以清除障碍物和捕食者。那些成功抵达上游的鱼 变成了不透明的鳗鱼，在终于抵达狩猎场后，它们开始吞食任何能吃东西。这些杂食动物的生长速度 与其食量成比例，在接下来的十年里， 它们会长成更大的黄鳝。这个阶段，它们 大约会长到 80 厘米长，并终于发育出性器官。但鳗鱼生命的最后阶段 以及它们繁殖的秘密，仍然是一个谜。1896 年，研究人员确认 细鳞鱼是幼鳗，并推断出它们是 从大西洋某处来到了欧洲。然而，要找到这个神秘繁殖地，就必须有人对海洋 进行难度极大的搜寻，来寻找这些不足 30 毫米的幼虫。约翰内斯·施密特（ Johannes Schmidt） 就是真正采取行动的那个人。在接下来的 18 年里，这位丹麦海洋学家 在四大洲的海岸进行了拖网捕鱼，捕捉到越来越小的细鳞鱼。终于，在1921 年，他在马尾藻海的南部边缘 发现了迄今为止最小的鱼苗。尽管科学家们 已经了解了鳗鱼的往返迁徙，但还从未在野外观察到交配现象，也没有发现过一颗鳗鱼卵。主流理论认为，鳗鱼繁殖是一连串外部受精过程，在这个过程中，大量的精子 为自由漂浮的卵子受精。但马尾藻海强大的海流 和缠结在一起的海藻使得这个理论难以被证实。研究人员甚至不知该去哪里观察，因为他们还没有成功地追踪到鳗鱼的洄游过程。在这些挑战得以解决之前，鳗鱼的古老秘密 将继续从我们指缝中溜走。

**P888 2020-07-16 The myth of Ireland's two greatest warriors - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=888)

Cú Chulainn, hero of Ulster, stood at the ford at Cooley, ready to face an entire army singlehandedly— all for the sake of a single bull. The army in question belonged to Queen Meadhbh of Connaught. Enraged at her husband’s possession of a white bull of awesome strength, she had set out to capture the fabled brown bull of Ulster at any cost. Unfortunately, the King of Ulster had chosen this moment to force the goddess Macha to race her chariot while pregnant. In retaliation, she struck down him and his entire army with stomach cramps that eerily resembled childbirth— all except Cú Chulainn. Though he was the best warrior in Ulster, Cú Chulainn knew he could not take on Queen Meadhbh’s whole army at once. He invoked the sacred rite of single combat in order to fight the intruders one by one. But as Queen Meadhbh’s army approached, one thing worried him more than the grueling ordeal ahead. Years before, Cú Chulainn had travelled to Scotland to train with the renowned warrior Scáthach. There, he met a young warrior from Connaught named Ferdiad. They lived and trained side-by-side, and soon became close friends. When they returned to their respective homes, Cú Chulainn and Ferdiad found themselves on opposite sides of a war. Cú Chulainn knew Ferdiad was marching in Meadhbh’s army, and that if he succeeded in fending off her troops, they would eventually meet. Day after day, Cú Chulainn defended Ulster alone. He sent the heads of some of his adversaries back to Meadhbh’s camp, while the rushing waters of the ford carried others away. At times, he slipped into a trance and slayed hundreds of soldiers in a row. Whenever he saw the queen in the distance, he hurled stones at her— never quite hitting her, but once coming close enough to knock a squirrel off her shoulder. Back at the Connaught camp, Ferdiad was laying low, doing everything he could to avoid the moment when he’d have to face his best friend in combat. But the Queen was impatient to get her hands on the prize bull, and she knew Ferdiad was her best chance to defeat Cú Chulainn. So she goaded him and questioned his honor until he had no choice but to fight. The two faced off at the ford, matching each other exactly in strength and skill no matter what weapons they used. Then, on the third day of their fight, Ferdiad began to gain the upper hand over the exhausted Cu Chulainn. But Cú Chulainn had one last trick up his sleeve: their teacher had shared a secret with him alone. She told him how to summon the Gáe Bulg, a magical spear fashioned from the bones of sea monsters that lay at the bottom of the ocean. Cu Chulainn called the spear, stabbed Ferdiad to death, and collapsed. Meadhbh seized her chance and swooped in with the rest of her army to capture the brown bull. At last, the men of Ulster were recovering from their magical illness, and they surged out in pursuit. But they were too late: Queen Meadhbh crossed the border unscathed, dragging the brown bull with her. Once home, Meadhbh demanded another battle, this time between the brown bull and her husband’s white bull. The bulls were well matched, and struggled into the night, dragging each other all over Ireland. At long last, the brown bull killed the white bull, and Queen Meadhbh was finally satisfied. But the brown bull’s victory meant nothing to him. He was tired, injured, and devastated. Soon after, he died of a broken heart, leaving behind a land that would remain ravaged by Meadhbh’s war for years to come.

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翻译人员: JIAHUI WANG 校对人员: Yanyan Hong阿尔斯特（Ulster）的英雄， 库哈拉（Cú Chulainn），站在库雷（Cooley）的渡口，准备单枪匹马面对整支军队——这一切都是为了一头公牛。这支军队隶属康诺特（Connaught） 女王米德布（Queen Meadhbh）。她因丈夫拥有一头 力大无穷的白牛而愤愤不平，所以不惜一切代价 也要抓住传说中的阿尔斯特棕牛。可惜阿尔斯特国王选择了这个时刻，强迫女神玛卡（Macha）在 怀孕的情况下驾驶战车比赛。作为报复，她用类似分娩的胃痉挛 将他击倒并让他全军覆没——除了库哈拉幸免于难。虽然他是阿尔斯特最优秀的战士，但库哈拉知道他不可能一下子 能对付米德布女王的全部军队。他引用了单兵作战的神圣仪式，以便将入侵者逐个击破。但随着米德布女王的军队逼近，有一件事比先前的艰苦考验更让他担心。几年前，库哈拉曾前往苏格兰，与著名的战士思格哈一起训练。在那里，他遇到了一位自康诺特 名叫费迪亚德的年轻战士。他们并肩生活和训练， 很快就成了好朋友。当他们回到各自的家园时，库哈拉和费迪亚德发现 彼此在战场上竟成了敌人。库哈拉知道费迪亚德 在米德布的军队中行进，如果他成功抵御住她的军队，他们最终会相遇。日复一日，库哈拉独自捍卫着阿尔斯特。他把一些对手的头颅 送回了米德布的营地，而湍急的河水则把其他人带走了。有时，他精神恍惚， 一连杀了数百名士兵。每当他看到远处的女王， 他就向她投掷石块——从来没有完全击中她，但有一次很接近， 把一只松鼠从她的肩膀上打下来。回到康诺特营地，费迪亚德低调行事，竭力避免自己不得不面对好友作战的那一刻。但女王迫不及待地 想要得到那头战利品公牛，她知道费尔迪亚德是 她击败库哈拉的最好机会。于是，她怂恿他，质疑他的荣誉，直到他别无选择，只能战斗。两人在岔路口对峙，无论使用什么武器，在力量和技巧上都旗鼓相当。然后，在他们战斗的第三天， 面对精疲力竭的库哈拉，费迪亚德开始占据上风。但库哈拉还有最后一招：他们的老师单独和他分享了一个秘密。她告诉他如何召唤盖布洛克（Gáe Bulg），一支置身海底用海怪骨头制成的魔法矛。库哈拉调用长矛， 刺死了费迪亚德，然后倒下了。米德布抓住机会，带着剩下的军队突击去抓棕牛。终于，阿尔斯特的人从魔病中恢复过来，他们猛然追了出去。但他们太迟了：米德布女王拖着棕牛安然无恙地越过了边界。一回到家，米德布要求再战一场，这次是棕牛和她丈夫的白牛之间的战斗。公牛们配合得很好，一直斗争到晚上，把对方拖到了爱尔兰各地。最后，棕牛终于杀死了白牛，米德布女王终于满意了。但胜利对棕牛自己而言毫无意义。他累了，受了伤，也被摧毁了。不久，他就因伤心欲绝而死，留下了一片因米德布多年征战 而满目疮痍的土地。

**P889 2020-07-17 Can you solve the honeybee riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=889)

You’re a biologist on a mission to keep the rare honeybee Apis Trifecta from going extinct. The last 60 bees of the species are in your terrarium. You’ve already constructed wire frames of the appropriate size and shape. Now you need to turn them into working beehives by helping the bees fill every hex with wax. There are two ways to fill a given hex. The first is to place a bee into it. Once placed, a bee cannot be removed without killing it. The second: if at any point an unfilled hex has three or more neighboring wax-filled hexes, the bees already in the hive will move in and transform it. Once the bees have transformed every hex in a hive, you can place an additional bee inside and it’ll specialize into a queen. The hive, if well cared for, will eventually produce new bees and continue the species. If there are no hexes with three or more transformed neighbors, the bees will just sit and wait. And once a bee transforms a hex, it can never become a queen. You could put 59 bees in one wire hive, wait till they transform all the hexes, and then create a queen. But then just one collapse would end the species. The more viable hives you can make now, the better. So how many can you make with 60 bees? Pause the video to figure it out yourself Answer in 3 Answer in 2 Answer in 1 Answer in 0 What you're looking for here is some kind of self-sustaining chain reaction, where a small number of bees will transform an entire hive. The lower the number of bees needed, the better. So how low can we go, and how can we engineer a chain reaction? Let’s start with the first question. There's a really clever approach to this, which involves counting the sides of the filled-in hexes, and examining their total perimeter. Let’s suppose we put bees in these three hexes. The total transformed perimeter has 18 sides. But the middle hex has three transformed neighbors, so the bees will transform it too. What happens to the perimeter? It’s still 18! And even after the bees transform the next sets of hexes with three neighbors, it still won’t change. What’s going on here? Each hex that has at least three sides touching the bee-friendly space will remove those sides from the perimeter when it transforms. Then it adds at most three new sides to the perimeter. So the perimeter of the transformed hexes will either stay the same or shrink. The final perimeter of the entire hive is 54, so the total perimeter of the hexes we place bees in at the start must be at least 54 as well. Dividing that 54 by the six sides on each non-adjacent hex tells us it’ll take at least 9 bees to transform the entire hive. That’s a great start, but we still have the tough question of where the nine bees should go, and if we’ll need more. Let’s think smaller. We already know that three bees could completely transform a hive this big. What about a slightly bigger one? The perimeter of this hive is 30, which means we’ll need at least 5 bees to fill it in. With 6 it’d be easy. Placing them like this would fill out the whole hive in just three steps. But we can do better! We don’t actually need to place a bee on this hex, since the other bees will transform that spot on their own. It looks like we have the beginning of a pattern. Can we extend it to our full hive? That would mean placing our 9 bees like so. Once they get to work, they’ll create a chain reaction that fills in the center of the hive and extend it to its edges. Add a 10th bee to the completed hive and it becomes a queen. Repeat that process five more times and you’ve helped the last 60 members of Apis trifecta create 6 producing hives. All in all, it’s a pretty good bee-ginning.

**P889 2020-07-17 Can you solve the honeybee riddle - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=889)

翻译人员: Carol Wang 校对人员: Candace Hwang作为生物学家，你正在执行一项防止稀有蜜蜂 Apis Trifecta 绝种的任务。最后的 60 只蜜蜂 就在你的饲养室里，你已构建了合适大小 和形状的巢框。现在要把它们变成正常工作的蜂巢，你需要往每个六边形里充蜡。充蜡有两种方法：第一种是放一只蜜蜂进去，蜜蜂一旦放入便不能拿出， 除非杀死它；第二种方法，如果一个空六边形与 三个以上充蜡的六边形相邻，蜂巢中的蜜蜂就会 进入该六边形充蜡。一旦蜜蜂完成蜂巢里 所有六边形的充蜡，你再放入一只蜜蜂， 它就会变成蜂王。如果精心照料，蜂巢就会产生新的蜜蜂， 将这个物种延续下去。如果没有与至少三个 充蜡六边形相邻的空六边形，蜜蜂只能干等，而且充腊蜜蜂无法成为蜂王。你可以把 59 只蜜蜂放入蜂巢框架， 等待它们为所有六边形充蜡后，再创造一个蜂后。但只要一次失败， 就会导致该物种灭绝，所以，你现在制造的蜂巢越多越好。那么 60 只蜜蜂能造多少个蜂巢呢？[ 可暂停视频，自己解题 ][ 答案倒计时 3 ][ 答案倒计时 2 ][ 答案倒计时 1 ][ 答案倒计时 0 ]这里你需要用到的方法是 所谓的“自持链式反应”，只需少量蜜蜂即可完成蜂巢充蜡，需要的蜜蜂数量越少越好。那最少需要多少只蜜蜂， 又如何设计链式反应呢?就从第一个问题开始吧。有个非常巧妙的方法，那就是计算充蜡六边形的边数，并算出它们的总周长。假设把蜜蜂放在这三个六边形里，充蜡后的周长共有 18 条边。但中间的六边形 与三个已充蜡的相邻，所以，蜜蜂也会对它充蜡。现在周长是多少呢？还是 18 !即便蜜蜂完成下一轮 对三个充蜡邻居的六边形充蜡后，周长依然不变。这是什么道理呢？至少有三个充蜡邻居的六边形 在蜜蜂完成充蜡后，相邻边要从周长中剔除，然后最多给周长增加三条新边。因此，充蜡六边形的总周长 要么不变，要么变小。整个蜂巢的总周长是 54，所以，我们一开始放入蜜蜂，这些六边形的周长至少是 54 。用 54 除以一个六边形边数 6，得出至少需要 9 只蜜蜂 才能完成整个蜂巢的充蜡。这个开头不错，但棘手的问题是， 这 9 只蜜蜂该放哪里，以及是否需要放入更多蜜蜂。让我们想想小一点的蜂巢。我们已知 3 只蜜蜂 能完成这么大蜂巢的充蜡，稍微大一点的蜂巢会怎样呢?这个蜂巢的周长是 30，意味着我们至少需要 5 只蜜蜂完成充蜡。6 只蜜蜂就轻松完成。这样放置只需要三步 就能完成整个蜂巢充蜡。但我们可以做得更好！其实勿需把蜜蜂放入该六边形，因为其它蜜蜂会为它充蜡。看起来这个模式 有了一个良好的开端，能把它扩展到整个蜂巢吗？即把我们的 9 只蜜蜂 都放在类似位置。一旦蜜蜂开始工作， 就会产生连锁反应，直至填满蜂巢中心， 并延伸到蜂巢边缘。在完工的蜂巢中放入第 10 只， 它就会变成蜂王。重复这个过程五次，你就帮最后的 60 只 Api trifecta 蜜蜂建成了 6 个蜂巢。总之，这个开端相当不错。

**P890 2020-07-17 Ethical dilemma - The burger murders - George Siedel and Christine La**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=890)

A few years ago, you founded a company that manufactures meatless burgers. Your product is now sold in stores worldwide. But you’ve recently received awful news: three unrelated people in one city died after eating your burgers. The police concluded that a criminal targeted your brand, injecting poison into your product in at least two grocery stores. The culprit used an ultrafine instrument that left no trace on the packaging, making it impossible to determine which products were compromised. Your burgers were immediately removed from the two stores where the victims bought them. The deaths are headline news, the killer is still at large, and sales have plummeted. You must quickly develop a strategy to deal with the crisis. Your team comes up with three options: 1. Do nothing. 2. Pull the products from grocery stores citywide and destroy them. Or 3. Pull and destroy the product worldwide. Which do you choose? Your company lawyer explains that a recall is not required by law because the criminal is fully responsible. She recommends the first option— doing nothing— because recalling the product could look like an admission of fault. But is that the most ethical strategy? To gauge the ethicality of each choice, you could perform a “stakeholder analysis.” This would allow you to weigh the interests of some key stakeholders— investors, employees, and customers— against one another. With the first option your advisors project that the crisis will eventually blow over. Sales will then improve but probably stay below prior levels because of damage to the brand. As a result, you’ll have to lay off some employees, and investors will suffer minor losses. But more customers could die if the killer poisoned packages elsewhere. The second option is expensive in the short-term and will require greater employee layoffs and additional financial loss to investors. But this option is safer for customers in the city and could create enough trust that sales will eventually rebound. The third option is the most expensive in the short-term and will require significant employee layoffs and investor losses. Though you have no evidence that these crimes are an international threat, this option provides the greatest customer protection. Given the conflict between the interests of your customers versus those of your investors and employees, which strategy is the most ethical? To make this decision, you could consider these tests: First is the Utilitarian Test: Utilitarianism is a philosophy concerned with maximizing the greatest amount of good for the greatest number of people. What would be the impact of each option on these terms? Second is the Family Test: How would you feel explaining your decision to your family? Third is the Newspaper Test: how would you feel reading about it on the front page of the local newspaper? And finally, you could use the Mentor Test: If someone you admire were making this decision, what would they do? Johnson & Johnson CEO James Burke faced a similar challenge in 1982 after a criminal added the poison cyanide to bottles of Tylenol in Chicago. Seven people died and sales dropped. Industry analysts said the company was done for. In response, Burke decided to pull Tylenol from all shelves worldwide, citing customer safety as the company’s highest priority. Johnson & Johnson recalled and destroyed an estimated 32 million bottles of Tylenol valued at 250 million in today’s dollars. 1.5 million of the recalled bottles were tested and 3 of them— all from the Chicago area— were found to contain cyanide. Burke’s decision helped the company regain the trust of its customers, and product sales rebounded within a year. Prompted by the Tylenol murders, Johnson & Johnson became a leader in developing tamper-resistant packaging and the government instituted stricter regulations. The killer, meanwhile, was never caught. Burke’s decision prevented further deaths from the initial poisoning, but the federal government investigated hundreds of copycat tampering incidents involving other products in the following weeks. Could these have been prevented with a different response? Was Burke acting in the interest of the public or of his company? Was this good ethics or good marketing? As with all ethical dilemmas, this has no clear right or wrong answer. And for your meatless burger empire, the choice remains yours.

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翻译人员: Jason Guo 校对人员: Yanyan Hong几年前，你成立了 一家生产素食汉堡的公司。你的产品目前在世界各地的商店销售。但最近你收到了一个糟糕的消息：在一个城市中，三个毫不相干的人 在吃了你的汉堡后死亡。警方认定一个犯罪团伙盯上了你的产品，在两家杂货店中的商品注入了毒药。罪魁祸首使用了超缜密的工具， 所以包装上没留任何痕迹，这使得你无法判断哪些产品被下了毒。两家受害者购买到有毒汉堡的商店第一时间下架了你的汉堡。致命汉堡成了头条新闻。凶手仍然逍遥法外，而销售量直线下降，你必须快速制定策略来应对危机。你的团队想出了以下三种方法：1. 什么也不做。2. 把汉堡从各个城市里 所有的商店下架并销毁。或者 3. 将世界各地所有的产品销毁。你会怎样做决定？你公司的律师解释说， 法律没有要求强制召回产品，因为罪犯应为此事全权负责。她给出的第一种建议是—— 什么也不做——因为召回产品或被认为是在承认错误。但这是最符合伦理道德的策略吗？为了衡量每个选择的道德标准，你可以进行 “利益相关者分析”。这可以让你权衡一些 主要利益相关者的利益——投资人，员工 以及顾客——之间的相互联系。对于第一个选择，你的顾问相信危机终将会结束。销售额将有所改善， 但由于事件对品牌的伤害，销售额可能会持续低于先前的水平。因此，你必须裁掉部分员工，这样投资者也可以经受更小损失。但如果凶手在其它的包装上下药的话， 将会有更多的顾客因此丧命。第二个选择短期内花费会很高，并且要裁掉更多的员工。投资者也会有更多的经济损失。但是这个选择对市内的消费者更加安全，并可以赢得更多信任 使得销售最终会反弹。第三种方法是短期内最贵的，并会造成大量员工流失和投资者的损失。尽管你没有证据证明 这些罪犯会制造国际威胁，但这个选择能给消费者最大的保护。鉴于你的顾客利益之间的冲突和你的投资者与员工相比，哪一个决策才是更符合道德呢？做决定前，你需要思考这些考量：第一是功利主义者心态的考量：功利主义与哲学有关，为最多的人争取最大的利益。每种方案对这些条款的影响是什么？第二是家庭里的考量：你会怎样向家人解释你的决定？第三是新闻中的考量：如果你在当地报纸头版上 读到你的决定会作何感想。最终是导师考量：如果你敬仰的人在做这个选择， 他们会怎么选？强生公司 CEO 詹姆斯·伯克 (James Burke) 在 1982 年面临了同样的问题，犯罪分子在芝加哥 向瓶装泰诺醇中添加了氰化毒后。造成七人死亡，销量下滑。业内分析人士称，该公司已经完了。作为响应，伯克决定 从全球所有货架上撤下泰诺，将客户安全视为公司的首要任务。强生公司召回并销毁了大约 3200 万瓶泰诺，价值相当于今天的 2.5 亿美元。对召回的瓶子中的 150 万瓶 进行了检测，其中有三个——全部来自芝加哥地区——被发现含有氰化物。伯克的决定帮助他的公司 重新获得了客户的信任，产品销售在一年之内反弹。在泰诺尔谋杀案的促进下 强生公司在开发防篡改包装中成为了领导者，而政府制定了更严格的规定。与此同时，那个凶手从没落网。伯克的决定避免了在最初的 中毒事件后造成更多的死亡，但联邦政府在接下来数周内 调查了数百起涉及其它产品仿冒篡改事件。这些是否可以通过不同的应对措施来预防？伯克的做法是在为公司 还是大众的利益着想？这到底是良好的道德还是良好的营销？就像其它道德的难题一样， 这没有明确的对错。而对于你的素食汉堡帝国来说， 选择权依然在你手上。

**P891 2020-07-17 Is the weather actually becoming more extreme - R. Saravanan**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=891)

From 2016 to 2019, meteorologists saw record-breaking heat waves around the globe, rampant wildfires in California and Australia, and the longest run of category 5 tropical cyclones on record. The number of extreme weather events has been increasing for the last 40 years, and current predictions suggest that trend will continue. But are these natural disasters simply bad weather? Or are they due to our changing climate? To answer this question we need to understand the differences between weather and climate— what they are, how we predict them, and what those predictions can tell us. Meteorologists define weather as the conditions of the atmosphere at a particular time and place. Currently, researchers can predict a region’s weather for the next week with roughly 80% accuracy. Climate describes a region’s average atmospheric conditions over periods of a month or more. Climate predictions can forecast average temperatures for decades to come, but they can’t tell us what specific weather events to expect. These two types of predictions give us such different information because they’re based on different data. To forecast weather, meteorologists need to measure the atmosphere’s initial conditions. These are the current levels of precipitation, air pressure, humidity, wind speed and wind direction that determine a region’s weather. Twice every day, meteorologists from over 800 stations around the globe release balloons into the atmosphere. These balloons carry instruments called radiosondes, which measure initial conditions and transmit their findings to international weather centers. Meteorologists then run the data through predictive physics models that generate the final weather forecast. Unfortunately, there’s something stopping this global web of data from producing a perfect prediction: weather is a fundamentally chaotic system. This means it’s incredibly sensitive and impossible to perfectly forecast without absolute knowledge of all the system’s elements. In a period of just ten days, even incredibly small disturbances can massively impact atmospheric conditions— making it impossible to reliably predict weather beyond two weeks. Climate prediction, on the other hand, is far less turbulent. This is partly because a region’s climate is, by definition, the average of all its weather data. But also because climate forecasts ignore what’s currently happening in the atmosphere, and focus on the range of what could happen. These parameters are known as boundary conditions, and as their name suggests, they act as constraints on climate and weather. One example of a boundary condition is solar radiation. By analyzing the precise distance and angle between a location and the sun, we can determine the amount of heat that area will receive. And since we know how the sun behaves throughout the year, we can accurately predict its effects on temperature. Averaged across years of data, this reveals periodic patterns, including seasons. Most boundary conditions have well-defined values that change slowly, if at all. This allows researchers to reliably predict climate years into the future. But here’s where it gets tricky. Even the slightest change in these boundary conditions represents a much larger shift for the chaotic weather system. For example, Earth’s surface temperature has warmed by almost 1 degree Celsius over the last 150 years. This might seem like a minor shift, but this 1-degree change has added the energy equivalent of roughly one million nuclear warheads into the atmosphere. This massive surge of energy has already led to a dramatic increase in the number of heatwaves, droughts, and storm surges. So, is the increase in extreme weather due to random chance, or changing climate? The answer is that— while weather will always be a chaotic system— shifts in our climate do increase the likelihood of extreme weather events. Scientists are in near universal agreement that our climate is changing and that human activity is accelerating those changes. But fortunately, we can identify what human behaviors are impacting the climate most by tracking which boundary conditions are shifting. So even though next month’s weather might always be a mystery, we can work together to protect the climate for centuries to come.

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翻译人员: Qian Xu 校对人员: Wanting Zhong在 2016 到 2019 年间，气象学家在全球观测到了 前所未有的热浪，加利福尼亚州与 澳大利亚山火肆虐，五级热带飓风的持续时间 也创下了纪录。过去 40 年来， 极端天气事件发生的次数在持续增加，而当前的预测表明， 这一趋势还会继续下去。但这些自然灾害 仅仅是 “天气不好” 吗？还是源自我们的气候变化？要回答这个问题，我们首先要理解 天气与气候之间的区别——它们是什么？如何进行预测？ 预测结果又代表了什么？气象学家将 “天气” 定义为在某个特定时间及地点的大气状况。目前，研究人员能够以 大约 80% 的准确率预测出某个地区 接下来一周的天气。“气候” 描述的则是某个地区 在一个月或以上的时间段内的平均大气状况。气候预测能够预估 未来数十年的平均气温，但无法预测可能发生的 具体天气事件。这两种预测之所以能提供 如此不同的信息，是因为它们分别基于不同的数据。在预测天气时，气候学家要测量大气的初始状况：当前的降水量、气压、湿度、风速及风向，决定了 该地区的天气状况。来自全球 800 多个气象站的 气候学家每天会向大气中 释放两次探空气球。这些气球搭载的仪器 叫做“无线电探空仪”，它会测量大气的初始状况，然后将结果传送给国际气象中心。气象学家将数据输进 物理预测模型，生成最终的天气预报。遗憾的是，某件事情 妨碍了这张全球数据网做出完美的预测：天气本质上是一个混沌系统。这意味着它极度敏感， 若没有对系统中所有因素了如指掌，就不可能做出完美的预测。在短短的十天内， 即便是极度微小的干扰，也能对大气状况造成巨大的影响——因此，要准确预测 两周以后的天气是不可能的。相对而言，气候预测 则远没有这么大的不确定性。部分原因在于，气候的定义本身就是一个地区 所有天气数据的平均值。除此以外，气候预测会忽略 大气当前的状况，而注重可能出现的 大气状况的范围。这些参数被称为“边界条件”，顾名思义，它们代表了 气候及天气状况的边界限制。边界条件的一个例子是太阳辐射。通过分析某个地区 与太阳间的精确距离和角度，我们就能判断该地区所接收的热量。既然我们知道 一年中太阳的运行模式，就能够准确地预测 它对气温的影响。对多年的数据取平均值后，就能发现周期性规律，例如季节。边界条件的数值大多定义明确、 变动很慢，甚至完全不变。因此，研究者能对未来数年的气候 做出可靠的预测。但问题来了。这些边界条件 即使发生极其微小的变化，也对混沌的天气系统 产生巨大的扰动。例如，过去 150 年以来，地球的表面温度 上升了将近 1 摄氏度。这变化看似微小，但这 1 摄氏度的变化 向大气层中释放的能量相当于约 100 万颗核弹。这一波巨大的能量已导致了热浪、干旱及 风暴潮的数量急剧增加。那么，极端天气的增长 究竟是出于偶然还是气候变化？答案是——虽然天气系统永远是混沌的，但气候变化确实会增加 极端天气事件的概率。科学家们几乎一致同意， 我们的气候在产生变化，且人类活动正在加剧这些变化。所幸，我们能通过追踪 哪些边界条件发生了变动，来判断哪些人类行为 对气候造成的影响最大。所以，虽然下个月的天气 可能始终是个谜，但我们仍然可以为共同保护未来 数百年的气候而努力。

**P892 2020-07-18 Newton’s three-body problem explained - Fabio Pacucci**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=892)

In 2009, two researchers ran a simple experiment. They took everything we know about our solar system and calculated where every planet would be up to 5 billion years in the future. To do so they ran over 2,000 numerical simulations with the same exact initial conditions except for one difference: the distance between Mercury and the Sun, modified by less than a millimeter from one simulation to the next. Shockingly, in about 1 percent of their simulations, Mercury’s orbit changed so drastically that it could plunge into the Sun or collide with Venus. Worse yet, in one simulation it destabilized the entire inner solar system. This was no error; the astonishing variety in results reveals the truth that our solar system may be much less stable than it seems. Astrophysicists refer to this astonishing property of gravitational systems as the n-body problem. While we have equations that can completely predict the motions of two gravitating masses, our analytical tools fall short when faced with more populated systems. It’s actually impossible to write down all the terms of a general formula that can exactly describe the motion of three or more gravitating objects. Why? The issue lies in how many unknown variables an n-body system contains. Thanks to Isaac Newton, we can write a set of equations to describe the gravitational force acting between bodies. However, when trying to find a general solution for the unknown variables in these equations, we’re faced with a mathematical constraint: for each unknown, there must be at least one equation that independently describes it. Initially, a two-body system appears to have more unknown variables for position and velocity than equations of motion. However, there’s a trick: consider the relative position and velocity of the two bodies with respect to the center of gravity of the system. This reduces the number of unknowns and leaves us with a solvable system. With three or more orbiting objects in the picture, everything gets messier. Even with the same mathematical trick of considering relative motions, we’re left with more unknowns than equations describing them. There are simply too many variables for this system of equations to be untangled into a general solution. But what does it actually look like for objects in our universe to move according to analytically unsolvable equations of motion? A system of three stars— like Alpha Centauri— could come crashing into one another or, more likely, some might get flung out of orbit after a long time of apparent stability. Other than a few highly improbable stable configurations, almost every possible case is unpredictable on long timescales. Each has an astronomically large range of potential outcomes, dependent on the tiniest of differences in position and velocity. This behaviour is known as chaotic by physicists, and is an important characteristic of n-body systems. Such a system is still deterministic— meaning there’s nothing random about it. If multiple systems start from the exact same conditions, they’ll always reach the same result. But give one a little shove at the start, and all bets are off. That’s clearly relevant for human space missions, when complicated orbits need to be calculated with great precision. Thankfully, continuous advancements in computer simulations offer a number of ways to avoid catastrophe. By approximating the solutions with increasingly powerful processors, we can more confidently predict the motion of n-body systems on long time-scales. And if one body in a group of three is so light it exerts no significant force on the other two, the system behaves, with very good approximation, as a two-body system. This approach is known as the “restricted three-body problem.” It proves extremely useful in describing, for example, an asteroid in the Earth-Sun gravitational field, or a small planet in the field of a black hole and a star. As for our solar system, you’ll be happy to hear that we can have reasonable confidence in its stability for at least the next several hundred million years. Though if another star, launched from across the galaxy, is on its way to us, all bets are off.

**P892 2020-07-18 Newton’s three-body problem explained - Fabio Pacucci**

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翻译人员: Carol Wang 校对人员: Candace Hwang2009 年，两名研究人员 做了个简单实验，基于我们对太阳系所有的了解，计算了 50 亿年后 每颗行星的位置。为此，他们进行了 2000 多次数值模拟，所有初始条件保持不变，除了一个参数值： 水星到太阳的距离在每次后续模拟中减少 不足 1 毫米的距离差。令人震惊的是， 大约 1% 的模拟中，水星轨道发生了巨大变化，它可能会一头扎进太阳 或与金星相撞。更糟糕的是，一次模拟实验中，水星打破了整个内太阳系的稳定。模拟实验没有出错；模拟结果的 惊人变化揭示了这样一个事实：我们的太阳系可能 远没有看上去的那么稳定。对于引力系统的这种惊人特性，天体物理学家称之为 “N 体问题”。虽然我们可以用方程式来完美预测两个引力物体的运动，但面对包含更多物体的系统时， 我们的分析工具就捉襟见肘了。实际上，根本不可能写出 一个包含所有变量的通用公式，来精确地描述三个 或更多引力物体的运动。为什么？这实际上取决于 一个 N 体系统究竟包含多少个未知变量。多亏了艾萨克·牛顿，我们才可以写出一套方程 来描述作用于两个物体间的引力。但当我们试图找出这些方程中未知变量的通解时，则面临着数学上的限制：对每个未知变量，必须至少有一个单独描述它的方程。起初，和运动方程相比，二体系统似乎有更多 关于位置和速度的未知变量。然而，技巧在这里：要考虑两个物体相对于系统重心的相对位置和速度。这样就减少了未知数的数量， 使其变成一个可解的系统。若有三个或更多绕轨道运行的物体， 一切就会变得复杂得多。即使同样使用 考虑相对运动的数学技巧，我们面临的未知变量的数量 也多于描述它们的方程。对于这个方程组来说，变量太多，无法得到一个通解。不过在现实中，宇宙中物体是如何遵循这些无解运动方程运动的呢？由三颗恒星组成的系统—— 像半人马座——可能会相互碰撞， 或者，更有可能的是，表面看似稳定了很长时间后， 有些恒星就会被甩出轨道。除了少数极不可能的稳定配置外，从较长的时间尺度来看， 几乎所有可能情况都不可预测。基于位置和速度的最微小差异，每项潜在的结果都可能存在于 一个很大的天文数学范围里。这种行为被物理学家称为“混沌”，也是 N 体系统的一个重要特征。这样的系统仍然有确定性—— 即它没有任何随机性。如果多个系统初始条件完全相同，它们总是会得到相同的结果。但如果初始条件稍有改变， 结果将难以预料。对人类太空任务来说， 这显然关系重大，因为复杂的轨道 需要非常精确的计算。庆幸的是，计算机模拟技术的持续进步 为避免灾难提供了大量方法。利用日益强大的处理器 计算出更接近的解决方案，我们可以更自信地预测出 N 体系统在长时间尺度上的运动。如果三体系统中有一个质量很轻，它对另外两个物体施力轻微，这个三体系统的运行 则非常近似于二体系统，这种方法称为“限制性三体问题”。实际证明，这种方法非常有用。例如，用来描述地球-太阳 引力场内的小行星，或黑洞和恒星引力场内 小一点的行星。至于我们的太阳系—— 你大可不必担心——至少在未来几亿年内它都会很稳定，我们对此有充分的信心。但若一颗恒星从银河系另一边出发，正向我们飞来，那么一切后果都将难以预料。

**P893 2020-07-20 The big-beaked, rock-munching fish that protect coral reefs - Mike Gi**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=893)

As the sun rises over a quiet coral reef, one animal breaks the morning silence. Named for their vibrant scales and beak-like teeth, these parrotfish are devouring a particularly crunchy breakfast: rocks. It may not be immediately clear why any creature would take bites out of the seafloor. But the diet of these flashy foragers actually plays a key role in defending the coral reef’s complex ecosystem. Massive coral reefs begin with tiny coral larvae, which settle on the seafloor’s hard surfaces and metamorphasize into coral polyps. Over time, these polyps generate rock-like skeletons made of calcium carbonate. Together, colonies of polyps produce large three-dimensional structures, which form the basis of an underwater metropolis. These coral complexes are full of nooks and crannies that house and protect countless life forms. Even though coral reefs occupy less than one percent of the ocean floor, these dense ecosystems are home to more than twenty-five percent of marine life. Many fish use corals as shelters for sleeping and to hide from large predators between their trips foraging for seaweed. As the primary food source for many of the reef’s fish and invertebrates, seaweed is vital to this ecosystem. But in high densities, seaweed can become problematic, and even lethal to corals. Seaweed grows on the same hard open surfaces that coral larvae rely on, and their growth prevents new coral from settling and expanding. These competitors have also evolved a variety of ways to kill existing corals, including smothering and abrasion. Some seaweed species even engage in chemical warfare— synthesizing compounds that destroy coral on contact. This is where parrotfish come in. Like many reef fish, these colorful creatures eat seaweed. But unlike their neighbors, parrotfish can completely remove even the tiniest scraps of seaweed from the ocean floor. Their so-called beak is actually a mosaic of tightly-packed teeth which can scrape and grind rock, allowing them to consume every bit of seaweed covering a stony surface. This helps parrotfish reach seaweed other fish can’t consume, while simultaneously clearing out open space for new corals to settle and existing colonies to expand. Eating rocks is just one way parrotfish help manage seaweed. Through a dynamic system of social networks, parrotfish can convey information to other coral dwelling fish. Each fish’s presence and simple routine behaviors produce sensory information that nearby fish can see, hear, or smell. They can even detect changes in water pressure produced by their neighbors using a special sensory organ. All these factors can inform the behavior of nearby fish. For example, a fish safely entering an open feeding ground and not getting attacked means it’s safe to forage. Conversely, a fish rapidly leaving a location can provide an early warning that a threat is approaching. By simply trying to stay alive, these reef fish can incidentally help their neighbors survive— and more of these fish means less seaweed. Unfortunately, human activities over the last several decades have disrupted almost every part of this complex system. In many coral reefs, overfishing has reduced the number of parrotfish, as well as other seaweed eaters, such as surgeonfish and rabbitfish. This has led to unchecked seaweed growth, which threatens to degrade entire coral reefs. The parrotfish that remain live in much smaller communities. Their reduced numbers can weaken their social network, making surviving fish more timid and less effective at controlling seaweed. Today, climate change and pollution are lowering coral’s natural defenses while contributing to runaway seaweed growth— leaving reef ecosystems more fragile than ever. Our reefs are vitally important to both marine and human life. Their unparalleled biodiversity offers unique opportunities for ecotourism, sustainable fishing, and scientific research, while their rocky structures guard coastlines from waves and storm surges. Fortunately, continued research into reef species like the quirky and critical parrotfish can inform new strategies for preserving these essential ecosystems.

**P893 2020-07-20 The big-beaked, rock-munching fish that protect coral reefs - Mike Gi**

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翻译人员: Jenny Stinehour 校对人员: Yanyan Hong当晨光轻抚过一簇珊瑚礁之时， 一个小动物打破了清晨的安宁。以他们鲜明的鳞片与喙状齿闻名，这群鹦鹉鱼在忙着吃 一种特别脆的早餐：石头。也许无法马上明白为什么会有生物想吃海床。但是这些亮眼的觅食者其实为保护珊瑚礁复杂的生态系统 扮演着重要的角色。巨大的珊瑚礁始于小小的珊瑚幼虫，它们定居在海床上坚硬的表面上，并变成珊瑚虫。逐渐地，这些珊瑚虫长出形似石头，由碳酸钙组成的骨架。成群的珊瑚虫一起制造出立体的结构，就有了水下都市的基础。这些珊瑚构成的结构中 处处都是的隐蔽处与缝隙，给无数生命提供了住处和庇护。虽然珊瑚礁仅占据不到 1% 的海床，有超过 25% 海洋生物 把这些稠密的生态系统当作家。很多鱼把珊瑚当作庇护所， 可以在里面睡觉，寻觅海藻期间， 也可以借此躲过大型捕食者。海藻是许多礁鱼和无脊椎动物的主要食物，对这个生态系统来说是必不可少的。但如其密度太高，海藻可能会带来害处，甚至会导致珊瑚死亡。海藻与珊瑚虫一样， 长在坚硬的开放的表面上，所以，它们的生长 阻止新的珊瑚定居、扩展。这些竞争者也进化出 许多杀死珊瑚的方法，包括使其窒息以及磨损。一些海藻物种甚至开始了化学战——生成接触到珊瑚就会 使其死掉的化学物质。这就是鹦鹉鱼上场的时刻了。和许多礁石鱼一样， 这些五彩斑斓的生物吃海藻。但它和它邻居不一样的是，鹦鹉鱼能够从海床上完全移除海藻，甚至是其最小的残渣。它们所谓的喙其实是拼起来的紧凑牙齿，坚硬到能够刮并磨碎石头，这使它们能够把覆盖在 石头上的所有海藻都吃光。这帮助鹦鹉鱼吃到 其他鱼够不到的海藻，还能为新的珊瑚清扫出开放的生长空间，帮助新的珊瑚定居，让原有珊瑚生长。吃石头只是鹦鹉鱼 打理海藻的一种方式。通过一个动态社交网，鹦鹉鱼能向其他珊瑚居民传递信息。每只鱼的存在和它们简单的日常都会生成可以让附近的鱼 看、听或闻到的感知信息。它们甚至能通过一个特别的感知器官察觉到邻居们导致的水压变化。所有这些因素， 都能传递邻近鱼类的行为信息。例如，一条鱼安全地进入 到一个开放的觅食区且未受攻击， 就意味着在这里觅食是安全的。相反的，一条鱼迅速地离开某地就是有危险靠近的预警。这些礁石鱼仅仅为了努力生存，却无意间也帮助了 它们邻居的生存——而越多的鱼就意味着越少的海藻。不幸的是，近几年的人类活动几乎干扰到了这个复杂系统的每一个部分。很多珊瑚礁中，过度捕捞 减少了鹦鹉鱼的数量，以及其他吃海藻的鱼， 例如，刺尾鱼和蓝子鱼。这导致了海藻过量生长，威胁到了整个珊瑚礁的生存。幸存的鹦鹉鱼只得生活在更小的群落里。它们下降的数目能动摇它们的社交网，使得存留的鱼越加胆小，难以控制海藻。在今天，全球暖化和环境污染 在降低珊瑚的自然保护，同时使海藻肆意生长——让珊瑚生态系统越加脆弱。我们的珊瑚对海洋生命和人类至关重要。它们无以伦比的生物多样性为生态旅游，可持续捕鱼，和科学研究 提供了独特的可能性，同时，它们似岩石的构造 保护海岸线不受海浪和风暴的侵害。幸运的是，对珊瑚礁物种的持续研究，像是稀奇古怪且至关重要的鹦鹉鱼，可以提供用于保护这些生态系统的新策略。

**P894 2020-07-25 Can you solve the cheating royal riddle - Dan Katz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=894)

You’re the chief advisor to an eccentric king who needs to declare his successor. He wants his heir to be good at arithmetic, lucky, and above all else, honest. So he’s devised a competition to test his children, and ordered you to choose the winner. Each potential heir will be given the same two six-sided dice. The red die has the numbers 2, 7, 7, 12, 12, and 17. The blue one has 3, 8, 8, 13, 13, and 18. The dice are fair, so each side is equally likely to come up. Each contestant will be sent into a Royal Rolling Room, where they’ll roll both dice 20 times. A contestant’s score starts at zero, and each turn, they should add the total of the two numbers rolled to their score. After 20 turns, they should report their final score. The rooms are secure, and no one observes the rolls. That means a contestant could add incorrectly, or worse, be dishonest and make up a score they didn’t achieve. This is where you come in. The king has instructed you that if you’re at least 90% sure a contestant mis-added or cheated, you should disqualify them. The highest-scoring player who remains will be the new heir to the throne. After you explain the rules, the children run to their rooms. When they return, Alexa announces her score is 385. Bertram says 840. Cassandra reports 700. And Draco declares 423. The future of the kingdom is in your hands. Whom do you proclaim to be the worthiest successor? Pause now to figure it out for yourself. Upon inspection, most of these scores are concerning. Let’s start with the highest. Bertram scored 840. That’s impressive… but is it even possible? The highest numbers on the two dice are 17 and 18. 17 plus 18 is 35, so in 20 rolls, the greatest possible total is 20 times 35, or 700. Even if Bertram rolled all the highest numbers, he couldn’t have scored 840. So he’s disqualified. Cassandra, the next-highest roller, reported 700. That’s theoretically possible… but how hard is it to be that lucky? In order to get 700, Cassandra would have to roll the highest number out of six on 40 separate occasions. The probability of this is 1 over 6 to the 40th power, or 1 in about 13 nonillion— that’s 13 followed by 30 zeros. To put that in perspective, there are about 7.5 billion people in the world, and 7.5 billion squared is a lot less than 13 nonillion. Rolling the highest number all 40 times is much less likely than if you picked a completely random person on Earth, and it turned out to be actor Paul Rudd… and then you randomly picked again, and got Paul Rudd again! You can’t be 100% sure that Cassandra’s score didn’t happen by chance… but you can certainly be 90% sure, so she should be disqualified. Next up is Draco, with 423. This score isn’t high enough to be suspicious. But it’s impossible for a different reason. Pick a number from each die, and add them up. No matter which combination you choose, the result ends in a 0 or a 5. That’s because every red number is 2 more than a multiple of 5, and every blue number is 3 more than a multiple of 5. This means that when you add them together, you’ll always get an exact multiple of 5. And when you add rolls that are multiples of 5, the result will also be a multiple of 5. These sorts of relationships between integers are studied in a branch of math called number theory. Here number theory shows us that Draco’s score, which is not a multiple of 5, cannot be achieved. So he should be disqualified as well. This leaves Alexa, whose score is a multiple of 5 and is in the achievable range. In fact, the most likely score is 400, so she was a little bit unlucky. But with everyone else disqualified, she’s the last heir standing. All hail Queen Alexa, the worthiest successor! At least if you agree that the best way to organize your government is a roll of the dice...

**P894 2020-07-25 Can you solve the cheating royal riddle - Dan Katz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=894)

翻译人员: Siyu Yang 校对人员: Zizhuo Liang你是一个古怪国王的首席顾问，国王需要宣布他的继承人。他希望他的继承人 要擅长算数，运气好，以及最重要的是，要诚实。所以他设计了一个比赛 来考验他的孩子们，并命令你来选出获胜者。每个可能的继承人都会 拿到两枚相同的六面骰子。红色的骰子上的数字是 2，7，7，12，12 和 17 。蓝色骰子上的数字是 3，8，8，13, 13 和 18。骰子是公平的，这意味着 每面向上的概率都相同。每位参赛者都会被 送去一个皇家掷骰室，在那他们将两个骰子各掷 20 次。在每回合开始时 参赛者们的分数都是零。每轮结束后他们要把两个数字的 总和加到他们的分数中。20 个回合后，他们要上报 他们的最后得分。这些房间很安全， 没人有能看到掷骰的过程。这就意味着参赛者可能会加错， 或更糟的是，可能会撒谎并编造出一个他们没有达到的分数。这就是你要履行职责的时刻了。国王下令如果你有 90% 的 把握确定有某个选手添加错误或舞弊， 你就应该取消他的资格。得分最高的选手 将成为新的王位继承人。当你解释完规则后， 孩子们跑进他们的房间。当他们回来时，艾丽莎宣布她的成绩是 385，伯特伦说 840，卡桑德拉说 700，德拉科说 423。王国的未来掌握在你手上。你将宣布谁是最合适的继承人？【如果你想尝试自行解题，请在此暂停。】经检查，大部分的分数令人起疑。我们先从最高分开始。伯特伦得了 840 分。这真了不起……但是这可能吗？两个骰子上最大的数字是 17 和 18 。17 加 18 是 35，所以在 20 个回合中，可能得到的最高分是 20 乘以 35 ，即 700。就算伯特伦掷出所有最大的数字，他也不可能得到 840 分。所以他的资格被取消了。得分第二的掷骰者是卡桑德拉，她取得了 700 分。这在理论上是可能的…… 但是做到这样幸运要多难呢？如果想要取得 700 分，卡桑德拉必须要在 40 种不同情况下掷出六个数字中最大的数。这个概率是六分之一的 40 次方。或者说是 13 乘以 10 的 30 次方分之一，也就是 13 后面有 30 个 0 。换个角度来看，地球上约有 75 亿人，75 亿的平方还是比 13 乘以 10 的 30 次方要小得多，在全部 40 次投掷中都掷出最大的数比在地球上随机挑选一个人，而那个人正好是演员 保罗 · 路德（Paul Rudd）接着再随机挑选又挑到保罗 · 路德的概率还要小得多。你不能百分百肯定卡桑德拉的分数不是巧合……但是你至少有九成把握她作弊了， 所以她应该被取消资格。下一位是德拉科，423 分。这个分数并没有高到受怀疑的程度。但有另一个原因， 可以说明这是不可能的。从每个骰子中选一个数字， 然后把它们加起来。无论你选择哪种组合， 结果都应该以 0 或 5 结尾。这是因为每个红色的数字 都比 5 的倍数大 2 ，每个蓝色的数字都比 5 的倍数大 3，这就意味着当你把它们加在一起时，你总会得到 5 的倍数。并当你把两个 5 的倍数相加时，结果一定是 5 的倍数。有一个数学分支叫做 “数论”就是在研究整数之间的关系。在这里“数论”告诉我们，德拉科的分数不是 5 的倍数， 因此是无法成立的。所以他也应该被取消资格。现在只剩下艾丽莎， 她的分数是 5 的倍数，并在一个可实现的范围内。事实上，最有可能的分数是 400， 所以她并不算走运。但因为其他人都被取消了资格， 她成为了唯一的继承人。向艾丽莎女王致敬， 她是最配得上的继承人！当然，这前提是你认同 组建政府最好的方式是掷骰子……

**P895 2020-07-29 Evolution’s great mystery - Michael Corballis**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=895)

In the 1980s, a bonobo named Kanzi learned to communicate with humans to an unprecedented extent— not through speech or gestures, but using a keyboard of abstract symbols representing objects and actions. By pointing to several of these in order, he created sequences to make requests, answer verbal questions from human researchers, and refer to objects that weren’t physically present. Kanzi’s exploits ignited immediate controversy over one question: had Kanzi learned language? What we call language is something more specific than communication. Language is about sharing what’s in our minds: stories, opinions, questions, the past or future, imagined times or places, ideas. It is fundamentally open-ended, and can be used to say an unlimited number of things. Many researchers are convinced that only humans have language, that the calls and gestures other species use to communicate are not language. Each of these calls and gestures generally corresponds to a specific message, for a limited total number of messages that aren’t combined into more complex ideas. For example, a monkey species might have a specific warning call that corresponds to a particular predator, like a snake— but with language, there are countless ways to say “watch out for the snake.” So far no animal communication seems to have the open-endedness of human language. We don’t know for sure what’s going on in animals’ heads, and it's possible this definition of language, or our ways of measuring it, don’t apply to them. But as far as we know, only humans have language. And while humans speak around 7,000 distinct languages, any child can learn any language, indicating that the biological machinery underlying language is common to all of us. So what does language mean for humanity? What does it allow us to do, and how did we come to have it? Exactly when we acquired this capacity is still an open question. Chimps and bonobos are our closest living relatives, but the lineage leading to humans split from the other great apes more than four million years ago. In between, there were many species— all of them now extinct, which makes it very difficult to know if they had language or anything like it. Great apes give one potential clue to the origins of language, though: it may have started as gesture rather than speech. Great apes gesture to each other in the wild much more freely than they vocalize. Language may have begun to take shape during the Pleistocene, 2 to 3 million years ago, with the emergence of the genus Homo that eventually gave rise to our own species, homo sapiens. Brain size tripled, and bipedalism freed the hands for communication. There may have been a transition from gestural communication to gestural language— from pointing to objects and pantomiming actions— to more efficient, abstract signing. The abstraction of gestural communication would have removed the need for visuals, setting the stage for a transition to spoken language. That transition would have likely come later, though. Articulate speech depends on a vocal tract of a particular shape. Even our closest ancestors, the Neanderthals and Denisovans, had vocal tracts that were not optimal, though they likely had some vocal capacity, and possibly even language. Only in humans is the vocal tract optimal. Spoken words free the hands for activities such as tool use and transport. So it may have been the emergence of speech, not of language itself, that led to the dominance of our species. Language is so intimately tied to complex thought, perception, and motor functions that it’s difficult to untangle its biological origins. Some of the biggest mysteries remain: to what extent did language as a capacity shape humanity, and to what extent did humanity shape language? What came first, the vast number of possible scenarios we can envisage, or our ability to share them?

**P895 2020-07-29 Evolution’s great mystery - Michael Corballis**

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翻译人员: Wanting Zhong 校对人员: Yolanda Zhang在 1980 年代，一只名叫 坎兹（Kanzi）的倭黑猩猩以前所未有的水平 学会了与人类交流——并非通过言语或手势，而是通过抽象符号键盘上 代表物体和行动的符号字。他能通过依序指向键盘符号 创造出序列，以提出请求、回答人类研究者的口头提问，并指代不在面前的物体。坎兹惊人的成就 立刻引燃了对一个问题的争议：坎兹是否已经学会了语言？我们称作 “语言” 的东西 是一种比交流更为具体的概念。语言是关于 分享我们头脑中的东西：故事、观点、问题、过去或未来、想象的时间或地点、理念。它本质上是开放性的，能用来表达数量无限的事物。很多研究者都确信 只有人类能使用语言，而其它物种用来沟通的 呼叫声和手势并不是语言。每种呼叫声和手势 通常对应一条特定的信息，信息的总数量有限，并不能组合形成更加复杂的意义。例如，某种猴子可能 有一种特定的警告声对应某种特定的天敌，比如蛇——但语言有无数种方式表达 “小心有蛇”。 [“别动！” “快跑！！” “蛇啊！”]到目前为止， 似乎没有任何的动物交流形式具有和人类语言一样的开放性。我们无法明确地知道 动物的头脑中在发生什么，有可能语言的这种定义，或者我们衡量语言的方法 对它们并不适用。但据我们目前所知， 只有人类具有语言。另外，人类有着 近七千门不同的语言，任何小孩都能学会任何语言，这意味着掌管语言的生物机能是我们所有人共有的。那么语言对人类意味着什么？它能让我们做什么， 我们又如何拥有了语言？我们获得这种能力的确切时间 仍是一个有待回答的问题。黑猩猩和倭黑猩猩 是我们现存最近的亲戚，但发展成人类的支系 早在 400 万年以前就与其他类人猿分开了。在这期间产生过很多物种—— 它们现在都已灭绝，也就难以得知它们是否有过语言 或者类似语言的系统。不过类人猿为语言的起源 提供了一个可能的线索：它最初有可能是手势，而非言语。 [ 猩猩：“帮我顺毛。” ]比起发声，野外的类人猿 [ 猩猩：“把那个给我。” ]更善于互相打手势。语言有可能是在 两三百万年前的更新世开始成型的，那时出现的人属最后演化成了 我们自身所属的物种，智人。大脑容量扩增到原来的三倍， 直立行走解放了双手用于沟通。那时有可能实现了从手势交流到手势语言的转变——从指向物体和模仿动作——变成了更加高效、抽象的手语。手势交流的抽象化 消除了对视觉的依赖，从而为向言语的转变备好了舞台。然而这个转变有可能 在以后才会发生。清晰的言语需要 某种特定形状的声道。即使我们最近的祖先， 尼安德特人和丹尼索瓦人，他们的声道也都并不完善，虽说他们很可能有一些发音能力，甚至有可能使用语言。只有人类的声带是完善的。口语解放了双手用于其他活动， 比如工具使用和运输。因此有可能是口语的出现，而非语言本身， 促成了人类物种的优势。语言和复杂思维、感知 及运动功能的联系如此紧密，以至于很难分离出它的生物起源。有些最大的谜团仍待解答：语言作为能力 在何种程度上塑造了人类，人类又在何种程度上塑造了语言？我们所能想象的众多情景， 与我们分享它们的能力——究竟何者在先？

**P896 2020-08-05 Can you outsmart the fallacy that fooled a generation of doctors - El**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=896)

Oh the humanity! Ah... humanity... It’s a trainwreck, but I can’t look away. It’s 1843, and a debate is raging among physicians about one of the most common killers of women: childbed fever. Childbed fever strikes within days of giving birth, killing more than 70% of those infected— and nobody knows what causes it. Obstetrician Charles Meigs has a theory. Having observed abdominal inflammation in patients who go on to develop the fever, he claims this inflammation is the cause of childbed fever. Much of the medical establishment supports his theory. Oh, come on! They really leave me no choice but to teach them some skepticism. That’s better. Now, Meigs, your argument is based on a fallacy— the false cause fallacy. Correlation does not imply causation: When two phenomena regularly occur together, one does not necessarily cause the other. So you say women who have inflammation also come down with childbed fever, therefore the inflammation caused the fever. But that’s not necessarily true. Yes, yes, the inflammation comes first, then the fever, so it seems like the inflammation causes the fever. But by that logic, since babies usually grow hair before teeth, hair growth must cause tooth growth. And we all know that’s not true, right? Actually, don’t answer that. A couple of different things could be going on here. First, it’s possible that fever and inflammation are correlated purely by coincidence. Or, there could be a causal relationship that’s the opposite of what you think— the fever causes the inflammation, rather than the inflammation causing the fever. Or both could share a common underlying cause you haven’t thought of. If I may, just what do you think causes inflammation? Nothing? It just is? Really? Humor me for a moment in discussing one of your colleague’s ideas— Dr. Oliver Wendell Holmes. I know, I know, you don’t like his theory— you already wrote a scathing letter about it. But let’s fill your students in, shall we? Holmes noticed a pattern: when a patient dies of childbed fever, a doctor performs an autopsy. If the doctor then treats a new patient, that patient often comes down with the fever. Based on this correlation between autopsies of fever victims and new fever patients, he proposes a possible cause. Since there’s no evidence that the autopsy causes the fever beyond this correlation, he doesn’t jump to the conclusion that autopsy causes fever. Instead, he suggests that doctors are infecting their patients via an invisible contaminant on their hands and surgical instruments. This idea outrages most doctors, who see themselves as infallible. Like Meigs here, who refuses to consider the possibility that he’s playing a role in his patients’ plight. His flawed argument doesn’t leave any path forward for further investigation— but Holmes’ does. It’s 1847, and physician Ignaz Semmelweis has reduced the number of childbed fever deaths in a clinic from 12% to 1% by requiring all medical personnel to disinfect their hands after autopsies and between patient examinations. With this initiative, he has proven the contagious nature of childbed fever. Ha! It’s 1879, and Louis Pasteur has identified the contaminant responsible for many cases of childbed fever: Hemolytic streptococcus bacteria. Hmm, my fries are cold. Must be because my ice cream melted.

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翻译人员: Zizhuo Liang 校对人员: Yolanda Zhang哦，人类！啊... 人类...这是一次沉船事件， 但是我并不想将我的目光移开。现在是 1843 年， 一场关于女性最常见的杀手之一的争论 在医生们中间激烈展开：产褥热。产褥热在分娩后 几天内就会发作，造成 70%的 感染者死亡，并且 没人知道这是什么原因引起的。产科医生查尔斯·梅格斯（Charles Meigs） 提出了一个理论。在观察到腹部发炎的病人们开始发烧之后，他声称这种腹部炎症 是引起产褥热的原因。大部分医疗机构都支持他的理论。哦，得了吧！这让我别无选择，只能教他们 怎么用怀疑的态度看待问题。这样就好多了。梅格斯，你的论点是建立在 谬论的基础上的，即因果谬误。相关性的存在 并不意味着因果关系的存在：当两种现象经常同时发生时，并不能说明一种现象的发生 导致了另一种现象的出现。所以你认为因为腹部发炎的 妇女都患有产褥热，所以产褥热一定 是由于炎症引起的。但是这并不一定是真的。是的是的，病人首先出现炎症， 然后是开始发热，所以这看起来 好像是炎症引起了产褥热。但是，根据这种逻辑，由于婴儿通常先长牙齿， 后长头发，那么头发的生长 必然导致了牙齿的生长。我们都知道那不是真的，对吧？还是不要回答好了。这里可能会有好多种不同的情况。首先，产褥热和炎症的关联 可能纯属巧合。或者，它们之间的确存在因果关系，但是这种因果关系与 你的设想恰好相反——即产褥热导致炎症， 而不是炎症导致产褥热。再或者，两者都是由同一个 你还没有想到的潜在诱因引起。我冒昧问一句，你认为是什么 导致了炎症的产生呢？想不出来原因吗？就这么凭空产生了？是吗？话说你的同事奥利弗·温德尔·霍尔姆斯 （Oliver Wendell Holmes）医生所提出了一个理论。我知道，我知道， 你不喜欢他的理论；你已经为此给他写了一封 尖刻的批评信。但我们还是满足一下 学生们的好奇心吧，好吗？霍尔姆斯注意到了一种模式：当一个病人因产褥热而死去时， 医生会对其进行尸检。如果那个医生在完成尸检后 再去治疗一位新的病人，那么那个病人通常 也会染上产褥热。基于检验产褥热患者尸体 和新患病的病人之间的关联，他提出了一个可能的诱因。因为并没有证据可以证明 尸检导致产褥热这一我们所观察到的关联性，所以他并没有立即下结论 认定是尸检导致了产褥热。相反，他认为医生是通过 他们的双手和手术器械上的一种看不见的污染物 感染病人的。这种想法激怒了大多数医生，他们都认为自己 是绝对不可能出错的——就像梅格斯一样，他拒绝相信 自己的行为有可能促使病人陷入困境。他带有缺陷的理论并没有为 下一步研究留下任何空间——但霍尔姆斯的主张却恰恰相反。1847 年，内科医生 伊格纳斯·塞梅尔韦斯（Ignaz Semmelweis）将产褥热在一个门诊的死亡率 从 12% 降到了 1%。他的做法是要求所有的医务人员在尸检后，以及对不同病人进行检查之间 对自己的双手进行彻底消毒。通过这一举措，他证明了 产褥热是具有传染性的。哈！现在是 1879 年， 路易斯·巴斯德（Louis Pasteur）发现了造成众多产褥热案例的传染源：溶血性链球菌。唔，我的薯条凉了。那一定是因为我的冰激凌化了。

**P897 2020-08-05 Why people fall for misinformation - Joseph Isaac**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=897)

In 1901, David Hänig published a paper that forever changed our understanding of taste. His research led to what we know today as the taste map: an illustration that divides the tongue into four separate areas. According to this map, receptors at the tip of our tongues capture sweetness, bitterness is detected at the tongue’s base, and along the sides, receptors capture salty and sour sensations. Since its invention, the taste map has been published in textbooks and newspapers. The only problem with this map, is that it’s wrong. In fact, it’s not even an accurate representation of what Hänig originally discovered. The tongue map is a common misconception— something widely believed but largely incorrect. So where do misconceptions like this come from, and what makes a fake fact so easy to believe? It’s true that the tongue map’s journey begins with David Hänig. As part of his dissertation at Leipzig University, Hänig analyzed taste sensitivities across the tongue for the four basic flavors. Using sucrose for sweet, quinine sulfate for bitter, hydrochloric acid for sour, and salt for salty, Hänig applied these stimuli to compare differences in taste thresholds across a subject’s tongue. He hoped to better understand the physiological mechanisms that affected these four flavors, and his data suggested that sensitivity for each taste did in fact vary across the tongue. The maximum sensation for sweet was located at the tongue’s tip; bitter flavors were strongest at the back; salt was strongest in this area, and sour at the middle of the tongue’s sides. But Hänig was careful to note that every sensation could also be tasted across the tongue, and that the areas he identified offered very small variations in intensity. Like so many misconceptions, the tongue map represents a distortion of its original source, however the nature of that distortion can vary. Some misconceptions are comprised of disinformation— false information intentionally designed to mislead people. But many misconceptions, including the tongue map, center on misinformation— false or misleading information that results from unintentional inaccuracy. Misinformation is most often shaped by mistakes and human error, but the specific mistakes that lead to a misconception can be surprisingly varied. In the case of the tongue map, Hänig’s dissertation was written in German, meaning the paper could only be understood by readers fluent in German and well versed in Hanig’s small corner of academia. This kicked off a game of telephone that re-shaped Häing’s research every time it was shared with outside parties. Less than a decade after his dissertation, newspapers were falsely insisting that experiments could prove sweetness was imperceptible on the back of the tongue. The second culprit behind the tongue map’s spread were the images that Hänig’s work inspired. In 1912, a rough version of the map appeared in a newspaper article that cautiously described some of the mysteries behind taste and smell research. Featuring clear labels across the tongue, the article’s illustration simplified Hänig’s more-complicated original diagrams. Variations of this approachable image became repeatedly cited, often without credit or nuanced consideration for Hänig’s work. Eventually this image spread to textbooks and classrooms as a purported truth of how we experience taste. But perhaps the factor that most contributed to this misconception was its narrative simplicity. In many ways, the map complements our desire for clear stories about the world around us— a quality not always present in the sometimes-messy fields of science. For example, even the number of tastes we have is more complicated than Hänig’s work suggests. Umami— also known as savory— is now considered the fifth basic taste, and many still debate the existence of tastes like fatty, alkaline, metallic, and water-like. Once we hear a good story, it can be difficult to change how we see that information, even in the face of new evidence. So, next time you see a convenient chart or read a surprising anecdote, try to maintain a healthy skepticism— because misconceptions can leave a bitter taste on every part of your tongue.

**P897 2020-08-05 Why people fall for misinformation - Joseph Isaac**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=897)

翻译人员: Nina Stinehour 校对人员: Wanting Zhong1901 年，大卫·哈尼格 （David Hänig）发表的一篇论文永远地改变了我们对味觉的理解。从他的研究中诞生了 我们现在所谓的“味觉图”：一张把舌头划分为 四个独立区域的示意图。根据这张示意图，舌尖的受体捕捉甜味，舌根检测苦味，舌头两侧的受体则 捕捉咸味和酸味。自发明以来， 味觉图被陆续刊登在了各类教科书和报纸上。这张图唯一的问题是—— 它是错误的。事实上，它甚至没有准确地代表哈尼格原本的发现。味觉图是个常见的错误观念——虽然广为人信， 大体上却是不准确的。那么，像这样的 错误观念是从哪来的？虚假信息又为什么 能让人如此轻易地信以为真？的确，味觉图的旅程 是从大卫 · 哈尼格开始的。哈尼格在莱比锡大学的学位论文中分析了舌头各部位 对四种基本味道的敏感度。他用蔗糖测甜味， 用硫酸奎宁测苦味，用盐酸测酸味， 用盐测咸味。哈尼格用这些刺激 来比较被试者舌头各处的味觉阈值的差异。他希望能更好地理解 影响这四种味觉的生理机制，而他的数据显示，舌头各部位对每种味道的敏感度 确实存在差异。对甜味最敏感的是舌尖；对苦味最敏感的是舌根； 咸味在这个区域最强，而酸味则在舌头两侧的中间。但是哈尼格谨慎地指出了，舌头的各个部位 都能尝出所有的味道，而且他所划分出的区域之间 敏感度差异非常小。就如其它很多错误观念一样，味觉图是最初来源的一种曲解，然而这种曲解的性质 可能存在差异。有些错误观念是由谣言组成的——刻意设计出来 以误导人们的虚假信息。但包括味觉图在内的很多错误观念围绕的是错误信息—— 因无意的失实导致的错误或误导性信息。最常见的错误信息是由 差错和人为失误造成的，但是导致错误观念的具体错误可以有惊人的多样性。在味觉图的例子里，哈尼格的学位论文是用德语写的，意味着能真正读懂这篇文章的 只有精通德语、且熟知哈尼格的 学术细分领域的人。这开启了一场传话游戏， 每次和外行人士分享时，哈尼格的研究都会改头换面。他的学位论文发表后不到十年，报纸已经在错误地坚称，实验能够证明 舌根完全感受不到甜味。导致味觉图广为流传的 第二个罪魁祸首是被哈尼格的研究启发的图像。1912 年，一张简略版的 味觉图出现在了报纸上，报道小心翼翼地描述了味觉和嗅觉研究背后的一些奥秘。这篇报道的插图 在舌头上标注了明确标签，简化了哈尼格 更加复杂的原始图解。这幅平易近人的图像的变体 被反复引用，但往往没有注明来源， 也没有对哈尼格的研究有些微斟酌。最终，这幅图像传到了 教科书和教室里，被当成我们如何体验味觉的真相。但也许对这个错误观念 贡献最大的因素是它叙事的简单性。在很多方面，味觉图满足了我们对 用明晰的故事讲述身边世界的渴望——然而这一特质在时而繁杂的 科学领域中却时有缺失。举个例子，甚至连味觉的种类 也比哈尼格所提到的更加复杂。旨味（umami）——又称鲜味—— 如今被认为是第五种基本味道，还有很多人仍在辩论 其他味道是否存在：比如脂肪味、碱味、 金属味、水味等。一旦我们听到一个好故事，想要改变看待它的方式是很难的——哪怕有新的证据摆在面前。所以下次看见一张简便图表，或读了一个惊人轶事时， [ “狗没法向上看！”]请尝试保持一个健康的怀疑态度——因为错误观念 会在你舌头上的每个角落留下一种苦涩的味道。

**P898 2020-08-06 The last living members of an extinct species - Jan Stejskal**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=898)

In the savannahs of Kenya, two female northern white rhinos, Nájin and Fatu, munch contentedly on the grass. At the time of this video’s publication, these are the last two known northern white rhinos left on Earth. Their species is functionally extinct— without a male, Nájin and Fatu can’t reproduce. And yet, there’s still hope to revive the northern white rhino. How can that be? The story starts about 50 years ago, when poachers began illegally hunting thousands of rhinos across Africa for their horns. This, combined with civil wars in their territory, decimated northern white rhino populations. Concerned conservationists began trying to breed them in captivity in the 1970s, collecting and storing semen from males. Only four rhinos were ultimately born through the ambitious breeding program. Nájin, and her daughter Fatu were the last two. In 2014, conservationists discovered that neither can have a calf. Though Nájin gave birth to Fatu, she now has weak hindlegs, which could harm her health if she became pregnant again. Fatu, meanwhile, has a degenerated uterine lining. Then, the last northern white rhino male of the species, Sudan, died in 2018. But there was one glimmer of hope: artificial reproduction. With no living males and no females able to carry a pregnancy, this is a complicated and risky process to say the least. Though scientists had stored semen, they would have to collect the eggs— a complex procedure that requires a female to be sedated for up to two hours. Then, they’d create a viable embryo in the lab— something that had never been done before, and no one knew how to do. Even that was just the beginning— a surrogate mother of another rhino species would have to carry the embryo to term. Females of a closely related species, the southern white rhino, became both the key to developing a rhino embryo in a lab and the leading candidates for surrogate mothers. Northern and southern white rhinos diverged about a million of years ago into separate— though still closely-related— species. They inhabit different regions, and have slightly different physical traits. In a fortunate coincidence, several female southern white rhinos needed treatment for their own reproductive problems, and researchers could collect eggs as part of that treatment. In Dvůr Králové Zoo in October 2015, experts of IZW Berlin began collecting eggs from southern white rhinos and sending them to Avantea, an animal reproduction laboratory in Italy. There, scientists developed and perfected a technique to create a viable embryo. Once they mastered the technique, researchers extracted Nájin and Fatu’s eggs on August 22, 2019 and flew them to Italy. Three days later, they fertilized the eggs with sperm from a northern white rhino male. After another week, two of the eggs made it to the stage of development when the embryo can be frozen and preserved for future. Another collection in December 2019 produced one more embryo. As of early 2020, the plan is to collect Nájin and Fatu’s eggs three times a year if they’re healthy enough. In the meantime, researchers are looking for promising southern white rhino surrogate mothers— ideally who’ve carried a pregnancy to term before. The surrogacy plan is somewhat of a leap of faith— southern and northern white rhinos have interbred both during the last glacial period and more recently in 1977, so researchers are optimistic a southern white rhino would be able to carry a northern white rhino to term. Also, the two species’ pregnancies are the same length. Still, transferring an embryo to a rhino is tricky because of the shape of the cervix. The ultimate goal, which will take decades, is to establish a breeding population of northern white rhinos in their original range. Studies suggest that we have samples from enough individuals to recreate a population with the genetic diversity the species had a century ago. Though the specifics of this effort are unique, as more species face critical endangerment or functional extinction, it’s also an arena for big questions: do we have a responsibility to try to bring species back from the brink, especially when human actions brought them there in the first place? Are there limits to the effort we should expend on saving animals threatened with extinction?

**P898 2020-08-06 The last living members of an extinct species - Jan Stejskal**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=898)

翻译人员: Nicole Tsang 校对人员: Yolanda Zhang在肯尼亚的大草原上， 两头雌性北部白犀牛，纳金和法图，正在草地上大快朵颐。在这段视频发布的时候，它们是已知地球上仅存的 最后两头北部白犀牛。这一物种在功能上已经灭绝了，没有雄性个体的存在， 纳金和法图根本无法繁衍。但是，复兴北部白犀牛 这一物种的希望还存在。要如何做到呢？这个故事始于大约 50 年前，当时的偷猎者在非洲各地开始非法狩猎， 捕获了数以千计的犀牛。再加上它们的领土上发生了内战，导致北部白犀牛的数量锐减。20 世纪 70 年代，环保人士 开始尝试人工饲养这些犀牛，并收集和储存雄性犀牛的精液。尽管存在这项雄心勃勃的繁衍计划， 最终也只诞生了四头犀牛。纳金和女儿法图 是最后两头。2014 年，环保主义者发现， 这两头犀牛都无法生育下一代。虽然纳金生了法图， 但现在它的后腿很脆弱，如果她再次怀孕， 可能会危害她的健康。同时，法图则出现了子宫内膜退化。随后，最后一头雄性北方白犀牛， 苏丹，也于 2018 年死亡。但是还有一线希望： 人工繁殖。没有存世的雄性白犀牛， 也没有能够怀孕的雌性白犀牛，这至少也是一个复杂而冒险的过程。尽管科学家们储存了精液， 还不得不收集卵子——这一复杂的过程需要给雌性白犀牛 注射效力长达两小时的镇静剂。然后，他们还需要在实验室里 创造出具备可存活的胚胎。这是一次前无古人的尝试， 没人知道怎样才能成功。就连这一步也仅仅是开始——另一个代孕犀牛物种还必须孕育胚胎至足月。南方白犀牛是 北方白犀牛的近亲物种，于是雌性白犀牛成为了 实验室犀牛胚胎发育的关键，也是代孕母体的首选对象。大约在一百万年前， 南北白犀牛就分化成了彼此独立，但仍具备亲缘关系的物种。它们栖居在不同的地区， 并拥有略微不同的物理特征。在一个机缘巧合下， 几头雌性南方白犀牛刚好出现了生殖问题， 让研究人员得以收集卵子作为治疗的一部分。2015 年 10 月，在德武尔·克拉洛维 （Dvůr Králové Zoo）动物园，来自德国莱布尼兹动物园与野生动物研究所 （IZW Berlin）的专家开始收集南部白犀牛的卵，并把它们送到了意大利的 阿凡提亚（Avantea）动物繁殖实验室。在那里，科学家发展和完善了 一项能创造可存活胚胎的技术。在掌握了这项技术之后，在 2019 年 8 月 22 日，研究人员 提取了纳金和法图的卵子，并把它们送到了意大利。三天后，他们用一头 雄性北方白犀牛的精子使卵子受精。又过了一周，两颗卵子 进入了发育阶段，这时就可以对胚胎 进行冷冻保存以备用。在 2019 年 12 月搜集的精子和卵子 又生产了一颗新的胚胎。到 2020 年初，研究人员计划 在保证纳金和法图身体健康的情况下，每年收集三次它们的卵子。同时，研究人员也在寻找潜在的南部白犀牛代孕母体——最理想的是有过足月生育经历的母体。这一代孕计划在某种程度上 是信仰的一次飞跃，南部和北部白犀牛 都是在上一个冰河时期和最近的 1977 年才进行杂交的，所以研究人员对南部白犀牛 能够孕育北部白犀牛的胚胎至足月持非常乐观的态度。另外，这两个物种的孕期相同。尽管如此，由于子宫颈的形状的差异，犀牛胚胎跨物种移植 依然是一个非常复杂的过程。最终目标是在数十年的时间内将北方白犀牛的繁殖数量恢复到最初的水平。研究表明，我们拥有的 个体样本数量足以重现一个世纪前该物种拥有的 遗传多样性种群。虽然这项工作具有其独特性，但随着更多物种濒临灭绝 或功能性绝种，也引出了一些不容忽视的问题：我们是否有责任尝试挽救由于人类行为而导致濒危的物种？我们为拯救濒危动物所付出的努力有上限吗？

**P899 2020-08-06 What’s that ringing in your ears - Marc Fagelson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=899)

Arriving home after a long day, you settle in for a quiet evening alone. But instead of the sound of silence, you hear a constant ringing— even though there’s nothing making any noise. What you’re experiencing is called tinnitus, the perception of a noise like ringing, buzzing, hissing or clicking that occurs without any external source of sound. Tinnitus has been bothering humanity since Ancient Babylon, plaguing everyone from Leonardo da Vinci to Charles Darwin. Today, roughly one in seven people worldwide experiences this auditory sensation. So where does this persistent sound come from? When you normally hear something, sound waves hit various areas of your ear, creating vibrations that displace fluid inside the cochlea. If the vibrations are large enough, they elicit a chemical response that transforms them into bioelectrical signals. These nerve impulses are then relayed through the hearing pathway to the brain, where they result in the sounds we perceive. However, in the vast majority of tinnitus cases, the nerve signals that produce these mysterious sounds don’t travel through your ear at all. Instead, they’re generated internally, by your own central nervous system. Under usual circumstances, these self-produced signals are an essential part of hearing. All mammals demonstrate on-going neural activity throughout their hearing pathways. When there are no sounds present, this activity is at a baseline that establishes your neural code for silence. When a sound does appear, this activity changes, allowing the brain to distinguish between silence and sound. But the auditory system’s health can affect this background signal. Loud noises, diseases, toxins, and even natural aging can damage your cochlear cells. Some of these may heal in a matter of hours. However, if enough cells die, either over time or all at once, the auditory system becomes less sensitive. With fewer cochlear cells relaying information, incoming sounds generate weaker nerve signals. And many environmental sounds can be lost completely. To compensate, your brain devotes more energy to monitoring the hearing pathway. Just like you might adjust the knobs of a radio, the brain modifies neural activity while also tweaking the tuning knob to get a clearer signal. Increasing this background neural activity is intended to help you process weak auditory inputs. But it can also modify your baseline for silence— such that a lack of sound no longer sounds silent at all. This is called subjective tinnitus, and it accounts for the vast majority of tinnitus cases. Subjective tinnitus is a symptom associated with practically every known ear disorder, but it isn’t necessarily a bad thing. While its appearance can be surprising, subjective tinnitus has no inherently negative consequences. But for some, tinnitus episodes can trigger traumatic memories or otherwise distressing feelings, which increase the sound’s intrusiveness. This psychological loop often leads to what’s known as “bothersome tinnitus," a condition that can exacerbate the symptoms of PTSD, insomnia, anxiety, and depression. There’s no known cure for subjective tinnitus. So the most important thing doctors can do is help people understand this auditory event, and develop neutral associations with these often-distressing sounds. For example, sound therapy uses noises like rain, birdsong, or music to mask tinnitus and reduce stress. One form, called informational masking, uses soothing, complex auditory signals that distract the brain from the tinnitus sound. Another, called energetic masking, uses sounds with the same frequency as the patient’s tinnitus to occupy the neurons that would otherwise deliver the tinnitus signal. Practiced alongside counseling, these interventions allow people to re-evaluate their relationship with tinnitus. Losing the sound of silence can be troubling to say the least. Tinnitus reveals that your brain is constantly analyzing the world around you, even as it fails to filter its own internal noise. In a sense, experiencing tinnitus is like eavesdropping on your brain talking to itself— though it may not be a conversation you want to hear.

**P899 2020-08-06 What’s that ringing in your ears - Marc Fagelson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=899)

翻译人员: Yanyan Hong 校对人员: Wanting Zhong在辛苦了一天回家后， 你准备独自享受一晚的安宁。但你听到的却不是寂静， 而是持续不断的响铃声——即使没有任何东西在发出噪音。你正在经历的是 “耳鸣”，一种即使没有外界声源，也仍能感知到铃声、嗡嗡声、 嘶嘶声或敲击声等噪音的现象。从古老的巴比伦开始， 耳鸣就已经困扰着人类，从达・芬奇到查尔斯 · 达尔文， 都深受其害。今天，大概世界各地 每七个人中就会有一个会经受这种听觉感知。那么，这种持续的声音 是从何而来的？当你平时听到声音时， 声波会击中你耳朵的各个区域，产生振动， 使耳蜗内的液体发生位移。如果振动足够大，就会引起化学反应，将其转化为生物电信号。这些神经冲动随之 便通过听觉通路传递到大脑，然后变成我们听到的声音。然而，在大部分的耳鸣案例中，产生这些神秘声音的神经信号根本就没有经过你的耳朵。相反，它们是在你自己的 中枢神经系统内部产生的。在通常情况下， 这些身体自我产生的信号是听觉重要的组成部分。所有哺乳动物的听觉通路里都会有持续的神经活动。在没有外界声音的情况下，这种神经活动处于基线水平，建立了无声状态的神经编码。当一个声音出现时， 这个神经活动就会改变,能让大脑区分无声和有声。但是听觉系统的健康 会影响到这个背景信号。巨大的噪音、疾病、 毒素，甚至自然衰老都会损伤你的耳蜗细胞。有些细胞可能在 几个小时内就会痊愈。然而，如果有太多的细胞死亡，无论是随着时间逐渐死亡， 还是全部同时死亡，听觉系统就会变得没那么敏感了。因为传递信息的耳蜗细胞越来越少，传入的声音产生的 神经信号就会变弱。许多环境声音可能会完全听不见。为了弥补，你的大脑会投入 更多能量来监控听觉通路。就像你可以调整收音机的旋钮，大脑也会调整神经活动， 同时也调节旋钮以获得更清晰的信号。增加这种背景神经活动原本是 为了帮助你处理微弱的声音。但它也能改变你的无声状态基线——以至于 “没有声音” 听起来不再是无声的。这叫做“主观性耳鸣”，并且占了绝大多数的耳鸣病例。几乎所有已知的耳朵相关疾病都会有主观性耳鸣的症状，但这不一定是件坏事。虽然它的出现令人惊讶，但主观性耳鸣 本身并没有负面的后果。可对一些人来说， 耳鸣会触发创伤的记忆或者其他痛苦的感觉，两者都会增加这种声音的侵扰性。这种心理循环往往会 导致所谓的 “困扰性耳鸣” ,这种病症会加剧 创伤后应激障碍、失眠、焦虑和抑郁的症状。主观性耳鸣目前还没有已知疗法。所以，医生能做的最重要的事情是帮助人们了解这种听觉现象，并且针对这些令人烦恼的声音 建立有中和作用的关联。比如，声音疗法会运用 如雨声、鸟鸣或者音乐等杂音来掩盖耳鸣，减轻压力。有一种叫做信息掩蔽的疗法， 使用舒缓、复杂的听觉信号来分散大脑对耳鸣的注意力。另一种疗法，叫做能量掩蔽，使用与患者耳鸣频率相同的声音来占用原本会传递 耳鸣信号的神经元。这些干预措施与心理咨询同时进行，能让人们重新评估他们与耳鸣的关系。可以说，失去寂静之声 非常令人烦恼。耳鸣揭示了即使你的大脑 无法过滤自身的杂音，也仍在不断地分析你周围的世界。从某种意义上说，听到耳鸣就像是偷听到大脑的自言自语——不过这可能不是你想听到的谈话。

**P900 2020-08-17 The rise of modern populism - Takis S. Pappas**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=900)

In the mid-1970s, after decades of political turmoil, Greece finally seemed to be on the path to stability. With the introduction of a new constitution and negotiations underway to enter European institutions, many analysts expected Greek politics to follow the pattern of the larger Western world. Then in 1981, a political party called PASOK came to power. Its charismatic leader Andreas Papandreou railed against the new constitution, and accused those in power of “national betrayal.” Opposing Greece’s membership in NATO and the European Economic Community, Papandreou promised to govern for the betterment of the “common people" above all else. He famously declared, “there are no institutions, only the people exist.” Papandreou’s rise to power isn’t a unique story. In many democratic countries around the world, charismatic leaders vilify political opponents, disparage institutions, and claim the mantle of the people. Some critics label this approach as authoritarian or fascist, and many argue that these leaders are using emotions to manipulate and deceive voters. But whether or not this style of politics is ethical, it's certainly democratic, and it goes by the name of populism. The term populism has been around since Ancient Rome, and has its roots in the Latin word “populus” meaning “the people." But since then populism has been used to describe dozens of political movements, often with counterintuitive and sometimes contradictory goals. Populist movements have rebelled against monarchies, monopolies, and a wide variety of powerful institutions. It’s not possible to cover the full history of this term here. Instead, we’re focusing on one specific type of populism— the kind that describes Papandreou’s administration and numerous other governments over the last 70 years: modern populism. But to understand how political theorists define this phenomenon we first need to explore what it’s responding to. In the aftermath of World War Two, many countries wanted to move away from totalitarian ideologies. They sought a new political system that prioritized individual and social rights, aimed at political consensus, and respected the rule of law. As a result, most Western nations adopted a longstanding form of government called liberal democracy. In this context, “liberal” doesn’t refer to any political party, but rather a type of democracy that has three essential components. First, liberal democracies accept that society is full of many, often crosscutting divisions that generate conflict. Second, it requires that society’s many factions seek common ground across those divisions. Finally, liberal democracies rely on the rule of law and the protection of minority rights, as specified in constitutions and legal statutes. Taken together, these ideals propose that tolerance and institutions that protect us from intolerance, are the bedrock of a functional and diverse democratic society. Liberal democracies helped bring stability to the nations that adopted them. But like any system of government, they didn’t solve everything. Among other issues, an ever-increasing wealth gap led to underserved communities who distrusted both their wealthy neighbors and their political leaders. In some cases, political corruption further damaged the public's trust. Growing suspicion and resentment around these politicians primed citizens to look for a new kind of leader who would challenge established institutions and put the needs of the people first. In many ways, this reaction highlights democracy in action: if the majority of a population feels their interests are underrepresented, they can elect leaders to change that using existing democratic systems. But this is where assertive, modern populist candidates can subvert democracy. Modern populists identify themselves as embodying the "will of the people," and they place those interests above the institutions that protect individual and social rights. Modern populists argue these institutions are run by a self-serving ruling minority, who seek to control the vast majority of virtuous common people. As a result, politics is no longer about seeking compromise and consensus through tolerant democratic institutions. Instead, these leaders seek to overturn what they see as a broken system. This means that where a liberal democracy has the utmost respect for institutions like courtrooms, free press, and national constitutions, modern populists disparage any establishment that disagrees with the so-called “common will." Modern populist parties have arisen in many places, but the leaders of these movements are remarkably similar. They’re often charismatic individuals who identify themselves as embodying the “will of the people." They make exorbitant promises to their supporters, while casting their opponents as traitors actively undermining the country. But whether these politicians are sincere believers or manipulative opportunists, the dynamics they unleash can be profoundly destabilizing for liberal democracy. Even when modern populist leaders don’t follow through with their most extreme promises, their impact on political discourse, the rule of law, and public trust can long outlast their time in office.

**P900 2020-08-17 The rise of modern populism - Takis S. Pappas**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=900)

翻译人员: Yuxin Zhang 校对人员: Su Wang在 20 世纪 70 年代中期， 经历了数十年的政治动荡，希腊的局势似乎 终于开始趋于稳定。随着新宪法的制定，以及正在进行的 加入欧洲机构的谈判，许多分析家预测希腊政治将遵循更大的西方世界的格局。接着，在 1981 年，一个叫做 帕索克（PASOK）的政党上台。该党的迷人领袖安德烈亚斯·帕潘德里欧 （Andreas Papandreou）反对新的宪法，并指控掌权的那些人为"卖国份子"。帕潘德里欧反对希腊加入 北约（NATO）和欧洲经济共同体，并许诺，他的理念是“平民百姓”的利益高于一切。他的著名宣言是， “这里没有制度，只有人民的存在。”无独有偶，在全世界许多民主国家中，具有超凡魅力的领导人 常常诽谤政治对手，贬低制度，并宣称是以人民的名义。一些评论家把这种做法贴上了 “专制主义”或“法西斯主义”的标签，并且许多人认为， 这些领导人在利用情绪操纵和欺骗选民，但无论这种政治方法是否道德， 它肯定是民主的，而被称为“民粹主义”。自古罗马时代以来， 民粹主义一词就已经存在，它的词根是拉丁文 “populus”， 意思是 “人民”。但从那以后，民粹主义开始 被用来形容数十种政治运动，通常是与预期目标相反的， 有时甚至是矛盾的目标。民粹主义运动曾经 抵抗过君主政治、垄断以及许多强大的制度。这个词的历史很难用几句话说清。因此，我们只把焦点放在 一种特定的民粹主义上，它被用来描述帕潘德里欧的政府，以及过去七十年间的许多其他政府： “现代民粹主义”。但若要了解政治评论家 如何定义这种现象，我们首先需要探究它因何而生。第二次世界大战后，许多国家想要远离 极权主义的意识形态。他们在寻找一种新的政治制度，该制度优先考虑 个人权利和社会权利，旨在达成政治共识， 并尊重法治。结果，大多数西方国家 采用了已长期存在的政府形式，名为“自由民主”。在这种情况下， “自由”并不是指任何政党，而是一种民主类型， 具有三个基本元素。首先，自由民主制接受社会充满许多可产生冲突、 互相交错的部分。其次，它要求社会中的各个派系跨越分歧，寻找共同点。最后，自由民主制度依靠法律法规，保护少数群体的权利，正如宪法和法律法规所规定的。综上所述，这些理念提出，宽容和保护我们远离 不宽容的制度，是一个功能健全、 多元化的民主社会的基石。自由民主制度为 采用它的国家带来了稳定。但如同任何政治制度一样， 它们无法解决所有问题。其中一个就是， 贫富差距的不断扩大，导致贫困社区不信任他们富有的邻居和政治领导人。在某些情况下，政治腐败 进一步了破坏大众的信任，公民对这些政客 越来越怀疑和不满，致使他们想要找寻 一个新的领导人，一个能够挑战现有制度并且将人民需求放在第一位的人。从许多方面来看，这种反应 突出了民主制的运作方式：如果大部分民众没有 感受到自身利益被充分代表，他们可以利用现有民主制度 选举出新的领导者去改变现状。但这正是独断的现代民粹主义 可以颠覆民主的地方。现代民粹主义自称 是 “人民意志” 的象征，并且他们将这些利益置于保护个人 和社会权利的机构之上。现代民粹主义者认为，这些机构是由自私的少数政权主导，那些人试图控制 绝大多数善良的普通百姓。因此，政客们不再通过 包容的民主制度寻求妥协与共识。相反，这些领导人试图推翻 他们所谓的“腐朽残破的系统”。这就意味着，在自由民主制 给予最大尊重的地方，例如法院，新闻 和国家宪法等机构，民粹主义鄙视任何不同意所谓 “共同意志” 的机构。现代民粹主义的党派 已经在许多地方兴起，但这些运动的领导者都极为相似。他们通常很有魅力，自称自己体现了 “人民的意志”。他们对自己的支持者 做出了过高的承诺，同时将他们的对手当成 积极破坏国家的叛国者。但是，无论这些政客是真诚的信奉者， 还是操纵性的机会主义者，他们引起的动乱都可能极大地破坏 自由民主的稳定。即使民粹主义领导者没有遵循他们极端的承诺，他们对政治话语、 法治和公众信任的影响也会使他们的在任时间更长。

**P901 2020-08-23 How to outsmart the Prisoner’s Dilemma - Lucas Husted**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=901)

Two perfectly rational gingerbread men, Crispy and Chewy, are out strolling when they’re caught by a fox. Seeing how happy they are, he decides that, instead of simply eating them, he’ll put their friendship to the test with a cruel dilemma. He’ll ask each gingerbread man whether he’d opt to Spare or Sacrifice the other. They can discuss, but neither will know what the other chose until their decisions are locked in. If both choose to spare the other, the fox will eat just one of each of their limbs; if one chooses to spare while the other sacrifices, the sparer will be fully eaten, while the traitor will run away with all his limbs intact. Finally, if both choose to sacrifice, the fox will eat 3 limbs from each. In game theory, this scenario is called the “Prisoner's Dilemma.” To figure out how these gingerbread men will act in their perfect rationality, we can map the outcomes of each decision. The rows represent Crispy’s choices, and the columns are Chewy’s. Meanwhile, the numbers in each cell represent the outcomes of their decisions, as measured in the number of limbs each would keep: So do we expect their friendship to last the game? First, let’s consider Chewy’s options. If Crispy spares him, Chewy can run away scot-free by sacrificing Crispy. But if Crispy sacrifices him, Chewy can keep one of his limbs if he also sacrifices Crispy. No matter what Crispy decides, Chewy always experiences the best outcome by choosing to sacrifice his companion. The same is true for Crispy. This is the standard conclusion of the Prisoner's Dilemma: the two characters will betray one another. Their strategy to unconditionally sacrifice their companion is what game theorists call the “Nash Equilibrium," meaning that neither can gain by deviating from it. Crispy and Chewy act accordingly and the smug fox runs off with a belly full of gingerbread, leaving the two former friends with just one leg to stand on. Normally, this is where the story would end, but a wizard happened to be watching the whole mess unfold. He tells Crispy and Chewy that, as punishment for betraying each other, they’re doomed to repeat this dilemma for the rest of their lives, starting with all four limbs at each sunrise. Now what happens? This is called an Infinite Prisoner’s Dilemma, and it’s a literal game changer. That’s because the gingerbread men can now use their future decisions as bargaining chips for the present ones. Consider this strategy: both agree to spare each other every day. If one ever chooses to sacrifice, the other will retaliate by choosing “sacrifice” for the rest of eternity. So is that enough to get these poor sentient baked goods to agree to cooperate? To figure that out, we have to factor in another consideration: the gingerbread men probably care about the future less than they care about the present. In other words, they might discount how much they care about their future limbs by some number, which we’ll call delta. This is similar to the idea of inflation eroding the value of money. If delta is one half, on day one they care about day 2 limbs half as much as day 1 limbs, day 3 limbs 1 quarter as much as day 1 limbs, and so on. A delta of 0 means that they don’t care about their future limbs at all, so they’ll repeat their initial choice of mutual sacrifice endlessly. But as delta approaches 1, they’ll do anything possible to avoid the pain of infinite triple limb consumption, which means they’ll choose to spare each other. At some point in between they could go either way. We can find out where that point is by writing the infinite series that represents each strategy, setting them equal to each other, and solving for delta. That yields 1/3, meaning that as long as Crispy and Chewy care about tomorrow at least 1/3 as much as today, it’s optimal for them to spare and cooperate forever. This analysis isn’t unique to cookies and wizards; we see it play out in real-life situations like trade negotiations and international politics. Rational leaders must assume that the decisions they make today will impact those of their adversaries tomorrow. Selfishness may win out in the short-term, but with the proper incentives, peaceful cooperation is not only possible, but demonstrably and mathematically ideal. As for the gingerbread men, their eternity may be pretty crumby, but so long as they go out on a limb, their friendship will never again be half-baked.

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翻译人员: Joyce He 校对人员: Yolanda Zhang两个绝对理性的姜饼人， 嚼嚼和脆脆，在外面闲逛的时候 被一只狐狸抓住了。狐狸看到它们这么开心，就决定比起简单地把它们吃掉，它要通过一个残酷的窘境 来测试它们之间的友情。它分别问每只姜饼人是 选择解救还是牺牲对方。它们可以进行讨论，但直到它们的决定被确认后 才会知晓对方的选择。如果它们都选择解救对方， 那么狐狸只会吃掉每人一肢；如果只有一个人选择解救对方，那么选择解救对方的人会被吃掉，而叛徒却可以完好无损地跑掉。最后，如果它们都选择牺牲对方， 那么狐狸会吃掉每人三肢。在博弈论里，这个情况 被称之为“囚徒困境”。为了搞清楚这些姜饼人 在绝对理性的情况下会怎么选择，我们可以把每种情况的结果写出来。每一行代表的是脆脆的选择， 每一列代表的是嚼嚼的选择。同时，每个单元格中的数字代表的是每种选择所对应的结果，通过每人残留的肢体数量来表示：你觉得它们的友情在游戏 结束后还能完好无损吗？首先， 让我们来考虑嚼嚼的选项。如果脆脆选择解救他，那么嚼嚼 就可以通过牺牲脆脆来逃脱惩罚。但如果脆脆选择牺牲他，那么嚼嚼可以通过同时 牺牲脆脆来保留自己的一肢。不管脆脆如何选择，嚼嚼选择牺牲它的同伴 总能达到最优的结果。这一结论对脆脆来说也成立。这就是囚徒困境的标准结论：两人都会选择出卖对方。它们选择无条件牺牲对方的策略被博弈理论家称为 “纳什平衡”，意思是任何一方只要 背离这一策略都会有所损失。脆脆和嚼嚼遵照 这一理论做出决定让沾沾自喜的狐狸 得以吃了一肚子的姜饼，而两位昔日好友都只剩下 一肢在支撑着它们的身体。通常情况下， 故事到这里就结束了。但有一个巫师 恰巧见证了这一切。他告诉脆脆和嚼嚼， 作为背弃彼此的惩罚，它们余生都将注定 要一直重复这一窘境，每天日出的时候 都将重新获得四肢。现在该如何是好？这被称为“无限囚徒困境”， 它颠覆了之前的结论。这是因为姜饼人 可以用未来的决定作为现在讨价还价的筹码。让我们考虑下这个策略： 每人每天都同意互相解救对方。但凡有任何一个人选择牺牲对方，那么另一人就可以通过余生 一直选择牺牲它来进行报复。这样就足够让这些 可怜的，有意识的焙烤食品同意合作了吗？为了弄清楚，我们得 将另一因素考虑进来：比起将来，这些姜饼人应该会更重视现在。换言之，它们可能会将自己所在乎的未来的 肢体数量换算成一个数字，我们将其称为 δ 。这个点子类似于通货膨胀 会降低金钱的价值。如果 δ 是 1/2 ，那么第二天的每两个肢体对它们来说 都相当于是第一天的一个肢体，第三天的肢体是第一天肢体 价值的四分之一，以此类推。δ 等于 0 则意味着它们根本 不在乎未来的肢体数量，所以它们将会无止境地 重复最初的选择：互相牺牲。但当 δ 趋近 1， 它们将会尽己所能地避免自己每天无止境地 失去三肢的痛苦，于是他们会选择互相解救。当 δ 取这两个值之间的某个点时， 任何一种选择都有可能发生。我们可以通过写出 代表每种策略的无穷级数，来找到那个点的位置，设它们的数值相等，来求解 δ 。结果是 1/3 ，说明只要脆脆和嚼嚼 认为明天的重要性至少占今天的 1/3 ，那么合作：互相解救 是对他们最有利的。这个分析并不只 适用于饼干和巫师这则故事，在现实生活中也经常出现于像是贸易谈判和国际政治的形势下。理性的领导者必须假定 它们每天所做的决定会影响他们竞争对手明天的决定。自私自利也许在短期内能带来利润， 但只要有恰当的激励措施，和平的合作不只是可能的， 而且也被数学推导证实是更理想的。对于姜饼人来说，它们 无穷无尽的故事看起来很糟糕，但只要它们肯为对方担风险，那么它们的友谊就能地久天长。

**P902 2020-08-27 Can you solve the sorting hat riddle - Dan Katz and Alex Rosenthal**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=902)

An albatross delivered your invitation, you’ve acquired your wand, ridden the enchanted zeppelin, made some fast friends, and are finally ready for the adventure you’ve dreamed of your entire life: your first day at Magnificent Marigold’s Magical Macademy. But before you can learn your first spell you must get through the most nerve-wracking moment of the year: the sorting ceremony. When you put on the sorting hat, you hear a voice. “Ah, you’re an interesting one. Every year I choose one student for a special challenge, and I choose you. The Magical Macademy had 8 founders, and they established our four houses two by two by two by two. I alone know which witches founded which. But there was once a mysterious fifth house, lost to time but full of secrets and powerful artifacts. MMMMMM? If you can tell me who founded each house, I’ll sort you into whichever you want. However, if you can also tell me the name of the secret 5th house, I’ll let you sort into it, and you’ll inherit everything you discover. “The two founders of each house wore different colored hats with non-matching symbols. No founder started more than one house. Of Funflame and Imaginez, one was a founder of Gianteye and the other of Longmous. And of Miraculo and Rimbleby, one established Longmous and the other Meramaid. Finally, Septimus didn’t found Vidopnir.” So… who founded what, and what’s the name of the secret house? Pause the video now to figure it out for yourself! Answer in 3 Answer in 2 Answer in 1 The hardest part of solving this logic puzzle is knowing where to start. No rule by itself is enough to assign a founder to his or her house, so the next best thing would be to combine a pair of rules to learn something. 4 and 5 are good candidates to try that with, because they contain a lot of constraints and both mention Longmous. Miraculo and Rimbleby’s hats both have moons, which means that no matter who ends up in Longmous, moons will be accounted for. That means Imaginez, who also has moons, can’t have founded Longmous, so she’s in Gianteye and Funflame founded Longmous. Miraculo’s hat is red, so he can’t be there, so he must be in Meramaid and Rimbleby in Longmous. Halfway there! Now we can place Septimus–– rule 6 keeps him out of Vidopnir, and his yellow hat out of Gianteye, so he must be in Meramaid. Of the founders left, Deepmire and Hypnotum both have stars. So each must go into a different house, taking up the remaining space in Gianteye and leaving one spot open in Vidopnir, which Tremenda must fill. Tremenda’s blue hat keeps Deepmire out of Vidopnir, so we can easily place her and, finally, Hypnotum. Now that those founders are sorted, we can start to search for the secret house. If you don’t have it yet, here are a few hints: Pause the video now if you want to figure it out yourself! One good strategy for a puzzle like this is to look for patterns or unusual pieces of information. First of all, there’s the school’s obsession with the letter M, right down to its motto, which translates from Latin to “M is a magic letter.” Curiously, every founder has exactly one M in their name, and each M is in a different position. That means that the M’s can put them in order, 1 through 8. We know we needed to solve the logic puzzle before finding the secret house, so there must be something critical about the connection between the founders and their houses. Here’s where a pattern emerges: every founder and house have exactly the same number of letters. This allows the founders to line up with their houses quite nicely. The first letters don’t spell anything, but let’s look at the M’s in the names again and the letters they line up with: M, I, N, O, T, A, U, R. You shout out “MINOTAUR” to a stunned dining hall, and a secret passage grinds open. The wonders of house Minotaur are yours if you want them. But being the first and only resident of the secret house would come at a high price: loneliness. So which will it be: riches or friendship?

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翻译人员: Wanting Zhong 校对人员: Yolanda Zhang一只信天翁送来了你的入学通知书， 你买好了魔杖，坐上了魔法飞艇， 迅速结交了一些朋友，终于准备迎接 你一生都在梦想的冒险：你在梦幻墨菊魔法魔院 （MMMM）的第一天。但在学习第一个魔咒之前，你必须先经历这一年 最令人紧张的时刻：分院仪式。当你戴上分院帽时， 你听见了一个声音。“ 啊，你很有意思。每年我都会挑选一名学生接受一项 特别的挑战，今年我选中了你。魔法魔院有八名创始人，他们两两一组， 创设了我们的四个学院。只有我知道哪位巫师 建了哪个学院。但曾经有过一个神秘的第五学院，虽已在岁月长河中销声匿迹， 却充满了秘密与强力的魔法物件。嗯？如果你能说出每个学院的创始者， 我就会把你分进想去的任何学院。但是，如果你还能告诉我 神秘的第五学院的名字，我就可以让你分进那个学院，你就能继承你发现的所有宝物。每个学院的两位创始人 戴的帽子颜色不同、符号相异。没有任何创始人 建立了一个以上的学院。Funflame（趣焰）和 Imaginez（幻响）两人， 其中一位创立了 Gianteye（巨目学院），另一位创立了 Longmus （龙穆学院）。Miraculo（奇吉）和 Rimbleby（灵蜂），其中一位建立了 Longmus， 另一位建立了 Meramaid（仁鱼学院）。最后，Septimus（庚子）没有创立 Vidopnir（神雉学院）。”那么……哪位巫师创立了哪个学院， 神秘学院的名字又是什么？”请暂停视频，尝试自己解答吧！[ 想要发现神秘学院， 必须先将创始人与学院对上号，然后另辟蹊径地思考； 3:47 处有提示。][ 倒数 3、 校训："M 乃魔法" ][ 2、 校训："M 乃魔法" ][ 1！ 校训："M 乃魔法" ]解答这个逻辑谜题的最难点， 在于找到入手之处。没有哪一个条件本身 足以确认任何创始人的学院，那么退而求其次，下一步是 将两个条件组合以得知信息。第四和第五条比较适合进行组合，因为它们包含了很多限制条件， 且都提到了 Longmus 学院。Miraculo 和 Rimbleby 的 帽子上都有月亮，也就是说无论哪位属于 Longmus， Longmus 中都有月亮图案。也就是说同样有月亮的 Imaginez 不可能是 Longmus 的创始人，所以她在 Gianteye， 那么 Funflame 就创办了 Longmus。Miraculo 的帽子是红色的， 那么他不可能是 Longmus 的，那么他只有可能在 Meramaid， 而 Rimbleby 是 Longmus 的。解开一半了！那么我们现在 能分派 Septimus 了——第六条说他不在 Vidopnir， 他的黄帽子不能在 Gianteye，那么他肯定在 Meramaid。剩下的创始人中，Deepmire 和 Hypnotum 都有星星。那么他们肯定属于不同学院，他们占去了 Gianteye 剩下的位置， 这样 Vidopnir 还剩一个空位，必须是 Tremenda 的。Tremenda 的蓝帽子 从 Vidopnir 排除了 Deepmire，那么我们能轻松地分派她， 最后是 Hypnotum。至此把创始人们分好，我们就能开始寻找神秘学院了。还没想出来的话，这里有几个提示： [ 1. 神秘学院有八个字母 ][ 2. 学校的校徽、名字和校训 ][ 3. 创始人名字的共同点 ][ 4. 共同点能提示 所需字母和顺序 ][5. 创始人和学院名字长度相同][6. 神秘学院以“M”开头]对于这种谜题，一个较好的策略是 寻找规律或非同寻常的信息。首先，学校对字母 “M” 异常执着， 连校训都是拉丁文“M 是一个魔法字母”。神奇的是，每位创始人的名字里都恰好 有一个 “M”，且每个 “M” 都在不同的位置。也就是说能根据 “M” 的位置 对八人进行排序。我们知道必须要先解出逻辑谜题 才能找到秘密学院，因此创始人和各自的学院之间 一定有什么至关重要的联系。这里就出现了规律： 每位创始人和学院名字中的字母个数都刚好相等。这就能让创始者们 和自己的学院完美对齐。首字母什么都拼不出，但让我们再看看名字中的 “M” 以及它们所对齐的字母：M, I, N, O, T, A, U, R。（弥诺陶， 希腊神话中迷宫里的牛头怪物）。你对着目瞪口呆的大饭堂 喊出 “MINOTAUR”，接着，一条秘密通道轰隆隆地打开了。如果你想的话，牛首学院的 奇珍异宝都能归你所有。但成为秘密学院第一位 也是唯一一位住客，将伴随高昂的代价：孤独。那你会怎样选择呢： 财富，还是友情？

**P903 2020-08-27 The fish that walk on land - Noah R. Bressman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=903)

This pond is the only home this fish has ever known. But lately, it’s gotten crowded and food is scarce. Luckily, it has an option many don’t: as a walking catfish, it can dance its way out of the water and onto bigger and better things. However, it faces many challenges on its terrestrial journey: it’s now in danger of suffocating, drying up, suffering physical damage from rough terrain, and being hunted by land predators. We think of fish as completely aquatic animals. But the walking catfish is just one of hundreds of fish species that are actually amphibious, meaning that they possess adaptations that enable them to survive on land. Fish amphibiousness is a spectrum. At one end are species like the mosquitofish that’ll only move on land when forced. And at the other end are species like mudskippers that nonchalantly hop around mudflats for days at a time. But why do fish make the exodus from water to land? And how do they cope with this drastic transition? If temperatures get too high for the mangrove rivulus in the shallow tropical pools it inhabits, it’ll flip itself onto a bank and cool off in the shade. During the dry period, it can survive for two months out of the water by staying in moist environments. Meanwhile, the eel catfish makes its onshore voyage to satisfy its hearty craving for beetles. And for others, the terrestrial draw is more ritualistic. Every year under the cover of night, masses of California grunion flop their way onto sandy beaches, where females deposit thousands of eggs into the sand before re-entering the ocean. Underwater, fish breathe with gills, which are feathery organs packed with blood vessels that absorb dissolved oxygen from the water. But in the open air, their gills collapse and are rendered useless, so amphibious fishes need other ways to breathe. The armored catfish’s stomach is packed with blood vessels, so it can gulp down air and breathe through its stomach lining. And lungfish, being related to the ancestors of all tetrapods, or four-limbed vertebrates, are equipped with true lungs. They’ll actually drown if they’re kept underwater too long. Fish have thin, permeable skin that allows for essential compounds to diffuse into and out of their bodies while they’re underwater. But this works against them on land as their bodily moisture diffuses into the air. To dodge dehydration, mudskippers roll in the mud like puppies. But the lungfish takes the cake: the rivers it inhabits disappear during dry seasons, so it buries itself in the earth and coats its body in a mucus cocoon. It can survive like this for years until being resuscitated by the next big rainstorm. Amphibious fishes use powerful fins to move on land and clever tools to navigate as they go. The Nopoli rock-climbing goby, no bigger than a few centimeters, scales hundred-meter-tall Hawaiian waterfalls, inching its way up by alternately attaching the suction cups on its mouth and pelvic fins. To find water while on land, the mummichog, like most amphibious fishes, is on the lookout for reflective surfaces. Other species, like mosquitofish, exercise their inner ear to determine where they’re oriented on a slope, relying on the probability that they’ll find water by moving downhill. Our walking catfish, meanwhile, uses the taste buds that coat its body for navigation. These taste buds are concentrated in its whiskers, which whip through the air, sensing compounds that signal the proximity and quality of nearby water— and prey. The walking catfish will shimmy towards attractive volatile amino acids while steering clear of foul waters emanating hydrogen sulfide. While amphibious fishes face a multitude of new challenges upon leaving the water, they’ve evolved ingenious ways to overcome them. They’re resilient in the face of droughts and floods and have access to new prey as well as a plan B if they need to escape competitive, polluted, or unhealthy environments. While being a “fish out of water” is generally regarded as a bad thing, for these species, it offers an undisputed edge.

**P903 2020-08-27 The fish that walk on land - Noah R. Bressman**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=903)

翻译人员: Carol Wang 校对人员: Yanyan Hong池塘是这条鱼所知唯一的家园，但最近，池塘变得拥挤， 而且食物也变得匮乏了。幸好它有很多鱼没有的选择：作为一条会走路的鲶鱼， 它能一路舞动身体离开水面，去往更宽阔而更美好的地方。但它的陆地之行面临众多的挑战：现在，它面临着窒息、身体干枯、粗糙地形对身体造成损伤，还可能被陆地掠食者猎杀。我们以为鱼是纯粹的水生动物，但两栖鱼类有几百种，蟾胡鲇只是其中之一，两栖指它们有适应陆地生存的能力。鱼类的两栖性是一个范围：一端是类似食蚊鱼这样的种类，只有在不得已的情况下 它们才会到陆地上去；而另一端则是像弹涂鱼这样的种类，能若无其事地在泥滩上 一蹦就是好几天。但是，鱼为何从水里游上陆地呢？它们又是如何应对这种剧变呢？红树林鳉鱼栖息在热带浅滩中，如果那里温度太高的话，它就会跳上岸，在阴凉处凉快下来。干旱期来临，在没有水的情况下，它能在潮湿环境中存活两个月。与此同时，刚果河鳝胡鲶爬上岸只是为了吃最爱的甲虫。对其它鱼来说，登陆更有仪式感。每一年，在夜幕掩护下，大批加州滑银汉鱼登陆沙滩，雌鱼在沙滩上产卵数千枚后，又返回海洋。在水里，鱼用鳃呼吸，鳃是一种布满血管的羽毛状器官，能吸收水里的氧气；鱼一旦暴露在空气中， 鳃就功能尽失而变得无用，所以两栖鱼需要其它呼吸方式。长丝髯甲鲶的胃里布满血管，因此它可以吞入空气， 通过胃粘膜进行呼吸。肺鱼是所有四足动物 或四足脊椎动物祖先的亲戚，它们有真正的肺。如果它们在水下待太久， 反而会被淹死。鱼的皮肤薄且有渗透性， 当它们在水下时，必要的化合物能扩散进入、 也能离开鱼的身体。但在陆地上，这点对它们很不利，因为身体的水分会扩散到空气中。为了避免脱水，弹涂鱼 会像小狗一样在泥里打滚。但肺鱼却独辟蹊径：干旱季节，所在河流干涸，它会把自己埋进土里， 用粘液茧把身体裹住。像这样它可以存活数年，直到下次大暴雨才会复苏。两栖鱼用强壮的鳍在陆上行走，并用它聪明的触须进行导航。诺波利攀岩虾虎鱼仅几厘米长，能攀爬数百米高的夏威夷瀑布，它会交替使用嘴和腹鳍上的吸盘，慢慢地往上爬。为了在陆地上找水，加拿大底鳉像多数两栖鱼一样， 会寻找反光的表面。其它种类的鱼，如食蚊鱼，用内耳判断该往斜坡的哪个方向走，这取决于它们下坡时找到水的可能性。而蟾胡鲶则利用覆盖身体的味蕾来导航。味蕾集中在它的胡须上，通过挥动胡须感知空中的化合物，来感知水域的距离和水质，以及有无猎物。蟾胡鲶会向着诱人的 挥发性氨基酸而去，但会躲开散发硫化氢的污秽水域。虽然两栖鱼在离开水时 面临许多新挑战，但它们已进化出了巧妙的方法 来克服这些挑战。面对干旱和洪水，它们适应力很强，还能找到新猎物，它们也有逃离竞争、污染 或不健康环境的 B 计划。虽然 “如鱼离水” 往往会认为是件坏事，但对这些物种来说， 离水却让它们有无可争辩的优势。

**P904 2020-09-03 Are all of your memories real - Daniel L. Schacter**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=904)

In a study in the 1990s, participants recalled getting lost in a shopping mall as children. Some shared these memories in vivid detail— one even remembered that the old man who rescued him was wearing a flannel shirt. But none of these people had actually gotten lost in a mall. They produced these false memories when the psychologists conducting the study told them they’d gotten lost, and although they might not remember the incident, their parents had confirmed it. And it wasn’t just one or two people who thought they remembered getting lost— a quarter of the participants did. These findings may sound unbelievable, but they actually reflect a very common experience. Our memories are sometimes unreliable. And though we still don’t know precisely what causes this fallibility on a neurological level, research has highlighted some of the most common ways our memories diverge from what actually happened. The mall study highlights how we can incorporate information from outside sources, like other people or the news, into our personal recollections without realizing it. This kind of suggestibility is just one influence on our memories. Take another study, in which researchers briefly showed a random collection of photographs to a group of participants, including images of a university campus none of them had ever visited. When shown the images three weeks later, a majority of participants said that they had probably or definitely visited the campus in the past. The participants misattributed information from one context— an image they’d seen— onto another— a memory of something they believed they actually experienced. In another experiment, people were shown an image of a magnifying glass, and then told to imagine a lollipop. They frequently recalled that they saw the magnifying glass and the lollipop. They struggled to link the objects to the correct context— whether they actually saw them, or simply imagined them. Another study, where a psychologist questioned over 2,000 people on their views about the legalization of marijuana, highlights yet another kind of influence on memory. Participants answered questions in 1973 and 1982. Those who said they had supported marijuana legalization in 1973, but reported they were against it in 1982, were more likely to recall that they were actually against legalization in 1973— bringing their old views in line with their current ones. Our current opinions, feelings, and experiences can bias our memories of how we felt in the past. In another study, researchers gave two groups of participants background information on a historical war and asked them to rate the likelihood that each side would win. They gave each group the same information, except that they only told one group who had actually won the war— the other group didn’t know the real world outcome. In theory, both groups’ answers should be similar, because the likelihood of each side winning isn’t effected by who actually won— if there’s a 20% chance of thunderstorms, and a thunderstorm happens, the chance of thunderstorms doesn’t retroactively go up to 100%. Still, the group that knew how the war ended rated the winning side as more likely to win than the group who did not. All of these fallibilities of memory can have real-world impacts. If police interrogations use leading questions with eye witnesses or suspects, suggestibility could result in incorrect identifications or unreliable confessions. Even in the absence of leading questions, misattribution can lead to inaccurate eyewitness testimony. In a courtroom, if a judge rules a piece of evidence inadmissible and tells jurors to disregard it, they may not be able to do so. In a medical setting, if a patient seeks a second opinion and the second physician is aware of the first one’s diagnosis, that knowledge may bias their conclusion. Our memories are not ironclad representations of reality, but subjective perceptions. And there’s not necessarily anything wrong with that— the problems arise when we treat memory as fact, rather than accepting this fundamental truth about the nature of our recollections.

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翻译人员: C Cheng 校对人员: Su Wang在上世纪 90 年代的一项研究中，参与者回忆了他们童年时 在购物中心走失的经历。一些人用生动的细节 叙述了这些记忆——其中一人甚至记得 那个营救他的老人穿着一件法兰绒衬衣。但是，事实上，这些人 都不曾在购物中心走失过。他们制造了这些虚假记忆，只因为他们从进行该研究的 心理学家那里得知他们曾经走失过。虽然他们不一定记得这件事，但是他们的父母对此加以了证实。而且并非只有一两个人认为 他们曾走失过——1/4 的参与者都认为如此。这个调查结果可能听起来难以置信，但却反映了一个非常普遍的现象。我们的记忆有时并不可靠。虽然在神经学上， 我们还不能确切地知道是什么造成了这种易错性，但研究人员强调了几个最常见的造成记忆背离事实的途径。这个与购物中心相关的研究 重点展示了我们如何把来自外界的信息，比如来自他人或者新闻的信息，整合到我们的个人记忆中， 却对此浑然不觉。这种暗示只是 影响记忆的一种方式。以另一项研究为例，研究中，研究人员快速地 把一组随机收集的照片展示给一组参与者。其中一些图像是一所 他们从没去过的大学校园。三个星期后， 当再次看到这些图像时，大部分参与者表示他们以前可能或肯定去过这个校园。参与者把来自某一场景中的信息—— 一幅曾经见过的图像——错误地判断为来自另一个场景——对某些 自认为真实经历过的事件的记忆。还有一项实验，它向人们 展示了一幅放大镜的图像，然后让他们想象一支棒棒糖。他们的回忆经常是 既见过放大镜，也见过棒棒糖。他们努力将物体与 正确的场景联系起来——不论是实际上看到的还是想象的。在另一项实验中， 心理学家询问了 2000 多人对大麻合法化的看法。这个实验强调了 对记忆的另一种影响方式。参与者分别在 1973 和 1982 年对该问题做了回答。那些在 1973 年支持大麻合法化，却在 1982 年对此表示反对的人更有可能记得他们 在 1973 年是反对合法化的——即他们的旧观点与 当前观点保持一致。我们当前的意见、感觉和经历可以使我们对过去的感知 产生偏颇的记忆。在另一项研究中，研究人员为两组参与者提供了 一场历史战争的背景资料，并要求他们评估各方取胜的可能性。他们为两个组提供了相同的信息，但是只告知了其中一组 哪一方实际上赢得了这场战争——另一组并不知道实际战果。从理论上讲， 两个组的答案应该相近，因为各方取胜的可能性不应受到实际战战果的影响——就像如果发生雷雨的可能性是 20%， 而它确实发生了，但发生雷雨的可能性 并不会因此而追升为 100%。尽管如此， 知道实际战果的那一组与不知道的一组相比， 认为胜利的一方更有取胜的可能性。所有这些记忆的易错性 都可能对现实世界产生影响。如果警方在审讯时，对目击证人 或者嫌疑犯使用了引导性问题，其暗示性可能会造成 错误的身份鉴别或不可靠的供状。即使没有引导性的询问，张冠李戴也可以导致 错误的目击者证词。在法庭上，如果法官裁定某条证据不足采纳，并要求陪审团将其忽视， 他们可能做不到这一点。在医疗场景里， 如果患者请求重新诊断，而第二个医生对之前的 诊断有所了解的话，医生的结论可能会因此而产生偏差。我们的记忆并不是 对现实的铁定描述，而是主观认知。这并不一定是个错误——问题出现在 我们把记忆当作事实，而不接受这个基本的关于记忆本质的事实。

**P905 2020-09-04 A day in the life of an ancient Greek architect - Mark Robinson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=905)

As dawn breaks over Athens, Pheidias is already late for work. The year is 432 BCE, and he’s the architekton, or chief builder, for the Parthenon— Athens’ newest and largest temple. When completed, his masterpiece will be an enormous shrine to the goddess Athena, and a testament to the glory of the Athenians. But when he arrives onsite he finds five epistatai, or city officials, waiting to confront him. They accuse Pheidias of embezzling gold designated for the temple’s sacred central statue. He has until sundown to provide all the temple’s expenses and account for every flake of gold— or face the judgement of the courts. Though he’s insulted by these false charges, Pheidias isn’t surprised. Pericles, the politician who commissioned the Parthenon, has many enemies in city government, and this project is somewhat controversial. The public is expecting a classic temple in the Doric style: simple columns supporting a horizontal entablature, crowned with a triangular roof. But Pheidias’ plans are far more radical by Athenian standards. His designs combine Doric columns with a sweeping Ionic frieze, hosting a vast panorama of the city’s Great Panathenaic festival. Not only will this sculpture show humans and gods side by side— something never before seen in a temple’s décor— it will also cost much more than the traditional approach. Praying to the Gods that his colleagues have been keeping track of their spending, Pheidias sets off to prove his innocence. First, he checks in with his architects Iktinos and Callicrates. Rather than using a blueprint, they pore over the syngraphai, or general plan, and paradeigma, a 3D model. Without an exact blueprint, the team often has to resolve issues in real time, guided only by careful calculation and their instinct for symmetry. Maintaining this symmetry has proven especially difficult. The Parthenon is built on a curve with the columns leaning slightly inwards. To project strength, and potentially keep the columns looking straight from a distance, the architects incorporated entasis, or slight bulging, in each column. For the temple’s other elements, the team calculates symmetry by employing relatively consistent proportions across the design. But their shifting plans require constant recalculations. After helping solve one such computation, Pheidias collects his colleagues’ gold records and heads off to receive a special delivery. Immense marble blocks for the Parthenon’s pediment have just arrived from quarries at Mount Pentelikon. The usual ramps would collapse under the weight of these 2 to 3 ton stone blocks, so Pheidias orders the construction of new pulleys. After recording the additional expense and supervising the construction all afternoon, he finally arrives at the sculpture workshop. His sculptors are carving 92 mythical scenes, or metopes, to decorate the temple. Every carving depicts fighting from different epic battles— each a mythical representation of Greece’s victory over Persia about 40 years earlier. No temple has ever used so many metopes before, and each scene adds to the temple’s ballooning expenses. Finally, Pheidias turns to his primary responsibility, and the focal point of the entire temple. Covered in thick layers of gold, minutely decorated, and towering above her worshippers, this will be a statue of the city’s patron and protector: Athena Parthenos. When the temple is complete, throngs will gather on its perimeter— offering prayers, performing sacrifices, and pouring libations for the goddess of wisdom. Pheidias spends the rest of the day designing finishing touches for the statue, and as the light fades, the epistatai arrive to confront him. After looming over his records, they look up triumphantly. Pheidias may have accounted for the temple’s general spending, but his records show no mention of the statue’s gold. At that moment, Pericles himself arrives to save his chief builder. The temple’s sponsor tells them that all the gold on the statue can be removed and weighed individually to prove Pheidias’ innocence. Assigning laborers to the task— and charging the officials to watch them late into the night— Pheidias and his patron leave their adversaries to the mercy of mighty Athena.

**P905 2020-09-04 A day in the life of an ancient Greek architect - Mark Robinson**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=905)

翻译人员: Elena W 校对人员: Yolanda Zhang雅典黎明时分， 菲迪亚斯上班已经迟到了。现在是公元前 432 年，菲迪亚斯是帕特农神庙——雅典最新最大的 一座神庙的首席建筑师。完成之时，他的杰作将成为 雅典娜女神的圣殿，也是雅典人荣耀的见证。但当他来到建筑工地时，等待他的是 5 位城管。他们指控菲迪亚斯盗用了那些本要用来建造 神庙中央雕像的黄金。在太阳下山之前， 他必须拿出整个建筑工程以及每一片黄金用途的开销明细—— 否则他将面对法庭的审判。虽然菲迪亚斯觉得被诬告侮辱， 但这完全在他意料之中。伯里克利， 负责建造神庙的政治家，在政府当中有许多敌人。这个项目本身也备受争议。百姓们希望看到 一座多立克式的古典神庙：简单的圆柱支撑着楣构，顶部有着三角形的屋顶。但菲迪亚斯的计划 在雅典人眼中是相当极端的。他的设计结合了多立克柱式 和爱奥尼式的雕带，展示着泛雅典娜节 当日城市的风景。这座雕像不仅 将人与神并肩展示——这在以前的神庙装饰 中从未出现过——它的成本也比 传统神庙高出不少。向神明祈祷希望同事 一直都有记录花费之后，菲迪亚斯出发去证明他的清白。首先，他找到了建筑师们， 伊克提诺斯和卡拉克拉特。他们没有使用蓝图，而是仔细研究了总体规划书以及建筑的 3D 模型。因为没有明确的蓝图，团队只能依靠 精细的计算以及对于对称性的直觉，一边建造一边解决问题，事实证明，维持这种 对称性是非常困难的。帕特农神庙建造在弧面上， 柱子稍微向内弯曲。为了结构稳固，以及确保圆柱从远处 看起来是直的，建筑师们在每一根圆柱上 都添加了轻微的凸起。而对于神庙的其他元素，团队通过设计中 比较一致的比例来计算对称性。但他们不断变更的计划 需要经常重新计算。在完成了一个这样的计算后，菲迪亚斯从同事那里 拿到了黄金消费的记录，然后出发去收取 一件特殊的货物。神庙三角形楣饰 需要的巨型大理石刚从潘特利康山的采石场运来。普通的坡道会在这些 2 到 3 吨重的 石块的重压下倒塌，所以菲迪亚斯 下令建造新的滑轮。在记录下额外的费用并监督了整个下午的施工后，菲迪亚斯终于 来到雕像的工作坊。他的雕塑家们正在 雕刻 92 个用来装饰神庙的神话场景。每一个雕刻都讲述了 不同的史诗级战斗场面——描绘着希腊 40 年前战胜波斯的场景。从来没有神庙使用过 这么多神话场景，每一个都让神庙的费用大增。最后，菲迪亚斯 回到他的首要责任，也是整座神庙的焦点。覆盖了层层黄金、装饰精心、高高耸立在崇拜者之上的雅典的守护者与保护者： 处女雅典娜。神庙完成之时， 大批人潮将聚集此地向这位智慧女神祷告、献祭、奠酒。菲迪亚斯用剩下的时间来设计雕像的收尾工作。当光线逐渐暗淡时， 圣公会已经赶来，准备与他对质。看到他的记录后， 他们得意洋洋地望向他。菲迪亚斯虽然记载了 神庙的总体开销，但他的记录里并没有 提到建造雕像使用的黄金。这时，伯里克利亲自前来 解救自己的首席建筑师。伯里克利告诉他们， 雕像上的黄金可以可以被全部移除并一一称重， 由此证明菲迪亚斯的清白。在分配完执行 这项任务的工人以及看官他们的官员后，菲迪亚斯和他的恩人 将他们的对手交到了雅典娜女神的手下。

**P906 2020-09-04 The Japanese folktale of the selfish scholar - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=906)

In ancient Kyoto, a devout Shinto scholar lived a simple life, but he was often distracted from his prayers by the bustling city. He felt that his neighbors were polluting his soul, and he sought to perform some kind of personal harae— a purification ritual that would cleanse his body and his mind. He decided to travel to the revered Hie Shrine. The trip was an arduous climb that took all day. But he was glad for the solitude it afforded him, and the peace he felt upon returning home was profound. The scholar was determined to maintain this clarity for as long as possible, and resolved to make this pilgrimage another 99 times. He would walk the path alone, ignoring any distractions in his quest for balance, and never straying from his purpose. The man was true to his word, and as days stretched into weeks, he walked through driving rain and searing sun. Over time, his devotion revealed the invisible world of spirits which exists alongside our own. He began to sense the kami, which animated the rocks underfoot, the breeze that cooled him, and the animals grazing in the fields. Still he spoke to no one, spirit or human. He was determined to avoid contact with those who had strayed from the path and become polluted with kegare. This taboo of defilement hung over the sick and deceased, as well as those who defiled the land or committed violent crimes. Of all of the threats to the scholar’s quest for spiritual purity, kegare was by far the greatest. After paying his respects for the 80th time, he set out for home once more. But as darkness fell, he heard strained sobs in the night air. The scholar tried to push forward and ignore the moans. But the desperate cries overwhelmed him. Grimacing, he left his path to follow the sound to its source. He soon came to a cramped cottage, with a woman crumpled outside. Filled with pity, the scholar implored the woman to share her sorrow. She explained that her mother had just died— but no one would help her with the burial. At that news, his heart sank. Touching the body would defile his spirit, draining his life force and leaving him forsaken by the kami. But as he listened to her cries, his sympathy soared. And so, they buried the old woman together, to ensure her safe passage into the spirit world. The burial was complete, but the taboo of death weighed heavily on the scholar. How could he have been so foolish, to shirk his most important rule and corrupt his divine journey? After a tormented night, he resolved to go back to the shrine to cleanse himself. To his surprise, the usually quiet temple was filled with people, all gathering around a medium who communicated directly with the kami. The man hid himself, not daring approach in case anyone glimpse his polluted soul. But the medium had other ways of seeing, and called him forward from the crowd. Ready to be forsaken, the scholar approached the holy woman. But the medium merely smiled. She took his impure hand in hers, and whispered a blessing only he could hear— thanking him for his kindness. In that moment, the scholar discovered a great spiritual secret: contamination and corruption are two very different things. Filled with insight, the scholar set himself back on his journey. But this time, he stopped to help those he met. He began to see the beauty of the spirit world everywhere he went, even in the city he'd previously shunned. Others cautioned that he risked kegare— but he never told them why he so freely mingled with the sick and disadvantaged. For he knew that people could only truly understand harae through a journey of their own.

**P906 2020-09-04 The Japanese folktale of the selfish scholar - Iseult Gillespie**

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翻译人员: C Cheng 校对人员: Haylin Qin在古代的京都，一位虔诚的 神道教书生过着简朴的生活。但是，他常常因为熙熙攘攘的 城市而无法专心祈祷。他觉得他的邻居 正在污染他的的灵魂，于是他设法举行某种私人的祓——一种可以净化身心的仪式。他决定前往受人敬仰的日枝神社。这次旅程是一整日艰苦的攀登。但是他对因此而得到 独处的机会而感到高兴。回到家时， 他感受到了巨大的平静。书生决意要尽可能长久地 保持这种清晰的状态，并下定决心再进行 99 次这样的朝圣。他将独自行走， 为了寻求平衡而无视任何干扰，也绝不背离他的目标。这个人说到做到。 随着时间一天天过去，他走过了瓢泼的大雨 和灼热的骄阳。久而久之，他的虔诚 揭示了不可见、但与我们的世界并存的灵界。他开始体会到神的存在， 它使脚下的岩石、凉爽的微风和田间 吃草的动物都活了起来。他依旧不与任何人交谈， 不论是灵魂，还是人类。他决意避免接触那些偏离正轨，而被霉气污染了的人——这种亵渎的禁忌笼罩着病人和死者，以及那些玷污了大地 或犯下了暴力罪行的人。在所有威胁到书生追求 心灵纯净的事物中，霉气是最大的威胁。在第 80 次朝拜之后，他再次出发回家。但是，当夜幕降临时， 他听到暮色中有抽泣的声音。书生试图继续前行， 忽视这个呜咽之声。但是那个绝望的哭声 令他难以承受。他咧了咧嘴，寻声溯源， 而背离了原本的路。很快，他来到了一间小屋， 一位女子瘫倒在屋外。满怀同情的书生 询问女子悲伤的缘由。她解释说， 她的母亲刚刚过世——但是没人愿意帮她埋葬母亲。听到这个消息， 他的心沉了一下。接触尸体会玷污他的精神，消耗他的生命力， 还会让他遭到神的唾弃。但是，听到她的哭声， 他实在难掩心中的同情。于是，他们一起 埋葬了那位老妇人，以确保她能安全地跨入灵界。埋葬结束了，但是死亡的禁忌 却给书生带来了沉重的负担。他怎么会如此愚蠢，忽视了他最重要的原则， 并且毁了自己的神界之旅？一夜煎熬之后，他决心回神庙去净化自己。让他感到惊讶的是， 通常清净的寺庙里挤满了人。大家都聚集在一位巫女的周围， 她可以直接与神交流。他躲了起来，不敢靠近， 以免被人瞥见他不洁的灵魂。但是巫女另有观人之道， 并把他从人群中叫上前来。做好了被神唾弃的准备， 书生走向了那位圣女。但是，巫女只是微笑而已。她握住他不洁的手，耳语了一句只有他 才能听到的祝福——感谢他的仁慈。在那一刻，书生发现了 一个重大的心灵奥秘：污染与腐败是 截然不同的两回事。经历了彻悟的书生重又启程。但是这次，他不断停下来 帮助他所遇到的人。不论走到哪里，他都开始 领略到灵界之美，甚至是在他曾经逃避的城市里。别人告诫说， 他有冲撞霉气的风险——但是，他从来没有告诉过他们， 他为什么会如此自如地与病人和弱势的人相交往。因为他知道，人们只有通过 自己的跋涉才能真正理解祓。

**P907 2020-09-10 A brief history of plastic**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=907)

Today, plastics are everywhere. All of this plastic originated from one small object— that isn’t even made of plastic. For centuries, billiard balls were made of ivory from elephant tusks. But when excessive hunting caused elephant populations to decline in the 19th century, billiard balls makers began to look for alternatives, offering huge rewards. So in 1863 an American named John Wesley Hyatt took up the challenge. Over the next five years, he invented a new material called celluloid, made from cellulose, a compound found in wood and straw. Hyatt soon discovered celluloid couldn’t solve the billiard ball problem–– the material wasn’t heavy enough and didn’t bounce quite right. But it could be tinted and patterned to mimic more expensive materials like coral, tortoiseshell, amber, and mother-of-pearl. He had created what became known as the first plastic. The word ‘plastic’ can describe any material made of polymers, which are just the large molecules consisting of the same repeating subunit. This includes all human-made plastics, as well as many of the materials found in living things. But in general, when people refer to plastics, they’re referring to synthetic materials. The unifying feature of these is that they start out soft and malleable and can be molded into a particular shape. Despite taking the prize as the first official plastic, celluloid was highly flammable, which made production risky. So inventors began to hunt for alternatives. In 1907 a chemist combined phenol— a waste product of coal tar— and formaldehyde, creating a hardy new polymer called bakelite. Bakelite was much less flammable than celluloid and the raw materials used to make it were more readily available. Bakelite was only the beginning. In the 1920s, researchers first commercially developed polystyrene, a spongy plastic used in insulation. Soon after came polyvinyl chloride, or vinyl, which was flexible yet hardy. Acrylics created transparent, shatter-proof panels that mimicked glass. And in the 1930s nylon took centre stage— a polymer designed to mimic silk, but with many times its strength. Starting in 1933, polyethylene became one of the most versatile plastics, still used today to make everything from grocery bags, to shampoo bottles, to bulletproof vests. New manufacturing technologies accompanied this explosion of materials. The invention of a technique called injection-moulding made it possible to insert melted plastics into molds of any shape, where they would rapidly harden. This created possibilities for products in new varieties and shapes— and a way to inexpensively and rapidly produce plastics at scale. Scientists hoped this economical new material would make items that once had been unaffordable accessible to more people. Instead, plastics were pushed into service in World War Two. During the war, plastic production in the United States quadrupled. Soldiers wore new plastic helmet liners and water-resistant vinyl raincoats. Pilots sat in cockpits made of plexiglass, a shatterproof plastic, and relied on parachutes made of resilient nylon. Afterwards, plastic manufacturing companies that had sprung up during wartime turned their attention to consumer products. Plastics began to replace other materials like wood, glass, and fabric in furniture, clothing, shoes, televisions, and radios. Versatile plastics opened up possibilities for packaging— mainly designed to keep food and other products fresh for longer. Suddenly, there were plastic garbage bags, stretchy plastic wrap, squeezable plastic bottles, takeaway cartons, and plastic containers for fruit, vegetables, and meat. Within just a few decades, this multifaceted material ushered in what became known as the “plastics century.” While the plastics century brought convenience and cost-effectiveness, it also created staggering environmental problems. Many plastics are made of nonrenewable resources. And plastic packaging was designed to be single-use, but some plastics take centuries to decompose, creating a huge build up of waste. This century we’ll have to concentrate our innovations on addressing those problems— by reducing plastic use, developing biodegradable plastics, and finding new ways to recycle existing plastic.

**P907 2020-09-10 A brief history of plastic**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=907)

翻译人员: tina ti 校对人员: Yanyan Hong如今，塑料无处不在。这些塑料都源于一个小物体——一个甚至都不是由塑料组成的物体。几个世纪以来， 台球都是由象牙制成的。但在 19 世纪，当过度捕杀导致大象数量减少，台球制作者开始重赏求材， 寻找新的替代物。于是在 1863 年，一位美国人名为约翰 · 卫斯理 · 凯悦 （John Wesley Hyatt）接受了挑战。随后五年里，他发明了 一种新的材料叫赛璐珞，由纤维素制成，一种存在于木头和稻草中的化合物 。凯悦很快就发现赛璐珞 不能解决台球的问题——其材质并不够重， 球弹跳得也不太对。但赛璐珞可以上色和印图案，去模仿更加昂贵的材料，比如珊瑚，玳瑁壳，琥珀和珍珠母。他制造了我们所知道的塑料。“塑料”一词用来形容 由聚合物制成的任何材质，即由重复的亚基组成的大分子。这包含了所有人造的塑料，以及很多生物中发现的物质。但通常，当大家提及塑料，他们指的是合成材料。这些材料的共性就是 起初柔软且可塑性高，可以塑造成特定的形状。除了赛璐珞赢得了 第一个正式的塑料荣誉，赛璐珞是高度易燃品， 这给生产过程带来风险，所以发明者开始去寻找替代品。在 1907 年，一个化学家结合石碳酸，——一种煤焦油的产物——与甲醛，创造出一种 坚固的新型化合物叫酚醛树脂。相比赛璐珞，酚醛树脂不太易燃，以及组成酚醛树脂的原材料更容易得到。酚醛树脂仅仅只是开始。20 年代，研究者首次 开发商业的聚苯乙烯，一种用于隔热的海绵似的的塑料。不久后，灵活且坚硬的 聚氯乙烯或乙烯基诞生了。丙烯酸创造了透明、 抗震板，仿似玻璃。而在 1930 年尼龙成为了新焦点——一种模仿绸缎丝绸而设计的， 却倍加坚韧的聚合物。自从 1933 年，聚乙烯 成为了最多功能的塑料之一，至今，许多东西仍然用它制成， 从购物袋，到洗发液的瓶子，还有防弹背心。新的制造技术伴随着材料的兴起。有个叫做注塑成型的技术创新，它可以在任何形状的 模具里面注入融化的塑料，然后迅速成形。这技术可以生产出 各种各样形状的产品，这也成为廉价、快速， 大批量生产塑料的方式。科学家们希望这种经济实惠的新材料所制造出的产品，能让原本 高价的产品供更多人使用。然而，塑料运用在二战期间。在战争期间， 美国的塑料生产量翻了四倍。士兵们戴着新的塑料头盔衬垫 以及防水的乙烯基雨衣。飞行员坐在由树脂玻璃—— 一种防碎的塑料——制成的驾驶舱，并依靠着由弹性的 尼龙制成的降落伞。此后，从战争时期崛起的塑料制造商把重心转移到消费品。塑料开始取代其他的材料，比如木材，玻璃和布料等用来制造家具，衣服，鞋子，电视和收音机。多功能的塑料为包装业带来新的可能，主要用于延长食品和其他产品保质期。突然间，出现了 塑料垃圾袋，弹性保鲜膜，可挤压的塑料瓶，外卖盒，装水果，蔬菜和肉的塑料盒。就在这短短的几十年， 这个多功能的材料迎来了大家所熟知的 “塑料世纪”。尽管塑料世纪带来了 便利以及经济实惠，它也造成了巨大的环境问题。很多塑料是由不可再生 资源所制成的。我们将塑料包装设计成一次性产品。但是，一些塑料甚至 要花好几世纪才能降解，这导致了很多的废物堆积。这个世纪， 我们得注重创新的解决办法，通过减少塑料使用， 发展可生物降解的塑料，并寻求新方式来回收现有的塑料。

**P908 2020-09-10 Is human evolution speeding up or slowing down - Laurence Hurst**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=908)

The Tibetan high plateau lies about 4500 meters above sea level, with only 60% of the oxygen found below. While visitors and recent settlers struggle with altitude sickness, native Tibetans sprint up mountains. This ability comes not from training or practice, but from changes to a few genes that allow their bodies to make the most of limited oxygen. These differences are apparent from birth— Tibetan babies have, on average, higher birth weights, higher oxygen saturation, and are much likelier to survive than other babies born in this environment. These genetic changes are estimated to have evolved over the last 3,000 years or so, and are ongoing. That may sound like a long time, but would be the fastest an adaptation has ever evolved in a human population. It’s clear that human evolution isn’t over— so what are other recent changes? And will our technological and scientific innovations impact our evolution? In the past few thousand years, many populations have evolved genetic adaptations to their local environments. People in Siberia and the high arctic are uniquely adapted to survive extreme cold. They’re slower to develop frostbite, and can continue to use their hands in subzero temperatures much longer than most people. They’ve undergone selection for a higher metabolic rate that increases heat production. Further south, the Bajau people of southeast Asia can dive 70 meters and stay underwater for almost fifteen minutes. Over thousands of years living as nomadic hunters at sea, they have genetically-hardwired unusually large spleens that act as oxygen stores, enabling them to stay underwater for longer— an adaptation similar to that of deep diving seals. Though it may seem pedestrian by comparison, the ability to drink milk is another such adaptation. All mammals can drink their mother’s milk as babies. After weaning they switch off the gene that allows them to digest milk. But communities in sub-Saharan Africa, the middle east and northwest Europe that used cows for milk have seen a rapid increase in DNA variants that prevent the gene from switching off over the last 7 to 8000 years. At least in Europe, milk drinking may have given people a source of calcium to aid in vitamin D production, as they moved north and sunlight, the usual source of vitamin D, decreased. Though not always in obvious ways, all of these changes improve people’s chance of surviving to reproductive age— that’s what drives natural selection, the force behind all these evolutionary changes. Modern medicine removes many of these selective pressures by keeping us alive when our genes, sometimes combined with infectious diseases, would have killed us. Antibiotics, vaccines, clean water and good sanitation all make differences between our genes less important. Similarly, our ability to cure childhood cancers, surgically extract inflamed appendixes, and deliver babies whose mothers have life-threatening pregnancy-specific conditions, all tend to stop selection by allowing more people to survive to a reproductive age. But even if every person on Earth has access to modern medicine, it won’t spell the end of human evolution. That’s because there are other aspects of evolution besides natural selection. Modern medicine makes genetic variation that would have been subject to natural selection subject to what’s called genetic drift instead. With genetic drift, genetic differences vary randomly within a population. On a genetic level, modern medicine might actually increase variety, because harmful mutations don’t kill people and thus aren’t eliminated. This variation doesn’t necessarily translate to observable, or phenotypic, differences among people, however. Researchers have also been investigating whether genetic adaptations to a specific environment could appear very quickly through epigenetic modification: changes not to genes themselves, but to whether and when certain genes are expressed. These changes can happen during a lifetime, and may even be passed to offspring— but so far researchers are conflicted over whether epigenetic modifications can really persist over many generations and lead to lasting changes in populations. There may also be other contributors to human evolution. Modern medicine and technology are very new, even compared to the quickest, most recent changes by natural selection— so only time can tell how our present will shape our future.

**P908 2020-09-10 Is human evolution speeding up or slowing down - Laurence Hurst**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=908)

翻译人员: Yuyang Liu 校对人员: Cissy Yun在海拔4500米高的青藏高原上，氧气含量只有平原上的60%。当游客和新定居者 饱受高原反应困扰时，西藏人却可以轻松地爬上山。这不是通过训练或练习得来的，而是因为某些基因的不同，让身体可以充分利用有限的氧气。这些变化从出生就开始了——有当地血统的婴儿 平均有更长的身长，更高的血氧饱和度，比当地出生的其他婴儿更易存活。这些遗传性变化估计 从三千年前开始，并且仍在进化。三千年听起来很长，但在人类所有适应进化中是最快的。人类的进化从未停止——那么最近有哪些变化呢？科技发展会影响人类进化的过程吗？在过去几千年中，很多人类族群进化出了 适应当地环境的基因。比如西伯利亚人和北极人 可以在极端寒冷中生活。他们比常人更难长冻疮，同时在零下温度中，可以用手劳作更长的时间。他们有更高的新陈代谢率，产生更多热量来挺过自然选择的考验。而在南边，东南亚的巴茹人 可以潜入70米水深，并在水里停留15分钟。作为在海上生活几千年的“游牧民族”，他们拥有与生俱来的 更大的脾，可以存储氧气，帮助他们在水下停留更长时间——就像海豹的遗传适应一样。虽然和前面比起来较平凡，但饮奶也是另一种适应。所有哺乳动物在婴儿时期都喝母乳。断奶后他们会关闭消化奶类的基因。在撒哈拉沙漠以南非洲、 中东和欧洲西北部，养牛饮奶的族群中， 出现DNA变体的激增，在过去七、八千年里 阻止了消化奶类基因的关闭。在欧洲，人们需要饮奶吸收钙元素，来帮助人体制造维生素D。 因为当他们往北迁徙时，提供维生素D的阳光会逐渐减少。虽然不总是以明显的方式，这些变化都提高了 人们达到生育年龄前的存活率——这驱动着自然选择，在背后推动所有进化的力量。现代医学解决了 很多类似的选择压力，比如说，在我们的基因遇到致命传染病时，保护了我们的生命。抗生素、疫苗、净水 以及良好的卫生环境，都让我们基因上的不同 变得没那么重要。在相同情况下， 可以治疗儿童癌症、做阑尾炎手术、在孕妇有生命危险时成功接生，都阻止了自然选择， 让更多人活下来，直到健康成长到生育年龄。但即使地球上每个人 都能得到现代医学的治疗，人类的进化也不会由此终止。因为除了自然选择， 依然有其他进化的因素。现代医学让遗传变异，从原本的服从自然选择，变为服从遗传漂移。遗传漂移让族群里的基因差异随机变化。从遗传学角度来说， 现代医学会让基因多样性增加，因为有害的基因突变 不再致死并被延续下来。不过，这些变异不一定会造成 能被观察到的、表型的差异。研究者们也正在探究在特定环境下快速产生的遗传适应是否与表观遗传修饰有关：不是因为基因本身变化，而是根据一些基因 是否或何时会被表达。遗传适应的变化是终生的，甚至可能传给后代。但到目前为止，研究者 仍在争论表观遗传修饰造成的变化是否可以传给多代后代，对族群造成长久的影响。此外可能也有其他因素 影响着人类的进化。即使与自然选择所带来的 最新最快的变化相比，现代医学技术发展时长较短——只有时间能告诉我们 现在会如何影响未来。

**P909 2020-09-11 'Jabberwocky' - One of literature's best bits of nonsense**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=909)

Today we have a frabjous treat for you. This poem is full of seemingly nonsensical words that somehow manage to make sense. Ready to see if you can follow along? Without further ado, we present: "Jabberwocky" by Lewis Carroll. ’Twas brillig, and the slithy toves Did gyre and gimble in the wabe: All mimsy were the borogoves, And the mome raths outgrabe. “Beware the Jabberwock, my son! The jaws that bite, the claws that catch! Beware the Jubjub bird, and shun The frumious Bandersnatch!” He took his vorpal sword in hand; Long time the manxome foe he sought— So rested he by the Tumtum tree And stood awhile in thought. And, as in uffish thought he stood, The Jabberwock, with eyes of flame, Came whiffling through the tulgey wood, And burbled as it came! One, two! One, two! And through and through The vorpal blade went snicker-snack! He left it dead, and with its head He went galumphing back. “And hast thou slain the Jabberwock? Come to my arms, my beamish boy! O frabjous day! Callooh! Callay!” He chortled in his joy. ’Twas brillig, and the slithy toves Did gyre and gimble in the wabe: All mimsy were the borogoves, And the mome raths outgrabe.

**P909 2020-09-11 'Jabberwocky' - One of literature's best bits of nonsense**

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翻译人员: 子也 杜 校对人员: yolanda zhang今天，我们将送给你 一份别样的礼物。这首诗看似语无伦次，却又别有意味。准备好一探究竟了吗？闲话少说，我们开始吧：《不知所云》——路易斯·卡罗尔。 （贾文浩、贾文渊的意译版）空洞巨龙光滑如菱鲆， 蜿蜒蠕动， 缠绕如藤萝，转动裕如，摹仿诚可信，真伪难辨， 反应虽敏捷，难掩愚蠢。行文旅途谨防空洞巨龙， 误受其害难免裂肤伤心。书林漫步远避鸣禽聒噪， 浮华伴侣不啻鬼怪妖精。强壮双手紧握修辞利剑， 精悍青年依傍简练树干，犀利明眸搜索冗赘敌手， 片刻沉思脑中获益匪浅。他的思路正在驰骋纵横， 空洞巨龙此时乘风来临，一路飘来依然废话连篇， 眼冒凶光俨然咄咄逼人！砍剁突刺好个翻飞宝剑，修辞利刃一如雷鸣闪电，空洞巨龙终于身首异处， 年轻英雄这才挂剑凯旋。空洞巨龙毙命他的寒剑， 年轻英雄回到我们身边，欢呼庆贺难言胸中喜悦，欣喜骄傲绽开他的笑颜。光滑如菱鲆，蜿蜒蠕动， 缠绕如藤萝，转动裕如，摹仿诚可信，真伪难辨， 反应虽敏捷，难掩愚蠢。

**P910 2020-09-14 Is life meaningless And other absurd questions - Nina Medvinskaya**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=910)

Albert Camus grew up surrounded by violence. His homeland of Algeria was mired in conflict between native Algerians and colonizing French Europeans. He lost his father in the First World War, and was deemed unfit to fight in the second. Battling tuberculosis in France and confronting the war's devastation as a resistance journalist, Camus grew despondent. He couldn’t fathom any meaning behind all this endless bloodshed and suffering. He asked: if the world was meaningless, could our individual lives still hold value? Many of Camus’ contemporaries were exploring similar questions under the banner of a new philosophy called existentialism. Existentialists believed people were born as blank slates, each responsible for creating their life’s meaning amidst a chaotic world. But Camus rejected their school of thought. He argued all people were born with a shared human nature that bonded them toward common goals. One such goal was to seek out meaning despite the world’s arbitrary cruelty. Camus viewed humanity’s desire for meaning and the universe’s silent indifference as two incompatible puzzle pieces, and considered trying to fit them together to be fundamentally absurd. This tension became the heart of Camus’ Philosophy of the Absurd, which argued that life is inherently futile. Exploring how to live without meaning became the guiding question behind Camus’ early work, which he called his “cycle of the absurd.” The star of this cycle, and Camus’ first published novel, offers a rather bleak response. "The Stranger" follows Meursault, an emotionally detached young man who doesn’t attribute much meaning to anything. He doesn’t cry at his mother’s funeral, he supports his neighbor’s scheme to humiliate a woman, he even commits a violent crime — but Meaursault feels no remorse. For him the world is pointless and moral judgment has no place in it. This attitude creates hostility between Meursault and the orderly society he inhabits, slowly increasing his alienation until the novel’s explosive climax. Unlike his spurned protagonist, Camus was celebrated for his honest philosophy. "The Stranger" catapulted him to fame, and Camus continued producing works that explored the value of life amidst absurdity many of which circled back to the same philosophical question: if life is truly meaningless, is committing suicide the only rational response? Camus’ answer was an emphatic “no.” There may not be any explanation for our unjust world, but choosing to live regardless is the deepest expression of our genuine freedom. Camus explains this in one of his most famous essays which centers on the Greek myth of Sisyphus. Sisyphus was a king who cheated the gods, and was condemned to endlessly roll a boulder up a hill. The cruelty of his punishment lies in its singular futility, but Camus argues all of humanity is in the same position. And only when we accept the meaninglessness of our lives can we face the absurd with our heads held high. As Camus says, when the king chooses to begin his relentless task once more, “One must imagine Sisyphus happy.” Camus’ contemporaries weren’t so accepting of futility. Many existentialists advocated for violent revolution to upend systems they believed were depriving people of agency and purpose. Camus responded with his second set of work: the cycle of revolt. In "The Rebel," he explored rebellion as a creative act, rather than a destructive one. Camus believed that inverting power dynamics only led to an endless cycle of violence. Instead, the way to avoid needless bloodshed is to establish a public understanding of our shared human nature. Ironically, it was this cycle of relatively peaceful ideas that triggered his fallout with many fellow writers and philosophers. Despite the controversy, Camus began work on his most lengthy and personal novel yet: an autobiographical work entitled "The First Man." The novel was intended to be the first piece in a hopeful new direction: the cycle of love. But in 1960, Camus suddenly died in a car accident that can only be described as meaningless and absurd. While the world never saw his cycle of love, his cycles of revolt and absurdity continue to resonate with readers today. His concept of absurdity has become a part of world literature, 20th century philosophy, and even pop culture. Today, Camus remains a trusted guide for moments of uncertainty; his ideas defiantly imbuing a senseless world with inspiration rather than defeat.

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翻译人员: C Cheng 校对人员: Yanyan Hong阿尔贝·加缪（Albert Camus） 在暴力的环境中成长。他的家乡阿尔及利亚 深陷于当地阿尔及利亚人与法国欧洲殖民者之间的冲突之中。他在第一次世界大战中失去了父亲，第二次世界大战时， 被认定不适合参加战斗。他在法国与结核病抗争， 并以抵抗组织记者的身份直面战争的破坏， 这些经历让加缪变得沮丧。他无法在这些无止境的 杀戮与痛苦背后找到任何意义。他问道：如果这个世界毫无意义，那么我们个体的生命还有价值吗？许多与加缪同时代的人都在存在主义这一新的哲学领域的旗号下 探索着类似的问题。存在主义者认为 人生之初犹如一块白板，在这个混乱的世界里， 每个人都有责任为自己的生活创造意义。但是加缪不认同这一思想学派。他认为所有人都天生 具有一个共同的人类本性；这一本性将人们团结起来， 向共同的目标前进。目标之一就是即便世界残酷无常， 也要去寻找意义，在加缪看来，人类对意义的渴望 与宇宙无声的冷漠犹如拼图中无法兼容的两块；并且认为将它们拼在一起的尝试 从根本上讲是荒谬的。这个紧张关系成了 加缪荒诞哲学的核心，它主张生命原本就是徒劳的。探索如何无意义地生活是加缪早期作品的引导性问题，他将其称为“荒诞系列”。这个系列里的明星， 也是加缪出版的第一部小说，给出了一个非常惨淡的回应。《局外人》围绕莫梭展开， 他是一个情感疏离的年轻人，不赋予任何事物太多的意义。他在母亲的葬礼上，没有哭，他支持邻居去羞辱一位妇女，他甚至犯下一起暴力罪行—— 但是莫梭都没有感到懊悔。对他而言，这个世界毫无意义， 道德判断在此没有立足之地。这一态度让莫梭与他所处的有序社会之间产生了敌意，并且让他越来越疏离社会， 直至小说进入爆炸性高潮。与他笔下遭人摒弃的主人公不同， 加缪因其真诚的哲学而受到赞扬。《局外人》使加缪一夜成名， 他继续进行创作，他的作品探索了 生命在荒谬之中的价值。其中多部作品都围绕着 同一个哲学问题：如果生命真的毫无意义，那么自杀是否是唯一的理性回应？加缪的回答是一个决然的“不”。对于我们这个非正义的世界， 也许不存在任何解释，但是，即便如此，仍然选择活着是对真正自由的最深切表达。加缪在他最著名的一篇 短文中对此做了解释。短文以希腊神话西西弗斯为中心。西西弗斯是一位国王，他欺骗了神，因而被判处将永无止境地 将巨石滚上山顶。惩罚的残酷之处在于怎么做都是徒劳的。但是加缪主张整个人类 都处在同样的境遇之中。只有当我们接受了生命的无意义之后，我们才能昂首面对荒谬。如加缪所说，当国王选择 重新开始他那无止境的任务时，“人们必须想象西西弗斯是幸福的”。加缪的同时代人 并不太接受徒劳的命运，许多存在主义者倡导用 暴力革命来推翻现有制度。他们认为这些制度剥夺了 人民的行动力和目的性。加缪以他第二套作品 对此做了回应：“反抗系列”。在《反抗者》中，他将反抗作为一种创造性， 而非破坏性，的行动来探讨。加缪坚信颠倒权力的内在动力只会导致无休止的暴力循环。与之相反，要避免无谓的杀戮要做的是让公众理解 大家共用的人类天性。讽刺的是，正是这个 相对和平的思想系列引起了他与多位同行 作家和哲学家之间的不和。尽管存在着争议，加缪依然开始着手创作他迄今 最长、最为私人化的小说：他的自传名为《第一个人》。这部小说的本意是开启 一个满怀希望的新方向：“爱情系列”。但是，1960 年，加缪 突然在一起车祸中丧生。这一事件只能被形容为 毫无意义，荒谬无稽。虽然世界将永远无法看到他的爱情系列，但是他的反抗与荒谬系列 迄今仍在读者中产生着共鸣。他关于荒谬的概念已经成为世界文学，20 世纪哲学， 甚至是大众文化的一部分。如今，在充满未知的时刻， 加缪仍然是一位值得信赖的引领者。他的思想以抗争的姿态 为这个无意义的世界灌注了灵感而非挫败。

**P911 2020-09-16 The World Machine \_ Think Like A Coder, Ep 10**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=911)

As Ethic falls, she remembers. She remembers the world before they unearthed the crystal. She remembers the glee she felt when she built her first robot. But mostly she remembers the friends she’s made these last few days: courageous Adila and her resistance movement. Octavia’s sacrifice to keep the guards distracted. Lemma and her idealistic drive to cure everyone. And Hedge. Her creation, her responsibility, her failure… her betrayer. Hedge, who convinced her to collect the three nodes that she never actually needed. For Ethic remembers how to operate the World Machine. If only she could get a second chance at it. Adila has been in radio contact with Octavia, whom the robots captured and imprisoned in the same jail that held Ethic. Ethic explains that Hedge has manipulated them all, and will now try to break down the Bradbarrier and cover the entire world in a giant maze, unless they can stop him. But she has a plan: Ethic herself will go to the crystal at the center of the maze and use its powers to stop Hedge. Meanwhile, Adila and Lemma will do whatever they can to slow Hedge down. As Ethic weaves her way towards the innermost maze, her radio picks up a transmission. Octavia has freed hundreds of members of the resistance from stasis. Together, they’ve staged a jailbreak and overwhelmed the guards. The resistance has access to the World Machine, but they don’t know how to use it; they’ll need Ethic for that. All they have at their disposal are nearly limitless spools of wire. The strands are durable, but prisoners can break them deliberately if they need to. Ethic reaches the entrance to the inner most maze… and it’s sealed from within. She remembers a few things from when she flew over the maze days earlier. It centers on the crystal. There are many dead ends, but no paths that loop back on themselves. Ethic has one opportunity to radio the members of the resistance a simple set of instructions before they plunge into the labyrinth in search of the exit. What directions can she give them so they can quickly navigate the maze, open the door, and guide Ethic straight back to the crystal? Pause now to figure it out for yourself. Hint in 3 Hint in 2 Hint in 1 Here’s a hint: One of the challenges here is to find a way to indicate where dead ends are, so that the resistance members don’t keep going down them. Try simplifying the maze to something like this. Let’s say you’ve just hit this dead end, then came back to this intersection. What could you do to show the next person who gets here that they don’t need to explore that path? Pause now to figure it out yourself. Solution in 3 Solution in 2 Solution in 1 Most programming puzzles involve giving instructions to a single actor so that they can accomplish a goal. Instead, here we have a swarm of individuals, each of whom can follow basic instructions. That’s unusual in programming, but not unheard of; researchers are currently experimenting with swarms of small robots to do things like conduct search and rescue missions. The prisoners aren’t robots, but for Ethic’s purposes they’ll act like them. And by working together they can achieve their goal much more efficiently. Because you have a lot of prisoners, you’ll want them to cover a lot of ground. This matches up well to a maze-mapping technique called a depth-first search. It’s called that because it involves going as deeply down a path as possible before going back. In other words, if you had a maze like this, you’d want to explore all the way down one of these branches before returning to this intersection and trying another. Everyone needs a clear set of instructions for what they should do. Like — first, tie down the loose end of your wire by the crystal, so it leads back there. If you find the door, open it and hand your spool to Ethic. If you’re in a passageway, keep going until you hit a dead end or an intersection. But what happens at either of those places? If someone encounters a dead end, they should backtrack to the last intersection. But they also need to mark it, so no one wastes time and goes back there. The best tool for that is the wire— one option is to break both sections that lead down the dead end path, and tie the spool to the wire that leads back to the crystal. The broken wires tell everyone else who gets to this intersection “Don’t go this way.” They’ll also guarantee the final path will lead straight to the crystal, rather than visiting dead ends. Ok, so let’s say someone’s at an intersection. Now which way should they go? The first priority is to have everyone cover fresh ground to minimize doubling up. So if there’s no wire down a direction, go that way. If there are multiple choices, choose one at random. What if they’re in a sub-section like this, with 3 marked dead ends? The only thing to do is to go back where they came from. We now know that this whole section is one big dead end, so they should break and retie the wire when they get to the next intersection. But let’s say they get there, and find two options where someone’s exploring, but no one’s hit a dead end yet. They may as well choose at random and go help explore that path further, in case it’s the right direction for the exit. This isn’t the only way to solve this challenge, but in any correct method, someone will eventually find the way out. The moment of truth will be when Ethic takes their wire and follows it back, inward towards her goal. The great thing about this method is that Ethic’s path is straight and true. The maze doesn’t have loops, so there's only one path from door to crystal. And because everyone has been breaking and retying their wires, Ethic won’t go down any dead-end paths. Face to face with her creation, Ethic has a choice: she can destroy Hedge, or set things right. All of this destruction was her fault, not Hedge’s; it was her oversight that instructed him to build an infinitely large maze. His decisions were misguided, but everything he did, he did to follow his programming. Ethic accesses his core and fixes her error with a single number: the size the maze was supposed to reach. Ethic has prevented catastrophe and regained possession of the World Machine. Her work with Adila, Octavia, and Lemma has already started to help people and heal the world’s turmoil, but there’s much work to be done. With the forgetting food out of their systems, the people will become themselves again. They’ll regain their will to create and progress. They’ll be free to break down the walls they’ve built between each other. And they may come to approach their future with a little less greed and a little more... Ethic

**P911 2020-09-16 The World Machine \_ Think Like A Coder, Ep 10**

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翻译人员: Zizhuo Liang 校对人员: Yolanda Zhang当艾斯克（Ethic）跌落时，她想起了这块水晶出世前的世界，也想起了当她打造出 第一个机器人时那种油然而生的喜悦。但更多的是她这些天所结交的那些朋友：勇敢的阿迪拉（Adila） 和她不畏强权的抵抗运动。奥克塔维亚（Octavia） 牺牲了自己，好让卫兵们分心。莱玛（Lemma）的理想主义 不断激励她去治愈每一个人。还有赫奇（Hedge）——她的作品、她的担当、 她的失败... 她的背叛者。赫奇说服了她去一起收集她根本不需要的三个节点。若要让艾斯克 记起如何操纵世界机器，她需要第二次机会。阿迪拉一直在用无线电联络被机器人抓获，曾与艾斯克 被囚禁在一起的奥克塔维亚。艾斯克解释说， 赫奇操纵了所有人，并准备尝试打破布拉德屏障，还要用一个巨大的迷宫 来覆盖整个世界，除非她们能够阻止他。但是她有一个计划：艾斯克将只身前往 迷宫中心的水晶，然后用她自己的力量阻止赫奇。与此同时，阿迪拉和莱玛 会尽她们所能拖住赫奇。当艾斯克向迷宫深处飞驰时，她的收音机接收到一个信号。奥克塔维亚已经解放了 数以百计的抵抗军成员。他们一起策划了一场 压垮卫兵的越狱。抵抗军可以进入世界机器，但他们并不知道如何使用它； 他们需要艾斯克的帮助。他们拥有的仅仅是 用之不尽的线轴。这些线非常结实耐用， 但囚犯们也可以在必要的时候切断它们。艾斯克到达了最里面迷宫的入口 ...这迷宫是从内部封死的。她记起了几天前 飞跃迷宫时的一些事情。迷宫以水晶为中心。那里有许多条死胡同， 但没有一条会绕回到起点。艾斯克仅有一次机会，可以在抵抗军成员 跳入迷宫寻找出口前，用无线电向他们 发出一条简单的指令。什么样的指令 能让他们快速穿过迷宫，打开门，然后引领 艾斯克走向水晶呢？[ 请在此暂停，并自行解题 ][ 答案揭晓：3 ][ 答案揭晓：2 ][ 答案揭晓：1 ]这里有一个提示：这里的挑战之一是找到一种 可以指明死胡同位置的方法，这样抵抗军成员 就不会一直走下去。试着把迷宫简化成这样。假设你刚撞到这个死胡同， 然后又回到这个十字路口。你如何让下一个来这里的人知道他们不需要探索这条路径？[ 请在此暂停，并自行解题 ][ 答案揭晓：3 ][ 答案揭晓：2 ][ 答案揭晓：1 ]大多数编程难题都涉及到 向单个参与者发出指令，以使他们能够完成一个目标。与之不同的是，这里有一群人，每个人都可以遵循基本的指令。这在编程中并不常见， 但却并非闻所未闻；研究人员目前正在用 成群的小型机器人进行实验，让它们来完成 像搜索救援这样的任务。囚犯们并不是机器人，但对艾斯克来说， 他们会表现得像机器人一样。然后通过合作，他们便可以 更有效的实现他们的目标。因为你有很多囚犯， 所以你需要他们能覆盖很多地方。这与一种叫深度优先搜索的 迷宫测绘技术非常相似。之所以这样叫， 是因为它要你在回去之前尽可能深的探索每一条路。换句话说，如果你有一个 像这样的迷宫，你会沿着其中的 一个支路探索到底，然后再回到这个十字路口 尝试下一条路。每个人都需要一套明确的指示， 来说明他们应该做什么。比如，首先将电线的 松动段绑在水晶附近，这样的话 它会引领你回到那里。如果你找到门，打开它， 然后将线轴交给艾斯克。如果你在一个通道里， 你要一直走，直到你碰到死胡同或十字路口。但是在十字路口 或是死胡同又该做什么呢？如果有人遇到死胡同， 他们应该原路返回到碰到死胡同之前的一个十字路口。但他们应该做好标记， 这样后来的人就不会重蹈覆辙了。最好的工具是电线 —— 一个办法是将导向死胡同的电线从两头砍断，然后将线轴绑到 通向水晶的电线上。断掉的电线告诉 其他路过这个路口的人“别走这条路。”这些断掉的电线还将保证 最终的路将通往水晶，而不是死胡同。好，让我们假设 有人站在十字路口。现在他应该走哪条路呢？第一要务应是尽可能让每个人 都去探索没有走过的路，以此减少重复探索 相同路径的几率。所以如果有一条路上没有电线， 那就朝那个方向走。如果有多个选择， 那就随机选一个。如果他们在一个十字路口 碰到了三个标记过的死胡同呢？唯一能做的只有回到 他们原来的地方。我们现在知道这一整个路段 就是一个大的死胡同，所以当他们到达下一个十字路口时， 他们应该断开并重新固定电线。但是假设他们到了那里后发现 有两个人正在探索，但还没有人走到死胡同呢？这样的话，他们可以选择 去帮助探索任意一条路，以防这正是通向出口的路。这并不是解决这一挑战的唯一方法，但使用任何正确的方法， 最终都会有人找到出口。决定性时刻将是 艾斯克顺着电线，跟随它走向她的目标。这种办法的好处是，艾斯克的道路 会是直接而且准确的。迷宫没有环路， 所以从门到水晶只有一条路。而且因为每个人都在剪断 或是重新调整电线，所以理论上艾莉克 不会走入任何死胡同。面对她的作品， 艾斯克需要做出选择：摧毁赫奇， 或者重新对它进行设置。这所有的破坏都是她的错， 而不是赫奇的；是她的疏忽，才导致赫奇 建造了一个无限大的迷宫。他的决定是被误导的，但他所做的一切， 都是按照他的程序来做的。艾斯克进入到他的核心， 并用一个数字修正了她的错误：迷宫本应达到的大小。艾斯克阻止了这场灾难，并重新获得了世界机器的所有权。她和阿迪拉、奥克塔维亚， 还有莱玛的研究，已经开始帮助恢复 这个混乱世界的秩序，但她们的工作还远不止于此。随着遗忘果实在体内消耗殆尽， 人们将重新成为他们自己，重新获得创新和进取的意志，并可以自由的拆毁 在彼此之间筑起的墙。对他们来说，通往未来的道路 也许会少一点贪欲，多一点道德（Ethic）的陪伴。 （此处为一语双关）

**P912 2020-09-17 The problem with the U.S. bail system - Camilo Ramirez**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=912)

Since 2000, the annual number of people convicted of crimes in the United States has stayed steady, but the average number of people in jail each year has shot up. How can that be? The answer lies in the bail system— which isn’t doing what it was intended to do. The term "bail" refers to the release of people awaiting trial on condition that they return to court to face charges. Countries around the world use many variations of bail, and some don’t use it at all. The U.S. bail system relies primarily on what’s called cash bail, which was supposed to work like this: When a person was accused of a crime, the judge would set a reasonable price for bail. The accused would pay this fee in order to be released from jail until the court reached a verdict on the case. Once the case ended, whether found guilty or innocent, they’d get the bail money back if they made all their court appearances. The rationale behind this system is that under U.S. law, people are presumed innocent until proven guilty— so someone accused of a crime should not be imprisoned unless they’ve been convicted of a crime. But today, the bail system in the U.S. doesn’t honor the presumption of innocence. Instead, it subverts peoples’ rights and causes serious harm, particularly to people in low-income communities and communities of color. A key reason why is the cost of bail. In order for cash bail to work as intended, the price has to be affordable for the accused. The cost of bail wasn’t meant to reflect the likelihood of someone’s guilt— when bail is set, the court has not reviewed evidence. Under exceptional circumstances, such as charges of very serious crimes, judges could deny bail and jail the accused before their trial. Judges were supposed to exercise this power very rarely, and could come under scrutiny for using it too often. Setting unaffordably high bail became a second path to denying people pretrial release. Judges' personal discretion and prejudices played a huge role in who they chose to detain this way. Bail amounts climbed higher and higher, and more and more defendants couldn’t pay— so they stayed in jail. By the late 19th century, these circumstances led to the rise of commercial bail bond companies. They pay a defendant’s bail, in exchange for a hefty fee the company keeps. Today, the median bail is $10,000— a prohibitively high price for almost half of Americans, and as many as nine out of ten defendants. If the defendant can’t pay, they may apply for a loan from a commercial bail bond company. It’s completely up to the company to decide whose bail they’ll pay. They choose defendants they think will pay them back, turning a profit of about $2 billion each year. In fact, in the past 20 years, pretrial detention has been the main driver of jail growth in America. Every year, hundreds of thousands of people who can’t afford bail or secure a loan stay in jail until their case is resolved. This injustice disproportionately affects Americans who are Black and Latino, for whom judges often set higher bail than for white people accused of the same offenses. Unaffordable bail puts even innocent defendants in an impossible position. Some end up pleading guilty to crimes they did not commit. For minor offenses, the prosecution may offer a deal that credits time already spent in jail toward the accused’s sentence if they plead guilty. Often, the time they’ve already spent in jail is the total length of the sentence, and they can go home immediately— but they leave with a criminal record. Defending their innocence, meanwhile, can mean staying in jail indefinitely awaiting trial— and doesn’t guarantee an innocent verdict. Bail may not even be necessary in the first place. Washington, D.C. largely abolished cash bail in the 1990s. In 2017, the city released 94% of defendants without holding bail money, and 88% of them returned to all their court dates. The nonprofit organization, The Bail Project, provides free bail assistance to thousands of low-income people every year, removing the financial incentive that bail is designed to create. The result? People come back to 90% of their court dates without having any money on the line, and those who miss their court dates tended to because of circumstances like child care, work conflicts, or medical crises. Studies have also found that holding people in jail before trial, often because they cannot afford cash bail, actually increases the likelihood of rearrests and reoffending. The damage of incarcerating people before their trials extends to entire communities and can harm families for generations. People who are incarcerated can lose their livelihoods, homes, and access to essential services— all before they’ve been convicted of a crime. It’s also incredibly expensive: American taxpayers spend nearly $14 billion every year incarcerating people who are legally presumed innocent. This undermines the promise of equal justice under the law, regardless of race or wealth. The issues surrounding cash bail are symptomatic of societal problems, like structural racism and over-reliance on incarceration, that need to be addressed. In the meantime, reformers like The Bail Project are working to help people trapped by cash bail and to create a more just and humane pretrial system for the future.

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[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=912)

翻译人员: Isabella Lu 校对人员: Yolanda Zhang千禧年以来，美国每年被判有罪的人数相对平稳，但是看守所的平均拘留人数却暴增。这是怎么一回事？答案在于和初始目的 背道而驰的保释制度。“保释”一词的意思是 等候受审的嫌犯以回来出庭受审作为条件， 将他们暂时释放。不同国家有着不同的保释系统，有的则根本没有。美国的保释系统基本建立在 现金保释的基础上，理论上应该是这么操作的：当一个人被指控一项罪名时，法官会制定一个合理的保释价，被告人支付这个费用后 就可以离开看守所，直到法院对案件做出判决。结案以后，不论是否被判有罪，只要被告人参加了全部的听证会， 就可以拿回保释金。这种系统的逻辑依据在于， 根据美国法律，在一个人被证实有罪之前， 他都是清白的。所以，除非已有法院判决他们有罪，否则被控告有罪的人不该被关押。但时至今日，美国的保释系统已不再是无罪推定原则的捍卫者，而是侵犯人权， 造成极恶劣影响的加害者，贫困人群和有色人种 受到的伤害尤甚。主要原因之一在于保释金的数额。要想让现金保释发挥效用，保释金额需要 在被告人的承受范围内，数额多少并不代表 被判有罪的几率，金额确定之后, 法院才会公布案件证据。特殊情况下 —— 比如被控罪名尤其恶劣的，法官有权拒绝保释， 并在开庭前拘禁被告人。按规定，法官应该只在 极少情况下行使这项权力，如果使用次数太过频繁， 则可能面临审查。设定难以负担的保释金额，变成了阻止假释的另一种办法。这种情况下，谁去谁留极大地受到法官的个人观点和偏见的影响。保释金数额水涨船高，愈来愈多的被告人难以支付，只能不得不留在看守所。直到十九世纪末，这样的情况推动了 商业保释公司的崛起。它们为被告人支付保释金， 以此得到一笔可观的报酬。时至今日，保释金中位数 已经达到了一万美元，这个价格对近半数的美国公民和九成的被告人来说，是一笔巨款。如果被告人无法支付保释金，他们可以选择向商业保释公司贷款。而给与不给、给谁保释， 保释公司有完全自由的决定权。他们评估最有能力 偿还贷款的申请人，每年能获得约 20 亿美元的利润。事实上，在过去的 20 年间，审前羁押已经成为 美国收押数量增长的主要动力。每年，成千上万无法支付保金 或获得贷款的人被收押在看守所，直到结案。黑人和拉丁裔 受到这种不公待遇的比例最高，相比被控同样罪行的白人，法官常给他们设定 更高的保释金费用。难以负担的保释金额 甚至让原本清白的被告人身陷囹圄，有些最终背负了莫须有的罪名。如果罪名较轻，检方可能会提出如果被告被判有罪，可以将其在看守所呆的时间 同样算在服刑期内。很多时候，被告呆在看守所的时间 已经是刑期的总时长，如此一来，他们就可以立即回家， 但从此也将背负一份案底。反之，继续上诉捍卫自己的清白，则意味着无限期地等待审讯，并且不能保证最终判定无罪。其实，保释金的存在可能并非必要，华盛顿特区在 1990 年代 取消了大部分的现金保释，2017 年，在未收取保释金的情况下， 特区释放了 94% 的被告，其中 88% 的人出席了所有的庭审。非赢利组织 The Bail Project每年为数以千计的低收入人群 提供免费的保释金帮付，消除了保释金想要带来的金钱桎梏。结果如何？在没有任何押金的情况下， 庭审出席率达到了 90%，且错过庭审的原因大多是照顾小孩、工作无法抽身 或重大疾病等情况。研究也同样发现，因无法支付释金 而在开庭前拒绝释放被告，实际上增加了再犯罪 和再次拘捕的可能性。在被告人开庭前 就将其监禁带来的影响会对整个社区 和几代家庭造成伤害。被拘留的人们可能会 失去饭碗、住所以及基本服务设施的使用权，这些都发生在他们被判有罪之前。审前羁押所需费用也极其高昂，美国每年税收中 有将近 140 亿美元花费在拘禁那些 法律上假定无罪的人。这打破了法律面前不论种族和财富人人平等的原则。有关保释金的种种其实是类似结构性种族主义 和过度依赖监禁等有待解决的社会问题的一种表现。与此同时， The Bail Project 一类的改革者们在孜孜不倦地帮助 因保释金而深陷困境的人们，以创造一个拥有更公平、 更人性化的审前制度的未来。

**P913 2020-09-18 Performing brain surgery without a scalpel - Hyunsoo Joshua No**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=913)

Every year, tens of thousands of people world-wide have brain surgery without a single incision: there’s no scalpel, no operating table, and the patient loses no blood. Instead, this procedure takes place in a shielded room with a large machine that emits invisible beams of light at a precise target inside the brain. This treatment is called stereotactic radiosurgery, and those light beams are beams of radiation: their task is to destroy tumors by gradually scrubbing away malignant cells. For patients, the process begins with a CT-scan, a series of x-rays that produce a three-dimensional map of the head. This reveals the precise location, size, and shape of the tumor within. The CT-scans also help to calculate something called "Hounsfield Units," which show the densities of different tissues. This offers information about how radiation will propagate through the brain, to better optimize its effects. Doctors might also use magnetic resonance imaging, or MRI’s, that produce finer images of soft tissue, to assist in better outlining a tumor’s shape and location. Mapping its precise position and size is crucial because of the high doses of radiation needed to treat tumors. Radiosurgery depends on the use of multiple beams. Individually, each delivers a low dose of radiation. But, like several stage lights converging on the same point to create a bright and inescapable spotlight, when combined, the rays of radiation collectively produce enough power to destroy tumors. In addition to enabling doctors to target tumors in the brain while leaving the surrounding healthy tissue relatively unharmed, the use of multiple beams also gives doctors flexibility. They can optimize the best angles and routes through brain tissue to reach the target and adjust the intensity within each beam as necessary. This helps spare critical structures within the brain. But what exactly does this ingenious approach do to the tumors in question? When several beams of radiation intersect to strike a mass of cancerous cells, their combined force essentially shears the cells’ DNA, causing a breakdown in the cells’ structure. Over time, this process cascades into destroying the whole tumor. Indirectly, the rays also damage the area immediately surrounding the DNA, creating unstable particles called free radicals. This generates a hazardous microenvironment that’s inhospitable to the tumor, as well as some healthy cells in the immediate vicinity. The risk of harming non-cancerous tissue is reduced by keeping the radiation beam coverage as close to the exact shape of the tumor as possible. Once radiosurgery treatment has destroyed the tumor’s cells, the body’s natural cleaning mechanism kicks in. The immune system rapidly sweeps up the husks of dead cells to flush them out of the body, while other cells transform into scar tissue. Despite its innovations, radiosurgery isn’t always the primary choice for all brain cancer treatments. For starters, it’s typically reserved for smaller tumors. Radiation also has a cumulative effect, meaning that earlier doses can overlap with those delivered later on. So patients with recurrent tumors may have limitations with future radiosurgery treatments. But these disadvantages weigh up against some much larger benefits. For several types of brain tumors, radiosurgery can be as successful as traditional brain surgery at destroying cancerous cells. In tumors called meningiomas, recurrence is found to be equal, or lower, when the patient undergoes radiosurgery. And compared to traditional surgery— often a painful experience with a long recovery period— radiosurgery is generally pain-free, and often requires little to no recovery time. Brain tumors aren’t the only target for this type of treatment: its concepts have been put to use on tumors of the lungs, liver, and pancreas. Meanwhile, doctors are experimenting with using it to treat conditions such as Parkinson’s disease, epilepsy, and obsessive compulsive disorder. The pain of a cancer diagnosis can be devastating, but advancements in these non-invasive procedures are paving a pathway for a more gentle cure.

**P913 2020-09-18 Performing brain surgery without a scalpel - Hyunsoo Joshua No**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=913)

翻译人员: Michael LV吕 校对人员: Yolanda Zhang每年，全世界有 成千上万的人接受了无创的脑部手术：没有手术刀，没有手术台， 病人不会失血。这种手术是在一个 屏蔽室里进行的，里面有一台大型机器， 它会向大脑内部的精确目标发射不可见的光束。这种治疗叫做 立体定向放射治疗,这些光束是辐射束:它们会逐渐清除恶性细胞， 最终消灭肿瘤。对于病人来说， 这个手术始于 CT 扫描,就是通过照射一系列的 X 射线 产生头部的三维成像。CT 扫描能显示出肿瘤的 精确位置、大小，以及形状。它还可以计算一种叫做 “亨氏单位（Hounsfield Units）”的指标，亨氏单位能显示 不同组织的密度，揭示辐射如何在大脑中传播， 以更好地发挥作用。医生也可以使用 磁共振成像（MRI），它能产生更清晰的软组织图像，以便于更好地概述 肿瘤的形状和位置。绘制出肿瘤的精确位置和大小 是至关重要的，因为治疗肿瘤 需要高剂量的辐射。放射治疗依赖于 多束射线的作用。每一束都能单独产生低剂量的辐射。但是，就像几盏舞台灯光 汇聚在同一点上会变成一个明亮的、 惹眼的聚光灯一样，辐射的射线聚集在一起 能够产生足够的能量来摧毁肿瘤。除了能使医生瞄准 大脑中的肿瘤，同时使周围的健康组织 相对不受伤害之外，多光束的使用 也给了医生提供了灵活性。他们可以优化 光束通过脑组织到达目标的最佳角度和路径，并根据需要调整每个光束的强度。这有助于避开大脑中的关键结构。但这种独特方法对肿瘤 到底有什么作用呢？当几束辐射交汇， 并射向一团癌细胞，它们会合力切断 细胞的 DNA，导致细胞结构遭到破坏。随着时间的推移，这一系列 连锁的过程会摧毁整个肿瘤。射线也会间接破坏 DNA 周围的区域，产生不稳定的粒子， 我们称之为自由基。这就产生了一种 有害的微环境，这种微环境对肿瘤以及附近的一些健康细胞 都是不利的。通过保持辐射束的覆盖范围尽可能接近肿瘤的确切形状，可以降低伤害非癌组织的风险。一旦放射外科治疗 摧毁了肿瘤细胞，身体的自然清理机制 就会开始发挥作用。免疫系统开始迅速 清理死细胞的外壳，将它们排出体外， 而其他细胞则会转化为疤痕组织。尽管放射治疗有其创新之处， 但它在所有的脑癌治疗中并非总是首选方案。首先，它通常被用来 对付较小的肿瘤。其次，辐射也具有累积效应，这就意味着，早期的辐射剂量 可能与后来的辐射剂量叠加。因此，肿瘤复发的病人在未来的放射外科治疗中 可能面临着局限性。尽管存在着这些缺点， 但放射治疗的优势依然非常明显。对于几种类型的脑瘤，放射治疗也可以 和传统的脑部手术一样成功地消灭癌细胞。在被称为脑膜瘤的肿瘤中， 患者接受放射治疗的复发率与手术相当，甚至更低。和传统手术相比——手术通常是一段需要 漫长恢复期的痛苦经历——而放射治疗通常是无痛的，通常几乎 不需要恢复时间。脑瘤并不是放疗的唯一用途：它的概念已经应用于 肺、肝和胰腺的肿瘤。与此同时，医生们正在试验 用它来治疗其他疾病，比如帕金森病、癫痫， 还有强迫症。诊断出癌症带来的痛苦 可能是撕心裂肺的,但这些非侵入性 治疗技术的进步也为更温和的治疗手段 铺平了道路。

**P914 2020-09-22 The myth of the stolen eyeballs - Nathan D. Horowitz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=914)

Deep in the Amazon rainforest in the river Nea’ocoyá, lived, according to Siekopai legend, a school of particularly big and tasty fish. When the rains came and the water rose, the fish appeared, swimming away as the waters fell again. The villagers along the river reveled in this occasional bounty— and wanted more. They followed them upriver deep into the jungle to a lagoon that thundered with the sound of flapping fish. The whole village set up camp by the lagoon, bringing barbasco, a poison they would put in the water to stun the fish. Meanwhile, their young shaman took a walk. He sensed he might not be completely alone. Then, he came to a monse tree humming so loudly he could hear it even above the thunder of the fish. With that, he was sure: spirits lived here. Back at camp, he warned his people these fish had an owner. He would find the owner. Until he returned, no one should fish. He went to the humming tree. Inside was a hollow as big as a house, full of busy weavers. Their chief invited him in, explaining that the juicy little siripia fruits were ripening, and they were weaving baskets to collect them. Though they looked and acted like people, the shaman knew they were juri, or air goblins, who could fly and control the winds. They taught him how to weave. Before the shaman left, the goblin chief whispered some cryptic instructions in his ear. Finally, he told him to tie a pineapple shoot outside a hollow log and sleep inside that night. Back at camp, the villagers were fishing with barbasco poison, cooking, and eating. Only the shaman’s little sister refrained. Then, everyone else fell into a deep sleep. The shaman and his sister yelled and shook them, but they wouldn’t wake. It was getting dark, so the shaman and his sister tied the pineapple sprout outside the hollow log and crawled inside. A strong wind rose— the mark of the air goblins. It broke branches and brought down trees. Caymans, boas and jaguars roared. The water began to rise. The fish flopped off the drying racks and swam away. The pineapple sprout turned into a dog. All night it barked, keeping the jungle creatures away from the fallen tree. When dawn broke, the flood receded. The fish were gone, and most of the people were, too: the jungle animals had devoured them. Only the shaman’s relatives survived. When his family turned toward him, the shaman realized what the goblins meant when they said the fruits were ripening: they weren’t really collecting siripia fruits at all, but human eyes. The shaman’s older sister called him over, trying to touch his face with her long, sharp nails. He backed away and, remembering the goblin chief’s instructions, threw palm seeds at her face. The seeds became eyes. But then she transformed into a white-lipped peccary and ran away— still alive, but no longer human. The shaman and his little sister’s whole community was gone. They went to live with another village, where he taught everyone to weave baskets, as the air goblins had taught him. But he couldn’t forget the last of the goblin chief’s words, which told him how to get revenge. He returned to the air goblins’ home carrying chili peppers wrapped in leaves. As the goblins watched through their peepholes, the shaman made a fire and put the chili peppers on it. The fire began to smoke the tree out. The goblins who had eaten people’s eyes died. Those who hadn’t were light enough to fly away. So the goblins, like the humans, paid a steep price. But they also lived to tell the tale, like the shaman. In Siekopai legend, where the spirit and human worlds meet, there are no clear victors, and even death is an opportunity for renewal.

**P914 2020-09-22 The myth of the stolen eyeballs - Nathan D. Horowitz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=914)

翻译人员: Yidai Song 校对人员: Lark Yu根据锡耶科比族的神话传说，在亚马孙雨林深处的 尼亚奥科亚河中，生活着一群尤为肥美的鱼。每当雨落水涨，鱼纷纷跃出水面，但随着水位下降，又顺势游走。沿岸村民贪恋于 这偶然的不劳而获——想要索取更多。他们跟随鱼群溯流而上深入丛林，来到一片环礁湖， 湖中鱼儿欢跳雀跃声不绝于耳。整个村庄据湖安营扎寨，他们带来了巴巴可鱼毒草， 一种可以放到水中迷晕鱼群的毒药。这时， 他们年轻的萨满出去散步，感觉到也许自己并非独自一人。他来到一棵 monse 树下， 大声吼叫，他能听到其中巨响甚至 盖过了湖中鱼群的欢跳雀跃声，这让他坚信：有妖精居住于此。返回营地后，他警告族人 这些鱼群有主人，而他会找到鱼群的主人。返回之前，禁止捕捞。他去往响声不断的那棵树下，树干中空，犹如一座大房子， 其中满是忙碌的编制工。织工首领邀请他进来，并告知有种叫 siripia 的 多汁果实快熟了，而他们正在编织篮子方便采摘。尽管他们的容貌、举止 与人类并无二致，但萨满知道他们是 Juri， 也就是空气妖精，他们可以飞行并且控制风向。妖精们教他如何编织，在萨满临走之前，首领向他耳语了一些神秘指示，最后，让他把菠萝枝 绑在空心的木头外，并且当晚睡在木头里面。返回营地，村民们依然在 用毒草捕鱼、烹饪并享用美食，唯独萨满的妹妹没有参与。接着，所有人都陷入了沉睡，萨满和妹妹冲他们大喊， 试图将他们摇醒，却未能成功。天色渐晚，萨满和妹妹，把菠萝枝绑到了空心木外面， 并爬了进去。一阵强风袭来—— 这是空气妖精来临的标志，大风吹断了树枝， 将树木连根拔起，短吻鳄、蟒蛇、美洲狮开始咆哮，河水开始上涨，被晾晒的鱼从晒架上掉下来， 趁机游走了，绑在木头外的菠萝枝芽 变成了一条狗，狂吠了一整夜，让丛林里中的野兽 远离这棵倒下大树。等到黎明破晓之时， 洪水终于消退，湖中的鱼群消失了， 许多村民也不见了踪影：他们早已被丛林里的野兽吞食，只有萨满的亲戚得以幸存。而当他们转过头来看他时，萨满突然明白了妖精口中 快要熟了的果实是什么意思：他们并不是要 采摘 siripia 果实，而是要收集人类的眼球。萨满的姐姐唤他过来，试图用她又长又尖的指甲 摸索他的脸，萨满不禁向后退缩， 并想起了妖精首领的指示，冲她的脸撒了些棕榈籽，种子变成了眼睛，但姐姐却变成了一头 白唇野猪转身逃走了——她虽然还活着， 但已失去了人的模样。萨满和妹妹的族群已彻底灭绝。他们前往另外一个村庄生活，并在那里教村民们如何编织篮子， 就像空气妖精之前教他的那样。但他一直忘不了 妖精首领最后的告诫，那就是如何替族人报仇。萨满带着树叶包裹的红辣椒， 回到了空气妖精的住处，妖精们从猫眼里偷偷窥视他，萨满先是生火， 后把红辣椒加了进去，浓烟逐渐灌满了树洞，吃人眼球的妖精们都被烟熏死了。而那些没有吃眼球的妖精， 凭借着轻盈的体态，统统飞走了。至此，妖精和人类 都付出了沉重的代价，但他们当中的一些人，比如萨满， 幸存了下来，让这个故事得以口耳相传。在锡耶科比族神话中， 当人类与妖精的世界碰撞，孰胜孰负，无从分辨，甚至死亡 都是某种意义上的新生。

**P915 2020-09-23 The surprising effects of pregnancy**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=915)

Muscles and joints shift and jostle. The heart’s pounding rhythm speeds up. Blood roars through arteries and veins. Over the course of a pregnancy, every organ in the body changes. Ignited by a range of hormones, these changes begin as soon as pregnancy begins. Just days after fertilization, the embryo implants in the lining of the uterus. Because its DNA doesn’t exactly match the mother’s, the immune system should theoretically recognize it as an invader, attack, and destroy it, like it would bacteria or other harmful microbes. That’s the challenge: the mother’s immune system needs to protect both her and the fetus, but can’t act as it usually does. What happens is not as simple as decreasing the immune response. Instead, it’s a complex interaction we’re just beginning to understand, involving many different types of immune cells— some of which seem to protect the fetus from attack by other immune cells. The body also creates an antibacterial plug made of mucus on the cervix, which keeps germs away and stays sealed until labor. As a pregnancy progresses, the uterus expands upward and outward with the growing fetus. To make room, hormones called progesterone and relaxin signal muscles to loosen. The muscles that propel food and waste through the digestive tract also loosen, which makes them sluggish, causing constipation as passage through the tract slows down. Loosened muscles at the top of the stomach might allow acid to escape into the esophagus and throat, causing heartburn and reflux. These changes can worsen morning sickness, which is caused in part by hormone HCG— and can also happen at other times of day. As the uterus grows, it pushes on the diaphragm, the muscle that expands and contracts the chest with each breath. This limits the diaphragm’s range. To compensate, the hormone progesterone acts as a respiratory stimulant, making the pregnant woman breathe faster so both she and the baby can both get enough oxygen with less lung capacity. This all may leave the pregnant woman feeling short of breath. Meanwhile, the kidneys make more erythropoietin, a hormone that increases red blood cell production. The kidneys also keep extra water and salt rather than filtering it out into urine to build up the volume of the blood. A pregnant woman’s blood volume increases by 50% or more. But it’s also a bit diluted, because it only has 25% more red blood cells. Usually, the body makes blood cells using iron from our food. But during pregnancy, the fetus is also building its own blood supply from nutrients in the mother’s food— leaving less iron and other nutrients for the mother. The heart has to work extra hard to pump all this blood through the body and placenta. A pregnant woman’s heart rate increases, but we don’t fully understand how blood pressure changes in a healthy pregnancy— an important area of research, because some of the most serious complications are related to the heart and blood pressure. The expanding uterus may press on veins— causing fluid buildup in the legs and feet. If it presses on a large vein called the inferior vena cava, it might interfere with blood returning to the heart, causing a dizzying drop in blood pressure after standing for too long. Some of these changes start to reverse even before birth. Shortly before delivery, the fetus drops down, decreasing the pressure on the diaphragm and allowing the pregnant woman to take deeper breaths. During labor and birth, much of the extra fluid in the body is lost when the water breaks. The uterus shrinks back down in the weeks after birth. Like the rest of the body, pregnancy affects the brain— but its effects here are some of the least understood. Recent studies show differences in brain scans after pregnancy and early parenting, and suggest that these changes are adaptive. That means they could help with parenting skills, such as an increased ability to read facial cues since babies can’t talk. The lack of information about pregnancy’s effects on the brain highlights a general truth: historically, almost all the research around pregnancy has focused on the fetus, rather than pregnant women. Experiences of pregnancy vary widely, both within the range of healthy pregnancies and due to complicating health conditions— new research will help us understand why, and develop effective treatments where necessary. In the meantime, every pregnancy is different, and it’s important to consult a doctor with any specific questions. Today, we’re turning an exciting corner, as more research is devoted to the astounding biology of pregnancy.

**P915 2020-09-23 The surprising effects of pregnancy**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=915)

翻译人员: Lengying Khoo肌肉与关节发生移位和挤压。心跳节奏加快， 血液在动脉和静脉中轰鸣。在怀孕过程中， 体内的每个器官都在发生变化。由一系列激素引发的这些变化在怀孕初期便会出现。在受精后的几天内， 胚胎就会被植入子宫内膜。因为它的 DNA 与母亲的 DNA 不完全匹配，理论上来说，免疫系统 会将它视为一个入侵者，并对其实施攻击和摧毁，就如同 对待细菌和其他的有害微生物一样。于是挑战出现了：母亲的免疫系统 需要同时保护自身和胎儿，但又不能像往常那样运作。事情并不像降低免疫反应那么简单。相反的，这是一个复杂的相互作用， 对此我们也才刚刚有所了解。它涉及许多不同类型的免疫细胞——其中一些细胞似乎在保护胎儿 免受其他免疫细胞的攻击。人体还在子宫颈上制造了 一个由粘液构成的抗菌栓，以防止细菌入侵 并保持密封直至分娩。随着妊娠的推进，子宫会随着胎儿的生长 而向上和向外伸展。为了腾出空间， 被称为孕酮和松弛素的激素会对肌肉发出放松的信号。那些在消化道内推动食物 和排泄物的肌肉也会变得松弛。这使肌肉运动变得迟缓，使其通过消化道的速度放慢， 因而造成便秘。胃部上方松弛的肌肉可能使胃酸逃入食道和咽喉，引起胃灼热和逆流。这些变化会加剧晨间孕吐。这一部分是由 HCG 激素引起—— 也可能发生在一天中的其他时间。不断胀大的子宫会挤压横膈膜，一种每次呼吸都会 扩张和收缩胸部的肌肉，这也限制了横膈膜的运动范围。作为弥补，黄体酮激素发挥了 呼吸兴奋剂的作用。它使孕妇呼吸加快，让她和胎儿在肺活量减小的情况下， 也可以得到足够的氧气。这也可能使孕妇感到喘不过气。同时，肾脏制造出 更多的红血球生成素，一种提高红细胞生成的激素。肾脏还会把额外的水和盐分储存起来， 而不是将其过滤到尿液中，以增加血液容量。孕妇的血液容量 会增加 50% 以上。但血液也被稍微稀释了，因为其中的红细胞含量 只增加了 25%。通常，人体利用食物中的 铁元素制造血细胞。但在怀孕期间，胎儿也从 母亲的食物中吸收营养以建立自己的血液供应，从而减少了母亲体内的 铁和其他营养成分。心脏必须格外用力才能把血液泵送到全身和胎盘。孕妇的心率会增加，但我们还不完全了解 血压在健康妊娠内如何变化——这是一个重要的研究领域，因为一些严重的并发症与心脏和血压有关。扩展中的子宫会压迫静脉造成下肢水肿。如果压迫到被称为 下腔静脉的大静脉上，就可能干扰到血液流回到心脏，导致孕妇在站立过久后 血压下降，感到眩晕。其中有些变化甚至 在婴儿出生前就会开始发生逆转。在分娩前夕，胎儿的位置下移，从而减轻了对横膈膜的压力，使孕妇能够进行深呼吸。在分娩期间，体内多余的积水 会因羊水破裂而流失。子宫会在分娩后的几周内收缩。就像身体的其他部分一样， 妊娠会影响大脑——但我们对其影响却知之甚少。最新的研究显示， 妊娠后和早期育儿阶段的大脑成像上存在差异，表明这些变化是适应性的。这也说明它们可能有助于 提高育儿技巧。比如，由于婴儿不会说话， 母亲对面部表情的读解能力会有所提升。缺乏有关妊娠 对大脑影响的信息也突出了一个普遍的事实： 几乎所有历来有关妊娠的研究针对的都是胎儿，而非孕妇。对妊娠的体验存在着很大的差异，这既出现在健康妊娠范畴中，也由复杂的健康状况引起—— 新的研究将帮助我们了解其原因，并开发出必要和有效的治疗方法。同时，每次妊娠的情况都不同，因而向医生咨询任何具体问题 是非常重要的。今天，我们迎来了 一个激动人心的转折点，致力于令人震惊的 怀孕生物学的研究正在蓬勃发展。

**P916 2020-09-24 What causes panic attacks, and how can you prevent them - Cindy J. Aa**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=916)

The body becomes its own corset. Past, present, and future exist as a single force. A swing without gravity soars to a terrifying height. The outlines of people and things dissolve. Countless poets and writers have tried to put words to the experience of a panic attack— a sensation so overwhelming, many people mistake it for a heart attack, stroke, or other life-threatening crisis. Though panic attacks don’t cause long-term physical harm, afterwards, the fear of another attack can limit someone’s daily life— and cause more panic attacks. Studies suggest that almost a third of us will experience at least one panic attack in our lives. And whether it’s your first, your hundredth, or you’re witnessing someone else go through one, no one wants to repeat the experience. Even learning about them can be uncomfortable, but it’s necessary— because the first step to preventing panic attacks is understanding them. At its core, a panic attack is an overreaction to the body’s normal physiological response to the perception of danger. This response starts with the amygdala, the brain region involved in processing fear. When the amygdala perceives danger, it stimulates the sympathetic nervous system, which triggers the release of adrenaline. Adrenaline prompts an increase in the heart and breathing rate to get blood and oxygen to the muscles of the arms and legs. This also sends oxygen to the brain, making it more alert and responsive. During a panic attack, this response is exaggerated well past what would be useful in a dangerous situation, causing a racing heart, heavy breathing, or hyperventilation. The changes to blood flow cause lightheadedness and numbness in the hands and feet. A panic attack usually peaks within 10 minutes. Then, the prefrontal cortex takes over from the amygdala and stimulates the parasympathetic nervous system. This triggers the release of a hormone called acetylcholine that decreases the heart rate and gradually winds down the panic attack. In a panic attack, the body’s perception of danger is enough to trigger the response we would have to a real threat— and then some. We don't know for sure why this happens, but sometimes cues in the environment that remind us of traumatic past experience can trigger a panic attack. Panic attacks can be part of anxiety disorders like PTSD, social anxiety disorder, OCD, and generalized anxiety disorder. Recurring panic attacks, frequent worry about new attacks, and behavioral changes to avoid panic attacks can lead to a diagnosis of a panic disorder. The two main treatments for panic disorder are antidepressant medication and cognitive behavioral therapy, or CBT. Both have about a 40% response rate— though someone who responds to one may not respond to the other. However, antidepressant medications carry some side effects, and 50% of people relapse when they stop taking them. CBT, meanwhile, is more lasting, with only a 20% relapse rate. The goal of CBT treatment for panic disorder is to help people learn and practice concrete tools to exert physical, and in turn mental, control over the sensations and thoughts associated with a panic attack. CBT begins with an explanation of the physiological causes of a panic attack, followed by breath and muscle exercises designed to help people consciously control breathing patterns. Next comes cognitive restructuring, which involves identifying and changing the thoughts that are common during attacks— such as believing you’ll stop breathing, have a heart attack, or die— and replacing them with more accurate thoughts. The next stage of treatment is exposure to the bodily sensations and situations that typically trigger a panic attack. The goal is to change the belief, through experience, that these sensations and situations are dangerous. Even after CBT, taking these steps isn’t easy in the grip of an attack. But with practice, these tools can both prevent and de-escalate attacks, and ultimately reduce the hold of panic on a person’s life. Outside formal therapy, many panickers find relief from the same beliefs CBT aims to instill: that fear can’t hurt you, but holding on to it will escalate panic. Even if you’ve never had a panic attack, understanding them will help you identify one in yourself or someone else— and recognizing them is the first step in preventing them.

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翻译人员: Boyu Yang 校对人员: Yolanda Zhang身体成为了它自己的盔甲。过去，现在和未来 凝聚成同一股力量。就像没有重力约束的秋千 翱翔到了令人恐怖的高度。人与物的边界线开始融化。无数的诗人与作家 试图将急性焦虑症的症状用文字描绘下来——这是一种排山倒海的感觉， 许多人误把它当成心脏病发作、中风， 或其他致命的危机。虽然急性焦虑症不会对身体 造成长期危害，但是，对于下一次病情复发的恐惧 会限制一个人的日常生活——并且会使急性焦虑症多次复发。研究表明， 我们当中近三分之一的人在一生中都会至少 体验一次急性焦虑症。无论这是你第一次， 还是第一百次，还是你正在目睹别人的一次经历，没人想要重复这种经历。即使学习关于它的点点滴滴 会使我们不安，但这是必须的 ——因为阻止急性焦虑症的第一步 就是了解它们。急性焦虑症的本质， 是身体面对危险时正常的生理状态。这种生理反应开始于杏仁核，它是大脑内负责处理恐惧的区域。杏仁核感受到恐惧的时候，它会刺激交感神经系统，从而使身体释放出肾上激素。肾上激素会加快心跳和呼吸频率，使血液和氧气更快地 抵达手臂和腿的肌肉。同时，大脑也会接收更多氧气， 让它变得更加警惕和敏捷。当急性焦虑症发作时，这种反应被夸大了，远远超过了在危险情况下 必要的程度，使得心脏快速跳动， 呼吸沉重或过度换气。血液流动的变化会造成晕眩和手脚的麻木。急性焦虑症的症状通常 会在十分钟内到达顶峰。随后，前额叶皮层将取代杏仁核，并刺激周边神经系统。这会刺激大脑释放一种 叫乙酰胆碱的荷尔蒙，它会降低心率， 并逐渐减缓急性焦虑症。在急性焦虑症发作时， 身体对于危险的感知足够触发我们面对 真正威胁时的反应。我们目前还不了解它发生的原因，有时，环境中的一些线索 会让我们想起过去那些创伤性的经历， 从而引发急性焦虑症。急性焦虑症是焦虑症的一种，后者还包括创伤后遗症、社交恐惧、 强迫症和广泛性焦虑障碍。反复发作的急性焦虑症， 频繁担心新的发作，甚至为避免发作 而做出的行为改变，都可能导致恐慌症的诊断。针对恐慌症， 两种主要的治疗手段有使用抗抑郁药物， 和认知行为疗法（CBT）。两者的有效率都大约为 40 %——然而对其中一种治疗方法产生反应的人 不一定会对另一种做出反应。不过，抗抑郁药物 有一些副作用，而且 50 %的人 会在停止服用后复发。但是，认知行为疗法会更加持久， 只有 20 % 的复发率。认知行为疗法的目的 是帮助人们学习和练习具体的方法，从而在身体上和精神上控制与急性焦虑症相关的 感觉和想法。认知行为疗法从解释 急性焦虑症的心理原因开始，然后通过一些设计好的 呼吸和肌肉练习来帮助人们有意识地控制呼吸规律。下一步是重构认知，这包括识别和改变在发作中常见的想法——例如觉得你会停止呼吸、 心脏病发作，或者死亡——并且把它们替换成 更加确切的想法。下一个阶段的治疗，是暴露于 通常会引发恐慌症的身体感觉和状况下。我们的目标是通过经验 来改变这种信念，即这些感觉和情况是危险的。即使在使用认知疗法后， 面对发作时采取这些步骤也不容易。但反复练习后，这些方法可以 防止和缓解发作，并最终减少一个人生活中的恐慌。在正式治疗之外，许多恐慌者也从认知行为疗法 旨在灌输的信念中找到了解脱：那就是恐惧不会伤害你， 但抓住恐惧不放会加剧恐慌。即使你从未经历过急性焦虑症，了解它们也能帮助你在自己 或别人身上识别出急性焦虑症——正确辨别， 是防止急性焦虑症的第一步。

**P917 2020-09-28 Can you solve the riddle and escape Hades - Dan Finkel**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=917)

Maybe the fates got clumsy. Maybe Poseidon had one of his angry days. However it happened, the underworld is overcrowded, and Zeus has ordered Hades to let some spirits out. Hades arranges all the souls of the dead in a line before Cerberus. When one of his three heads bites down on the soul in front of it, they’ll get returned to the land of the living. Anyone to the left must get out of line and stay in Hades forever. And everyone else shuffles forward, at which point Cerberus will feed again. Each of the dog’s heads has an equal chance of being the one to bite each time, and no two ever bite simultaneously. Unfortunately, Hades’ minions forgot to tell you what was happening, and by the time you show up there are only 99 souls left in line. Hades looks furious and drawing attention to yourself won’t end well. But suddenly, time freezes, and Hermes steps out of the shadows. He tells you he can instantly put you into the line, and no one will realize what happened. But he’ll only grant his grace to someone clever enough to take full advantage of it. Choose the best place in line and he’ll give you the spot. Choose wrong, and he’ll leave you to rot. Which spot should you pick? Pause the video to figure it out yourself. Answer in 3 Answer in 2 Answer in 1 It’s possible to calculate the exact probability of going free in all 100 spots. But there’s a much simpler path to the solution that requires surprisingly little calculation. Imagine being anywhere in line. Way up at the front, one of the three heads will pick someone at random, and you’ll move forward 1, 2, or 3 spaces. Since each is equally likely, your chance of survival from wherever you started is the average of the chances from each of the three spaces in front of you. And this is where you can find a huge shortcut. Averages must be on or between the extremes of what you’re averaging— they can never be higher than the highest value or lower than the lowest. So whatever your chances of survival are where you start, one of the three places in front of you is at least as good, and probably better. This observation is incredibly powerful. It means that wherever you are in line, it’d be wise to trade your place for one of the three spots in front of you. Let’s ignore which for now and think of them as a trio— this trio’s maximum value is better than this trio’s, and so on. Keep going and you’ll reach the front... These three spots must contain the extreme values— the best and worst probabilities— for the entire line. In other words, they’re all we need to consider. Place 1 is bad. Head one would save you, and the other two doom you forever. That’s just a 1 in 3 chance to escape. Place 2 is better: head two is great, head 3 is bad, and head 1 is ok in that it gives you another chance. But place 3 is best, because head 3 saves you while heads 1 and 2 both give you extra chances. If you did want to consider the exact probabilities, the odds of surviving in place 3 are 16 out of 27, or close to 60%. The spots later in line tend to be very close to having a 50% chance of survival. Why 50%? Because every time Cerberus sends one soul up to be reborn, he leaves 0, 1, or 2 souls in the underworld. That averages out to one person staying for each one who gets freed. But you can beat those odds handily with what you now know. Hermes has places to be, and so do you. He rewards your insight by sneaking you into the third spot. And from there it’ll be just a short wait to learn your ultimate fate.

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翻译人员: Peggy Chen 校对人员: Yolanda Zhang也许是命运的捉弄。也许是波塞冬生气的一天。然而事情还是发生了， 地狱里的人太多了，宙斯于是吩咐哈迪斯释放一些鬼神。哈迪斯让所有亡灵在 刻耳柏洛斯面前排成一排。当三头狗的其中一个头 咬了它面前的亡灵的时候，这个亡灵将会回到 他们生活的土地上。任何位于左边的亡灵 都要离开队伍，永远留在地狱。其他亡灵就要继续前进， 三头狗就继续吃掉面前的亡灵。三头狗的三个头 咬亡灵的概率都是均等的，只有一个头能够伸出来咬亡灵。不幸的是，哈迪斯的仆人 忘记告诉你这个规则，当你知道发生了什么的时候 队伍里只有 99 个亡灵了。哈迪斯非常生气，把注意力 吸引到你身上可不会有好结果。但是突然，时间停止了， 赫尔墨斯从影子里走出来。他告诉你，他可以 马上将你排入队伍里，并且没有人会发现发生了什么。但是他只把这个恩典 赐予足够聪明，能够充分利用这个机会的人。只有选择了队伍中最佳的位置， 他才会把这个位置给你。选择错误，你就只能等死。【哪一个位置是你应该选择的呢？】【暂停视频，思考一下吧】【答案揭晓 3 】【答案揭晓 2 】【答案揭晓 1 】在 100 个位置中 计算出精确的逃脱机率是有可能的。但是这里有更简单的解决方法，几乎不需要进行任何计算。想象你在队伍中的任意一个位置。在队伍的最前面，三头狗的 三个头将随机地咬掉一个亡灵，你将会向前移动一个、 两个，或三个位置。因为每一种情况都是等概率的，所以你从起点出发的生存几率就是你前面三个位置的 生存几率的平均值。也就是说，你可以从中 找到一个很大的捷径。平均数一定就是，或者 在你要平均的极值之间——平均数不会高于最高值，也不会低于最低值。所以无论在起始点 你的生存的几率是多少，在你前面的三个位置， 至少有一个一样好，也许更好。这一观察结果具有强大的力量。这意味着， 无论你在队伍的哪个位置，用你的位置去交换前面 三个位置中的一个都是明智的。让我们先忽略要选哪个位置，然后 把这些位置以三个为一组进行思考——这三个的最高值比这三个高， 以此类推。继续向前走，你将会来到最前面......这三个位置一定包括了整个队伍中的极值，即最好和最差的概率。换句话说，这些就是 我们需要思考的全部数值。位置 1 并不好。第一个头将会拯救你， 其余的两个将会让你永远消失。这里只有三分之一的机会逃离地狱。位置 2 不错：第二个头很好，第三个头不好，第一个头一般般， 因为它会给你第二个机会。但是第三个位置是最好的， 因为第三个头会拯救你，而第一个头和第二个头 只给了你额外的机会。如果你不想去思考准确的概率。位置 3 的生存机率是 16 / 27， 或者说接近 60%。队伍后面的位置的 生存机率无限接近于 50%。为什么是 50%？因为每一次三条狗 都让一位亡灵复活，再让 0 个，1 个或者 2 个亡灵留在地狱。平均下来，一个人被释放， 就有一个人留下来。但是利用目前已知的信息， 你已经可以轻易地战胜这些机率。赫耳墨斯有它的位置， 你也一样。他安排你前往第三个位置， 以奖励你的洞察力。在那里，只需要短暂的一瞬， 你就会得知自己最后的归宿。

**P918 2020-10-01 Who owns the 'wilderness' - Elyse Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=918)

In 1903, the President of the United States took a three-day camping trip in California’s Yosemite Valley. President Theodore Roosevelt slept in a grove of towering Sequoia trees, camped in a snowstorm, and spent hours talking around the campfire with his host and guide, conservationist John Muir. Roosevelt famously loved the outdoors, but Muir had invited him there for more than just camping: Yosemite was in danger. Though Yosemite became protected land in 1864, the valley was still at risk for overdevelopment in 1903. It was at the heart of a decades-old struggle to set aside land for both preservation and public use— two goals that were much easier said than done. The battle over Yosemite began with the 1849 gold rush, when miners surged west, seeking gold in the Sierra Nevada foothills. In 1851, a state-sanctioned militia, drove the Ahwahneechee tribe from Yosemite Valley. Those who managed to return witnessed white settlers claiming the land, felling giant sequoias, and building hotels and saloons. In response, a small group of concerned Californians lobbied senator John Conness to protect the valley from private interests. In 1864, Congress passed Conness’ bill, granting the Yosemite Valley to the State of California, marking the first time the U.S. government brought land under public protection. But the management of that land remained an open question, one that would only become more complicated as more lands came under similar protection. Seven years later, geologist Ferdinand Hayden led an expedition to the Yellowstone Plateau, which many Native American tribes used for ceremonies, hunting, and trade. The expedition’s scientists and artists brought back news of spectacular geysers and hot springs, inspiring widespread support to bring Yellowstone under government protection— and restrict native people’s access to the land. However, unlike Yosemite, Yellowstone couldn’t be granted to a state— it was part of three U.S. territories that hadn’t become states yet. Instead, Congress brought Yellowstone under federal stewardship in 1872, creating the world’s first true National Park. During his presidency, Teddy Roosevelt was instrumental in expanding the lands under public protection. By 1916, there were fifteen national parks. But the problem of management remained unsolved, and maintenance of the park was handled haphazardly over multiple government departments. Straightforward tasks like building roads and hiring personnel required inefficient bureaucratic maneuvering. None of the departments had set rules for conduct in the park, so hunters killed park wildlife, cattle overgrazed fields, and visitors vandalized landmarks. The solution came from Canada, which had a highly effective centralized park service. In 1916, the United States established the National Park Service based on this model. To this day, the mission for the park service is comprised of two goals that sometimes conflict: to conserve the parks for the future and to allow the public to enjoy them. That’s a delicate balancing act: roads, trails, and other infrastructure make the parks accessible to visitors, but also alter the landscape, while visitors themselves can contribute to pollution, erosion, and damage of delicate ecosystems. The very history of preservation can also be at odds with this mission. Many parks were not, at the time of their founding, the uninhabited wilderness that’s become the standard for their preservation. Instead, many were homes or places of worship for native peoples, who lost access to these lands in the name of public use. Only recently has the National Park Service begun to reckon with this legacy and engage Native Americans in park management. Around the world, indigenous communities play crucial roles in land management and preservation. Today, there are thousands of national parks worldwide, and each must balance public use with historical and ecological preservation. Parks in New Zealand, Iceland, Australia, and South Africa have experienced severe erosion as visitor numbers have skyrocketed. Some, like Mu Ko Similan National Park in Thailand, have closed sections to tourists entirely to allow the ecosystem to recover. National Parks have preserved irreplaceable landscapes for future generations. They also force us to reckon with hard questions: what are our responsibilities to this planet, and to each other?

**P918 2020-10-01 Who owns the 'wilderness' - Elyse Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=918)

翻译人员: C Cheng 校对人员: Yolanda Zhang1903 年，美国总统在加利福尼亚的优胜美地谷 经行了历时 3 天的露营旅行。西奥多·罗斯福总统睡在 高耸的红杉树丛里，在暴风雪中露营， 在营火周围与款待他的向导 约翰·缪尔交谈了数小时。罗斯福出了名的热爱户外活动，但是缪尔请他来此， 并不仅仅是为了露营：优胜美地的处境岌岌可危。虽然优胜美地已于 1864 年成为了保护地，但是山谷在 1903 年仍旧 面临着被过度开发的危险。几十年来，人们一直在努力 为保护和公共用地留出土地，而这里正是这场斗争的核心——实现这两个目标， 说起来容易做起来难。对优胜美地的争夺始于 1849 年的淘金热。当时矿工拥入西部，在内华达 山脉的山麓丘陵地带寻找金子。1851 年，一支 获政府批准的民兵组织把阿瓦尼契部落 驱赶出了优胜美地谷。那些设法回来的人目睹了 白人定居者在此索取土地，砍伐巨型红杉，修建旅馆和酒吧。作为回应，一小群为此 感到忧虑的加利福尼亚人向参议员约翰·康尼斯（John Conness）游说， 要求保护山谷免受私人利益的伤害。1864 年，国会通过了康尼斯法案，将优胜美地谷授予了加利福尼亚州，这标志着美国政府首次将土地 置于公共保护之下。但是对土地的管理仍然 是一个有待解决的问题。随着更多的土地受到此类保护，这个问题只会变得更加复杂。7 年后，地质学家费迪南德 ·海登 （Ferdinand Hayden）带领了一支考察队来到黄石高地，许多美国原住部落在此 举行仪式、狩猎和交易。考察队的科学家和艺术家们带回了关于壮观的间歇泉及温泉的消息，这激发了对黄石进行 政府保护的广泛支持——并且限制原住民进入该地。但是与优胜美地不同， 黄石无法被授予某个州——它分属美国三个 仍未设立州级建制的区域。取而代之，国会于 1872 年 将黄石设置在了联邦政府的管理之下，创建了世界上 第一座真正的国家公园。在总统任职期间，西奥多·罗斯福为拓展公共保护土地 发挥了重要的作用。到 1916 年，美国境内 已建立了 15 处国家公园。但是管理问题仍未解决，多个政府部门对公园的维护十分混乱。诸如修路和雇用人员之类的简单任务需要受到低效的官僚操控。没有一个部门为公园制定行为准则，猎人得以在园内捕杀野生动物， 牲畜过度啃食田野，游客肆意破坏标志性建筑。最终的解决方案来自加拿大，那里有着一套高度有效、 集中化的公园服务管理措施。基于这一模式， 美国于 1916 年成立了国家公园管理局。至今，公园管理局的使命仍然是折衷两个有时相互矛盾的目标：保护公园以备未来之用，同时让公众得以享受它们。这是一个微妙的寻求平衡的行动： 公路、轨道及其它基础设施便利了游客前往公园， 但是也改变了风景地貌。同时，游客自身也会导致污染、侵蚀，从而对脆弱的生态系统造成破坏。公园的维护历史 本身也会与这一使命相悖。许多公园在建立时并不是无人居住的荒野，而这一前提 现在却已成为对其建立保护的准则。相反，很多土地原本是 原住民的家园和宗教场所。在公共使用的名义下， 他们失去了对这些土地的使用权。只是到了最近，国家公园管理局才开始着手解决这个遗留问题， 并让美州原住民参与到公园管理中。在世界各地，土著社区在土地管理和保护中起着重要作用。如今，世界上有上千处国家公园，每一处都必须在公共使用和 历史生态保护之间取得平衡。在新西兰、冰岛、澳大利亚和南非，随着游客数量的猛增， 公园的生态环境遭受到了严重侵蚀。还有一些，比如泰国的 穆科斯米兰国家公园，为了恢复生态系统， 已经对游客关闭了部分区域。国家公园为后代保留了独一无二的景观，也迫使我们思考一些尖锐的问题：我们对这个星球，对彼此， 应该负有怎样的责任？

**P919 2020-10-03 The rise and fall of history’s first empire - Soraya Field Fiorio**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=919)

History’s first empire rose out of a hot, dry landscape, without rainfall to nourish crops, without trees or stones for building. In spite of all this, its inhabitants built the world’s first cities, with monumental architecture and large populations— and they built them entirely out of mud. Sumer occupied the southern part of modern Iraq in the region called Mesopotamia. Mesopotamia means “between two rivers”— the Tigris and the Euphrates. Around 5000 BCE, early Sumerians used irrigation channels, dams, and reservoirs to redirect river water and farm large areas of previously bone-dry land. Agricultural communities like this were slowly springing up around the world. But Sumerians were the first to take the next step. Using clay bricks made from river mud, they began to build multi-storied homes and temples. They invented the wheel— a potter’s wheel, for turning mud into household goods and tools. Those clay bricks gave rise to the world’s first cities, probably around 4500 BCE. At the top of the city’s social ladder were priests and priestesses, who were considered nobility, then merchants, craftspeople, farmers, and enslaved people. The Sumerian empire consisted of distinct city-states that operated like small nations. They were loosely linked by language and spiritual belief but lacked centralized control. The earliest cities were Uruk, Ur, and Eridu, and eventually there were a dozen cities. Each had a king who served a role somewhere between a priest and a ruler. Sometimes they fought against each other to conquer new territories. Each city was dedicated to a patron deity, considered the city’s founder. The largest and most important building in the city was this patron god’s home: the ziggurat, a temple designed as a stepped pyramid. Around 3200 BCE, Sumerians began to expand their reach. The potter’s wheel found a new home on chariots and wagons. They built boats out of reeds and date palm leaves, with linen sails that carried them vast distances by river and sea. To supplement scarce resources, they built a trade network with the rising kingdoms in Egypt, Anatolia, and Ethiopia, importing gold, silver, lapis lazuli, and cedar wood. Trade was the unlikely impetus for the invention of the world’s first writing system. It started as a system of accounting for Sumerian merchants conducting business with traders abroad. After a few hundred years, the early pictogram system called cuneiform turned into a script. The Sumerians drafted up the first written laws and created the first school system, designed to teach the craft of writing— and pioneered some less exciting innovations, like bureaucracy and taxes. In the schools, scribes studying from dawn to dusk, from childhood well into adulthood. They learned accounting, mathematics, and copied works of literature— hymns, myths, proverbs, animal fables, magic spells, and the first epics on clay tablets. Some of those tablets told the story of Gilgamesh, a king of the city of Uruk who was also the subject of mythical tales. But by the third millennium BCE, Sumer was no longer the only empire around, or even in Mesopotamia. Waves of nomadic tribes poured into the region from the north and east. Some newcomers looked up to the Sumerians, adopting their way of life and using the cuneiform script to express their own languages. In 2300 BCE, the Akkadian king Sargon conquered the Sumerian city-states. But Sargon respected Sumerian culture, and Akkadians and Sumerians existed side-by-side for centuries. Other invading groups focused only on looting and destruction. Even as Sumerian culture spread, a steady onslaught of invasions killed off the Sumerian people by 1750 BCE. Afterward, Sumer disappeared back into the desert dirt, not to be rediscovered until the 19th century. But Sumerian culture lived on for thousands of years— first through the Akkadians, then the Assyrians, then the Babylonians. The Babylonians passed Sumerian inventions and traditions through along Hebrew, Greek, and Roman cultures. Some persist today.

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翻译人员: Lily Xu 校对人员: Shu Fei Chow历史上的第一个帝国 地处一片炎热干燥的地区，那里既没有雨水灌溉农作物， 也没有建造房屋的树木和石头。尽管如此，这里的居民依然 建造出了世界上的第一座城市，有着宏伟壮观的建筑 和庞大的人口——且这些城市完全是由泥土建造的。苏美尔（Sumer）位于 当代伊拉克的南部，地处美索不达米亚平原。美索不达米亚意为“两河流域”——即底格里斯河和幼发拉底河。大约在公元前 5000 年，早期的 苏美人建造了水渠、水坝和水库，将河水引进这些 极其干燥的大面积耕作土地。像这样的农业社区 逐渐在世界各地慢慢兴起。但苏美尔人是最早 采取下一步行动的人。他们开始利用 由河泥制成的黏土砖建造高层住宅和神庙。他们发明了陶轮——利用泥土制作家具用品和工具。约公元前 4500 年左右，在这些黏土砖上诞生了 世界上第一座城市。处在这座城市最高社会阶层的 是男祭司与女祭司，他们被视为贵族。其后是商人、工匠、农民和奴隶。苏美尔帝国由不同的城邦组成，各个城邦如同 小型国家那样运作。他们依靠语言和宗教信仰 而松散地联系在一起，但缺乏集中管理。乌鲁克（Uruk）、乌尔（Ur） 和埃里都（ Eridu）是最早的城市，随后出现了十几座城市。每个城邦都有一个国王， 职责介于祭司与统治者之间。有时, 他们为了占领新领地 而互相争斗。每个城邦都供奉著一位 被视为该邦的创始者——守护神。城中最大且最重要的建筑 就是这位守护神的住所：之字形塔庙（ziggurat）， 外形很像阶梯式的金字塔。公元前 3200 年左右， 苏美尔人开始扩张自己的势力范围。陶轮发明开始 被应用在战车和马车上。他们用芦苇和椰枣叶建造了船,用亚麻做成了帆， 带领他们前往海上航行。为了补充稀缺的资源，他们与埃及、安纳托利亚、埃塞俄比亚 这些新兴的王国建立了商业贸易网络，引进了黄金、白银、青金石和雪松木。商业贸易看起来 是个影响力不大的动力，但它却推动了世界上第一个 书写系统的发明。书写系统最初 是用来记录苏美商人与国外贸易商 展开业务往来的会计系统。几百年后， 早期的象形文字系统，也称楔形文字， 发展成抽象文字。苏美尔人随后起草了 第一部成文律法，创建了第一个学校系统 用来传授书写能力——并开创了一些不太受欢迎的新制度， 比如官僚机构和税收。在学校，文人学士 从童年直到成年，日复一日，年复一年， 从黎明到黄昏都在学习。他们学习会计、数学、 抄写文学作品——赞美诗、神话、谚语、 动物寓言、魔咒，以及第一部 写在泥板上的史诗。其中的泥板记录了 吉尔伽美什（Gilgamesh）的故事。他是乌鲁克的国王， 也是神话故事的主角。但是到了公元前 3000 年，苏美尔不再是世上, 甚至不再是 美索不达米亚的唯一帝国。一群又一群的游牧部落 从北部和东部涌入了苏美尔。这些初来乍到的人们因仰慕苏美尔人， 而接受了他们的生活方式，并采用楔形文字来 表达他们自己的语言。公元前 2300 年，阿卡德国王 萨尔贡（Sargon）征服了苏美城邦。但是萨尔贡尊重苏美尔人的文化，因而让阿卡德人 和苏美尔人的文化并存了数世纪。其他的侵略者 则仅仅是为了劫掠和破坏。即便苏美尔文化 得到了广泛的流传，侵略者持续不断的杀戮依然 使苏美尔人在公元前 1750 年惨遭屠戮。此后，苏美尔便消失在 茫茫的历史尘埃之中，直到 19 世纪才被重新发现。但是苏美尔人的文化 却持续延续了数千年——先后被阿卡德人、亚述人 和巴比伦人传承。巴比伦人将苏美尔人的 发现和传统传入了希伯来、希腊和罗马文化，有些依然留存至今。

**P920 2020-10-08 Can we create the 'perfect' farm - Brent Loken**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=920)

Transcriber: TED Translators Admin Reviewer: Mirjana Čutura About 10,000 years ago, humans began to farm. This agricultural revolution was a turning point in our history that enabled people to settle, build and create. In short, agriculture enabled the existence of civilization. Today, approximately 40 percent of our planet is farmland. Spread all over the world, these agricultural lands are the pieces to a global puzzle we are all facing: in the future, how can we feed every member of a growing population a healthy diet? Meeting this goal will require nothing short of a second agricultural revolution. The first agricultural revolution was characterized by expansion and exploitation, feeding people at the expense of forests, wildlife and water and destabilizing the climate in the process. That's not an option the next time around. Agriculture depends on a stable climate with predictable seasons and weather patterns. This means we can't keep expanding our agricultural lands, because doing so will undermine the environmental conditions that make agriculture possible in the first place. Instead, the next agricultural revolution will have to increase the output of our existing farmland for the long term while protecting biodiversity, conserving water and reducing pollution and greenhouse gas emissions. So what will the future farms look like? This drone is part of a fleet that monitors the crops below. The farm may look haphazard but is a delicately engineered use of the land that intertwines crops and livestock with wild habitats. Conventional farming methods cleared large swathes of land and planted them with a single crop, eradicating wildlife and emitting huge amounts of greenhouse gases in the process. This approach aims to correct that damage. Meanwhile, moving among the crops, teams of field robots apply fertilizer in targeted doses. Inside the soil, hundreds of sensors gather data on nutrients and water levels. This information reduces unnecessary water use and tells farmers where they should apply more and less fertilizer instead of causing pollution by showering it across the whole farm. But the farms of the future won't be all sensors and robots. These technologies are designed to help us produce food in a way that works with the environment rather than against it, taking into account the nuances of local ecosystems. Lower-cost agricultural practices can also serve those same goals and are much more accessible to many farmers. In fact, many such practices are already in use today and stand to have an increasingly large impact as more farmers adopt them. In Costa Rica, farmers have intertwined farmland with tropical habitat so successfully that they have significantly contributed to doubling the country's forest cover. This provides food and habitat for wildlife as well as natural pollination and pest control from the birds and insects these farms attract, producing food while restoring the planet. In the United States, ranchers are raising cattle on grasslands composed of native species, generating a valuable protein source using production methods that store carbon and protect biodiversity. In Bangladesh, Cambodia and Nepal, new approaches to rice production may dramatically decrease greenhouse gas emissions in the future. Rice is a staple food for three billion people and the main source of livelihood for millions of households. More than 90 percent of rice is grown in flooded paddies, which use a lot of water and release 11 percent of annual methane emissions, which accounts for one to two percent of total annual greenhouse gas emissions globally. By experimenting with new strains of rice, irrigating less and adopting less labor-intensive ways of planting seeds, farmers in these countries have already increased their incomes and crop yields while cutting down on greenhouse gas emissions. In Zambia, numerous organizations are investing in locally specific methods to improve crop production, reduce forest loss and improve livelihoods for local farmers. These efforts are projected to increase crop yield by almost a quarter over the next few decades. If combined with methods to combat deforestation in the region, they could move the country toward a resilient, climate-focused agricultural sector. And in India, where up to 40 percent of post-harvest food is lost or wasted due to poor infrastructure, farmers have already started to implement solar-powered cold storage capsules that help thousands of rural farmers preserve their produce and become a viable part of the supply chain. It will take all of these methods, from the most high-tech to the lowest-cost, to revolutionize farming. High-tech interventions stand to amplify climate- and conservation-oriented approaches to farming, and large producers will need to invest in implementing these technologies. Meanwhile, we'll have to expand access to the lower-cost methods for smaller-scale farmers. This vision of future farming will also require a global shift toward more plant-based diets and huge reductions in food loss and waste, both of which will reduce pressure on the land and allow farmers to do more with what they have available. If we optimize food production, both on land and sea, we can feed humanity within the environmental limits of the earth, but there's a very small margin of error, and it will take unprecedented global cooperation and coordination of the agricultural lands we have today.

**P920 2020-10-08 Can we create the 'perfect' farm - Brent Loken**

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翻译人员: TED Translators Admin 校对人员: Yanyan Hong大约一万年前，人类开始了耕种。这场农业革命是 人类历史上的一个转折点使我们能够定居、建立和创造家园。简而言之，农业使文明得以存在。今天，地球上大约 40% 面积是农田，遍布世界各地，这些农田是我们所有人面临的全球性难题的一部分：在未来，我们怎样才能 让不断增长的人口中的每一个人都吃到健康的食物?要实现这一目标就需要进行第二次农业革命。第一次农业革命的特点是扩张和开发，以森林、野生动物和水资源为代价养活人类，并在此过程中破坏了气候。下次就不可能这样做了。农业依赖于稳定的气候和可预测的季节和天气模式。这意味着我们不能继续 扩大我们的农业用地，因为这样做首先会破坏使农耕成为可能的环境条件。相反，下一次农业革命将不得不从长远提高我们现有耕地的产量。在保护生物多样性的同时， 节约水资源，减少污染和温室气体排放。那么未来的农场会是什么样子呢?这架无人机在监控 下方农作物的生长状况。这个农场可能看起来杂乱无章，但这是进行精心设计利用的土地，使农作物和牲畜 与野生栖息地交织在一起。传统的耕作方法清理了大片土地并且只用于种植一种作物，从而在此过程中，消灭了野生动物，排放出大量的温室气体。此方法旨在纠正这种损害。与此同时，在庄稼间穿行的田间机器人团队 有针对性地给土地施肥，在土壤内，数百个传感器会收集养分和水位的数据。这一信息有助于减少不必要的用水，并告诉农民他们应该在 哪些地方多施肥以及少施肥，而不是把化肥洒遍 整个农场而造成污染。但未来的农场不会 全是传感器和机器人。考虑到当地生态系统的细微差别，这些技术旨在帮助我们以与环境协调，而非与环境对抗的方式生产粮食。低成本的农业做法也可以实现同样的目标，而且对许多农民来说更容易实现。事实上，许多这样的做法 今天已经在使用。而且随着被越来越多的农民所采用，它们将产生越来越大的影响。在哥斯达黎加 ，农民成功地将农田与热带栖息地交织在一起，从而为翻倍该国的森林覆盖率做出了重要贡献。这为野生动物提供了食物和栖息地，以及这些农场吸引来的鸟类和昆虫还提供了自然授粉和害虫防治，在恢复地球生态的同时生产粮食。在美国，牧场主们在 由本地物种组成的草原上养牛，利用储存碳和保护生物多样性的生存方式成为宝贵的蛋白质来源。在孟加拉国 、柬埔寨和尼泊尔 ，水稻生产的新方法可能 在未来显著减少温室气体排放。大米是 30 亿人的主食，以及数以百万计的家庭 主要的生计来源。90% 以上的水稻是在水田里种植的,这需要用到大量的水，并释放出每年 11% 的甲烷排放量。约占全球每年 温室气体排放总量的 1-2%。通过试验水稻新品系，减少灌溉，并采用劳动强度较低的播种方式，这些国家的农民已经提高了收入和作物产量，同时减少了温室气体的排放。在赞比亚 ，许多组织投资于当地特定的方法来提高作物产量，减少森林损失，并改善当地农民的生计。这些努力预计将使农作物产量在未来几十年提高近四分之一。如果与打击该区域 森林砍伐的方法相结合，就可以推动该国建立一个具有复原力、注重气候的农业部门。在印度，由于基础设施薄弱，高达 40% 的收成会损失或浪费。农民已经开始实施太阳能冷藏舱，帮助成千上万的农民保存他们的粮食，并成为供应链中可行的一部分。采取所有这些方法，从最高科技到最低成本，才能彻底改革农业现状。高科技干预将放大以气候和保护为导向的农耕方法，而大规模的农场将需要投资实施这些技术。与此同时， 我们必须增加小规模农民获得低成本方法的机会。对未来农业的展望还需要全球转向更多的植物性饮食，并大幅减少粮食损失和浪费。这两方面都将减轻土地压力，让农民能够利用可用资源做更多事情。如果我们优化陆地上的粮食 和海洋里的海产品的产量，我们可以在地球的环境范围内养活人类，但是有一个很小的误差，这将需要前所未有的全球合作和协调我们今天拥有的农业用地。

**P921 2020-10-09 Which type of milk is best for you - Jonathan J. O’Sullivan & Grace E**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=921)

If you go to the store in search of milk, there are a dizzying number of products to choose from. There’s dairy milk, but also plant-based products. To turn a plant into something resembling milk, it must be either soaked, drained, rinsed, and milled into a thick paste, or dried, and milled into flour. The plant paste or flour is then fortified with vitamins and minerals, flavoured, and diluted with water. The result is a barrage of options that share many of the qualities of animal milk. So which milk is actually best for you? Let’s dive into some of the most popular milks: dairy, almond, soy, or oat? A 250 ml glass of cow’s milk contains 8 grams of protein, 12 grams of carbohydrates, and 2 to 8 grams of fat depending on if it’s skim, reduced fat, or whole. That’s approximately 15% the daily protein an average adult needs, roughly 10% the carbohydrates and 2 to 15% the fat. Most plant-based milks have less carbohydrates than dairy milk. They also have less fat, but more of what’s often called “good fats.” Meanwhile, the healthy nutrients vitamin D and calcium found in dairy milk don’t occur naturally in most plant-based milks. Looking more closely at our plant-based milks, both almond and oat are low in protein compared to dairy. But while almond milk has the least nutrients of the four, oat milk is full of beta-glucans, a healthy type of fibre. It also has a lot of carbohydrates compared to other plant milks— sometimes as much as dairy milk. Soy milk, meanwhile, has as much protein as cow’s milk and is also a great source of potassium. Soybeans contain isoflavone, which people used to think might trigger hormonal imbalances by mimicking the function of estrogen. But ultimately, soy milk contains very small amounts of isoflavones, which have a much weaker effect on our bodies than estrogen. Depending on individual circumstances, one of these milks may be the clear winner: if you’re lactose intolerant, then the plant-based milks pull ahead, while if you’re allergic to nuts, almond milk is out. For people who don’t have access to a wide and varied diet, dairy milk can be the most efficient way to get these nutrients. But all else being equal, any one of these four milks is nutritious enough to be part of a balanced diet. That’s why for many people, the milk that’s best for you is actually the milk that’s best for the planet. So which uses the fewest resources and produces the least pollution? It takes almost 4 square kilometers to produce just one glass of cow’s milk, land use that drives deforestation and habitat destruction. Most of that is land the cows live on, and some is used to grow their feed. Many cows eat soy beans and oats. It takes much less land to grow the oats or soybeans for milk than it does to feed a dairy cow— only about a quarter square kilometer per glass. Almond milk has similar land use. But where that land is also matters— soybean farms are a major driver of deforestation, while oat and almond farms aren’t. Making milk uses water every step of the way, but it’s the farming stage where big differences emerge. Dairy milk uses the most water— about 120 liters per glass, mostly to water cows and grow their food. Almonds take second place, at more than 70 liters of water per glass. Most of that water is used to grow almond trees, which take years of watering before they start producing almonds. The trees must be watered consistently, or they die, while many other crops can be left fallow and still produce later. All told, soy and oats require less water to grow: only about 5 to 10 liters per glass of milk. Milk production generates some greenhouse gas emissions— about 0.1 to 0.2 kilograms per glass for the plant-based milks. But for dairy milk, the cows themselves also produce emissions by burping and farting out large quantities of the gas methane. Overall, each glass of dairy milk contributes over half a kilogram of greenhouse gas emissions. So while depending on your dietary needs, any one of these milks may be a good fit, in terms of the health of our planet there’s a strong case for choosing plant-based milks, particularly oat or soy milk.

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翻译人员: C Cheng 校对人员: Yu Xie如果你去商店购买饮用奶，你会发现可供选择的产品 多得让你眼花缭乱。既有动物奶，也有植物奶。要把植物转化为牛奶替代物，就必须将其浸泡、沥干、冲洗， 再研磨成粘稠的糨糊，或者将其晒干后研磨成粉末。之后，再向这些植物糨糊或粉末中 补充维生素和矿物质,调和味道，并用水稀释。这一系列的流程 可以生产出不同品种的奶，且都具有许多动物奶的特性。那么，哪种奶才是 最有益于你的呢？让我们看看一些 最流行的奶产品中：动物奶、扁桃仁奶、 豆奶，或者燕麦奶？一杯 150 毫升的牛奶 包含了 8 克蛋白质，12 克碳水化合物， 和 2 至 8 克脂肪，脂肪的含量取决于 它是脱脂、低脂，还是全脂奶。这大约是成年人平均 每日所需蛋白质的15％，以及约 10% 的碳水化合物， 和 2-15% 的脂肪。大多数植物奶中的 碳水化合物要少于动物奶。其脂肪含量也更低， 但却包含了更多的“优质脂肪”。同时，动物奶中健康的 营养元素，如维他命D和钙，并不自然存在于植物奶中。让我们更加仔细地 观察一下植物奶，与动物奶相比，扁杏仁奶和 燕麦奶中的蛋白质含量较低。在四种奶中，扁杏仁奶 所含的营养元素最少，燕麦奶却富含 β-葡聚糖， 这是一种有益于健康的纤维。与其它植物奶相比较， 它还包含了大量的碳水化合物——有时甚至和动物奶一样多。豆奶具有和牛奶 同样多的蛋白质，而且是很好的补充 体内钾含量的途径。大豆中含有异黄酮，人们曾经认为它可能会因具有类似于 雌激素的功能而引起荷尔蒙失调。但是，大豆只包含了 微量的异黄酮，它对人体的影响 要比雌激素弱得多。取决于个人境况，其中一种奶也许会 明显优于其它奶：如果你对乳糖不耐的话， 那么植物奶将胜出，但是，如果你对坚果过敏的话， 扁杏仁奶则要被淘汰。对于饮食缺乏广泛性 和多样性的人而言，动物奶是获得这些营养元素的 最有效的途径。如果其它一切正常的话， 这四种奶中的任何一种都具有足够的营养成分， 可以作为均衡饮食的一部分。这就是为什么，对许多人而言， 最有益于你的奶其实也是最有益于地球的奶。那么，哪种奶消耗的资源最少， 同时制造的污染也最少呢？生产一杯牛奶需要 大约 4 平方公里的土地，畜牧用地使得森林遭到砍伐， 栖息地遭到破坏。其中大部分的土地供奶牛生长， 还有一些用来种植饲料。很多奶牛食用大豆和燕麦。为生产奶而种植的 燕麦或大豆对土地的需求比饲养奶牛要少得多——一杯奶差不多只需要 1/4 平方公里的用地。扁杏仁奶的用地需求与此相近。但是，土地的选址也很重要——大豆农场是造成 森林滥伐的主要原因之一，但是种植燕麦和 扁杏仁的农场却非如此。生产奶的每道程序都要用到水，但是重要区别体现在种植过程中。动物奶的用水量最大—— 一杯奶大约需要 120 升水，大部分用来供奶牛饮用和种植饲料。扁杏仁的用水量次之， 一杯奶需要 70 多升水。大部分水用来种植扁杏仁树，这些树需要经过多年浇灌 才能开始出产扁杏仁。树木必须被持续浇灌， 否则它们就会枯死。而其它许多农作物则可以休耕， 并且在日后仍有产出。合计起来，种植大豆和燕麦 需要的用水量较少：一杯奶只需要大约 5 到 10 升的水。生产奶的过程会排放出 一些温室效应气体——每杯植物奶产生约 0.1 至 0.2 千克的气体。而就动物奶而言， 奶牛自身就会产生排放，它们通过打嗝和放屁 释放出大量沼气。总体而言，每杯动物奶会增加超过半千克的 温室气体排放。所以就你个人 对奶的需要而言，其中任何一种奶都可能非常适合， 但是，就地球的健康而言，我们有充足的理由 去选择植物奶，特别是燕麦奶或豆奶。

**P922 2020-10-13 The hidden treasures of Timbuktu - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=922)

On the edge of the vast Sahara desert, citizens snuck out of the city of Timbuktu and took to the wilderness. They buried chests in the desert sand, hid them in caves, and sealed them in secret rooms. Inside these chests was a treasure more valuable than gold: the city’s ancient books. Founded around 1100 CE in what is now Mali, the city of Timbuktu started out as an unremarkable trading post. But its unique location soon changed that. Timbuktu marked the intersection of two essential trade routes, where caravans bringing salt across the Sahara met with traders bringing gold from the African interior. By the late 1300s, these trade routes made Timbuktu rich, and the city’s rulers, the kings of the Mali Empire, built monuments and academies that drew scholars from Egypt, Spain, and Morocco. The city’s prime location also made it a target for warlords and conquerors. As the Mali Empire declined, one of its domains, Songhai, began to gain power. In 1468, the Songhai king conquered Timbuktu, burning buildings and murdering scholars. But in time, intellectual life in the city flourished again. The reign of the second king of the Songhai Empire, Askia Mohammed Toure, marked the beginning of a golden age in Timbuktu. He reversed his predecessor’s regressive policies and encouraged learning. The Songhai rulers and most of Timbuktu’s population were Muslim, and the scholars of Timbuktu studied Islam alongside secular topics like mathematics and philosophy. In the libraries of Timbuktu, tracts of Greek philosophy stood alongside the writings of local historians, scientists, and poets. The city’s most prominent scholar, Ahmed Baba, challenged prevailing opinions on subjects ranging from smoking to slavery. Gold and salt trade had funded the city’s transformation into a center of learning. Now, the products of that intellectual culture became the most sought-after commodity. With paper from faraway Venice and vibrant ink from local plants and minerals, the scribes of Timbuktu produced texts in both Arabic and local languages. Written in calligraphy and decorated with intricate geometric designs, the books of Timbuktu were in demand among the wealthiest members of society. In 1591, the golden age came to an abrupt end when the Moroccan king captured Timbuktu. Moroccan forces imprisoned Ahmed Baba and other prominent scholars and confiscated their libraries. In the centuries that followed, the city weathered a succession of conquests. In the mid-1800s, Sufi Jihadists occupied Timbuktu and destroyed many non-religious manuscripts. 1894, French colonial forces seized control of the city, stealing even more manuscripts and sending them to Europe. French became the official language taught in schools, and new generations in Timbuktu couldn’t read the Arabic manuscripts that remained. Through it all, the literary tradition of Timbuktu didn’t die— it went underground. Some families built secret libraries in their homes, or buried the books in their gardens. Others stashed them in abandoned caves or holes in the desert. The priceless manuscripts of Timbuktu dispersed to villages throughout the surrounding area, where regular citizens guarded them for hundreds of years. As desertification and war impoverished the region, families held on to the ancient books even as they faced desperate poverty and near-starvation. Even today, the struggle to protect the books continues. From the 1980s to the early 2000s, Timbuktu scholar Abdel Kader Haidara painstakingly retrieved hidden manuscripts from all over northern Mali and brought them back to Timbuktu. But in 2012, civil war in Mali once again threatened the manuscripts, most of which were evacuated to nearby Bamako. Their future remains uncertain, as they face both human and environmental threats. These books represent our best— and often only— sources on the pre-colonial history of the region. Many of them have never been read by modern scholars, and still more remain lost or hidden in the desert. At stake in the efforts to protect them is the history they contain— and the efforts of countless generations to protect that history from being lost.

**P922 2020-10-13 The hidden treasures of Timbuktu - Elizabeth Cox**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=922)

翻译人员: Chuqi Hu 校对人员: Yolanda Zhang在广阔的撒哈拉沙漠边缘，市民们溜出廷巴克图城，逃向荒野。他们把箱子埋藏在沙漠里， 藏在洞窟中，封在密室里。这些箱子里装着 比黄金更珍贵的宝藏：这座城市的古老书籍。廷巴克图城起初作为 一个普通的贸易站，于约公元 1100 年 出现于如今的马里。但独特的地理位置 很快改变了它的作用。廷巴克图是两条重要 贸易线的交汇点。在此，穿越撒哈拉的运盐车队与从非洲腹地 运来黄金的商人会合。到 1300 年代末， 这些贸易线使廷巴克图富裕起来。城市的统治者， 马里帝国的国王，建立了纪念碑和学院来吸引来自埃及、西班牙 和摩洛哥的学者们。该城市的绝佳位置也使其 成为了军阀和征服者的目标。当马里帝国日渐衰落， 它的领地之一，桑海，开始获得权势。在 1468 年， 桑海国王征服了廷巴克图，烧毁建筑，谋杀学者。但后来，城市的知识生活 再次兴盛了起来。桑海帝国的第二个皇帝——阿斯基亚·穆罕默德 （Askia Mohammed Toure）一世的统治标志着廷巴克图黄金时代的起点。他颠覆了前人的落后政策，并鼓励学习。桑海的统治者和 廷巴克图的大多数居民是穆斯林，廷巴克图的学者会学习伊斯兰教以及一些非宗教学科， 比如数学和哲学。在廷巴克图的图书馆，希腊哲学的书册和 当地历史学家、科学家及诗人的著作放在一起。这个城市最知名的学者 艾哈迈德·巴巴（Ahmed Baba），挑战了各种主流思想，从吸烟到奴隶制。黄金和盐巴贸易 奠定了这个城市转型为学习中心的基础。知识文化的产物成为了最受欢迎的商品。用来自遥远威尼斯的纸张和用当地植物 和矿物制成的鲜艳墨水，廷巴克图的抄写员 会用阿拉伯文和当地语言抄写文本。廷巴克图的书籍都由书法撰写， 并配上了精美的几何设计，社会上富有的人对它们有很大需求。在 1591 年， 黄金年代戛然而止。摩洛哥国王占领了廷巴克图。摩洛哥军力监禁了 艾哈迈德·巴巴和其他的著名学者，并封锁了他们的图书馆。在接下来的几个世纪， 这座城市经历了数次征战。在 1800 年代中期， 苏菲的圣战士占领了廷巴克图，并摧毁了很多非宗教的手稿。1894 年，法国殖民军队 掌控了城市的控制权，偷走了更多的手稿， 并将它们送到了欧洲。法语成为了学校教授的官方语言，廷巴克图的新一代无法阅读留存下来的 阿拉伯语手稿。经历了这一切，廷巴克图的 文学传统并没有消亡——而是转入了地下。有些家庭在家中 建造了隐密的图书馆，或者把书埋在他们的花园里。还有人把书藏在废弃的洞穴， 或者沙漠的空洞中。这些无价的廷巴克图手稿散布在周围地区的村庄里，在这里，平民百姓 守护了它们数百年。随着荒漠化和战争 使该地区日渐贫困，许多家庭在极度贫困 和几乎无法维持温饱情况下仍守护着古书。即使在今天，保护书籍的 斗争仍在继续。从 1980 年代到 2000 年代早期，廷巴克图的学者 阿巴杜·卡德·海德拉（Abdel Kader Haidara）辛苦地从马里北部各地取回了 藏匿的手稿，并将它们带回了廷巴克图。但在 2012 年，马里内战 再次让这些手稿面临威胁。很多手稿都被转移到了 附近的巴马科。面临着来自人类和自然的威胁，这些手稿的未来仍是未知数。要想了解该地区的殖民前历史。 这些古书是我们最好的，可能也是唯一的来源。很多手稿从未被现代学者研读过，还有更多已经遗失 或者隐藏在沙漠中。保护它们，就意味着 守护它们所承载的历史——以及数代人不让 这段历史失传的不懈努力。

**P923 2020-10-15 Could we harness the power of a black hole - Fabio Pacucci**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=923)

Imagine a distant future when humans reach beyond our pale blue dot, forge cities on planets thousands of light-years away, and maintain a galactic web of trade and transport. What would it take for our civilization to make that leap? There are many things to consider— how would we communicate? What might a galactic government look like? And one of the most fundamental of all: where would we get enough energy to power that civilization— its industry, its terraforming operations, and its starships? An astronomer named Nikolai Kardashev proposed a scale to quantify an evolving civilization’s increasing energy needs. In the first evolutionary stage, which we’re currently in, planet-based fuel sources like fossil fuels, solar panels and nuclear power plants are probably enough to settle other planets inside our own solar system, but not much beyond that. For a civilization on the third and final stage, expansion on a galactic scale would require about 100 billion times more energy than the full 385 yotta joules our sun releases every second. Barring a breakthrough in exotic physics, there’s only one energy source that could suffice: a supermassive black hole. It’s counterintuitive to think of black holes as energy sources, but that’s exactly what they are, thanks to their accretion disks: circular, flat structures formed by matter falling into the event horizon. Because of conservation of angular momentum, particles there don’t just plummet straight into the black hole. Instead, they slowly spiral. Due to the intense gravitational field of the black hole, these particles convert their potential energy to kinetic energy as they inch closer to the event horizon. Particle interactions allow for this kinetic energy to be radiated out into space at an astonishing matter-to-energy efficiency: 6% for non-rotating black holes, and up to 32% for rotating ones. This drastically outshines nuclear fission, currently the most efficient widely available mechanism to extract energy from mass. Fission converts just 0.08% of a Uranium atom into energy. The key to harnessing this power may lie in a structure devised by physicist Freeman Dyson, known as the Dyson sphere. In the 1960s, Dyson proposed that an advanced planetary civilization could engineer an artificial sphere around their main star, capturing all of its radiated energy to satisfy their needs. A similar, though vastly more complicated design could theoretically be applied to black holes. In order to produce energy, black holes need to be continuously fed— so we wouldn’t want to fully cover it with a sphere. Even if we did, the plasma jets that shoot from the poles of many supermassive black holes would blow any structure in their way to smithereens. So instead, we might design a sort of Dyson ring, made of massive, remotely controlled collectors. They’d swarm in an orbit around a black hole, perhaps on the plane of its accretion disk, but farther out. These devices could use mirror-like panels to transmit the collected energy to a powerplant, or a battery for storage. We’d need to ensure that these collectors are built at just the right radius: too close and they’d melt from the radiated energy. Too far, and they’d only collect a tiny fraction of the available energy and might be disrupted by stars orbiting the black hole. We would likely need several Earths worth of highly reflective material like hematite to construct the full system— plus a few more dismantled planets to make a legion of construction robots. Once built, the Dyson ring would be a technological masterpiece, powering a civilization spread across every arm of a galaxy. This all may seem like wild speculation. But even now, in our current energy crisis, we’re confronted by the limited resources of our planet. New ways of sustainable energy production will always be needed, especially as humanity works towards the survival and technological progress of our species. Perhaps there’s already a civilization out there that has conquered these astronomical giants. We may even be able to tell by seeing the light from their black hole periodically dim as pieces of the Dyson ring pass between us and them. Or maybe these superstructures are fated to remain in the realm of theory. Only time— and our scientific ingenuity— will tell.

**P923 2020-10-15 Could we harness the power of a black hole - Fabio Pacucci**

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翻译人员: C Cheng 校对人员: Yu Xie想象一下，在遥远的未来，人类 可及的疆域超越了我们淡蓝色的星球，在几千光年之外的星球上建造城市，维护着银河系的贸易 与交通网络。以我们现在的文明， 要如何实现这一飞跃？其中有许多事情需要考虑—— 我们该如何沟通？银河系政府将会是 什么样子？其中最基本的一个问题是：我们将从哪里获得足够的 能源来驱动这个文明——它的工业、外星环境改造 以及及宇宙飞船？一位名叫尼古拉·卡尔达肖夫 （Nikolai Kardashev）的天文学家提出了一个量表，用以量化文明 在进化中对能量不断增长的需求。在第一个进化阶段， 也就是我们现在所处的阶段,基于行星的燃料资源， 比如化石能源，太阳能电池板和核电站也许足够让我们在太阳系内 其它星球上定居，但也仅此而已。对于处在第三，也是 最后阶段的文明来说，在银河系的范畴内进行拓展则需要比太阳每秒释放的 385 尧焦耳 还要多出 100 亿倍的能量。除非在奇特物理学上取得重大突破，否则只有一种能量来源 可以满足需要：超大质量黑洞。把黑洞视为能量来源 是一种反直觉的想法，但它们的自然特性就是如此。 这要归结于它们的吸积盘（Accretion disk）：一种圆形扁平结构，由掉落在 事件视界（Event horizon）内的物质构成。由于角动量守恒，那里的颗粒物质 并不直接跌入黑洞，而是开始缓慢盘旋。由于黑洞强大的引力场，这些颗粒在一寸寸接近事件视界时， 将它们的势能转化成了动能。颗粒之间的相互作用使该动能得以辐射到宇宙空间。其间的物质到能量的 转化效率非常惊人：非旋转黑洞是 6%， 而旋转黑洞则可以高达 32%。这大大胜过了核裂变，这一目前最为有效且广泛使用的从物质中提取能量的方法。裂变只能将 0.08% 的 铀原子转化为能量。开发利用这一能量的关键， 也许就在于一个由物理学家弗里曼·戴森（Freeman Dyson）设计的， 被称为“戴森球”的结构。在 20 世纪 60 年代， 戴森提出，先进的星球文明可以设计建造一个围绕在 其主要恒星周围的人造球体，用它来捕获恒星所辐射出的 所有能量，从而满足他们的需求。一个类似，却更为复杂的设计可以在理论上用于黑洞。为了制造能量， 黑洞需要不间断的补给——所以我们不会想用一个球体 把它全部覆盖。即使我们这样做了，从许多超大质量黑洞的两极 射出的等离子射流也会把任何挡路的 建筑结构炸得粉碎。所以，取而代之， 我们也许可以设计一种“戴森圈”，由巨大的远程控制的收集器构成。它们沿着环绕黑洞的轨道成群移动，远离吸积盘， 但与其保持在同一平面上。这些装置可以用类似于镜子的嵌板把收集到的能量传送给动力装置或电池，来进行存储。我们需要确保这些收集器 建造在正确的半径上:如果太近，它们 会因辐射出的能量而融化。太远的话，它们则只能 收集到极小部分的可获能量，而且可能会被那些绕着 黑洞运行的恒星摧毁。我们很可能需要 相当于几个地球储量的，如赤矿石这样的高反光材料 来建造整个系统——再加上几个被拆卸了的星球， 以组建一支机器人施工军团。一旦建成，这个戴森圈 将是一个科技杰作。它将驱动文明在整个 银河系进行传播。这一切看起来似乎是一个疯狂臆测。但是即使是现在， 在当前的能源危机中，我们也面临着地球资源有限的问题。我们将始终需要新的方法来 制造可持续能源，特别是当人类这一物种在为生存和科技进步而努力的时候。也许，已经有文明征服了这些天体巨人。也许，我们甚至可以对此有所察觉：当我们看到从他们的黑洞 射出的光时而变暗时，那是戴森圈的部件 在我们与他们之间穿过。或许这些超级构造将注定 停留在理论范畴。只有时间——和我们的科学智慧 ——才知晓答案。

**P924 2020-10-16 What if there were 1 trillion more trees - Jean-François Bastin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=924)

Standing at almost 84 meters tall, this is the largest known living tree on the planet. Nicknamed General Sherman, this giant sequoia has sequestered roughly 1,400 tons of atmospheric carbon over its estimated 2,500 years on earth. Very few trees can compete with this carbon impact, but today, humanity produces more than 1,400 tons of carbon every minute. To combat climate change, we need to steeply reduce fossil fuel emissions, and draw down excess CO2 to restore our atmosphere’s balance of greenhouse gases. But what can trees do to help in this fight? And how do they sequester carbon in the first place? Like all plants, trees consume atmospheric carbon through a chemical reaction called photosynthesis. This process uses energy from sunlight to convert water and carbon dioxide into oxygen and energy-storing carbohydrates. Plants then consume these carbohydrates in a reverse process called respiration, converting them to energy and releasing carbon back into the atmosphere. In trees, however, a large portion of that carbon isn’t released, and instead, is stored as newly formed wood tissue. During their lifetimes, trees act as carbon vaults, and they continue to draw down carbon for as long as they grow. However, when a tree dies and decays, some of its carbon will be released back into the air. A significant amount of CO2 is stored in the soil, where it can remain for thousands of years. But eventually, that carbon also seeps back into the atmosphere. So if trees are going to help fight a long-term problem like climate change, they need to survive to sequester their carbon for the longest period possible, while also reproducing quickly. Is there one type of tree we could plant that meets these criteria? Some fast growing, long-lived, super sequestering species we could scatter worldwide? Not that we know of. But even if such a tree existed, it wouldn’t be a good long-term solution. Forests are complex networks of living organisms, and there’s no one species that can thrive in every ecosystem. The most sustainable trees to plant are always native ones; species that already play a role in their local environment. Preliminary research shows that ecosystems with a naturally occurring diversity of trees have less competition for resources and better resist climate change. This means we can’t just plant trees to draw down carbon; we need to restore depleted ecosystems. There are numerous regions that have been clear cut or developed that are ripe for restoring. In 2019, a study led by Zurich’s Crowtherlab analyzed satellite imagery of the world’s existing tree cover. By combining it with climate and soil data and excluding areas necessary for human use, they determined Earth could support nearly one billion hectares of additional forest. That’s roughly 1.2 trillion trees. This staggering number surprised the scientific community, prompting additional research. Scientists now cite a more conservative but still remarkable figure. By their revised estimates, these restored ecosystems could capture anywhere from 100 to 200 billion tons of carbon, accounting for over one-sixth of humanity’s carbon emissions. More than half of the potential forest canopy for new restoration efforts can be found in just six countries. And the study can also provide insight into existing restoration projects, like The Bonn Challenge, which aims to restore 350 million hectares of forest by 2030. But this is where it gets complicated. Ecosystems are incredibly complex, and it’s unclear whether they’re best restored by human intervention. It’s possible the right thing to do for certain areas is to simply leave them alone. Additionally, some researchers worry that restoring forests on this scale may have unintended consequences, like producing natural bio-chemicals at a pace that could actually accelerate climate change. And even if we succeed in restoring these areas, future generations would need to protect them from the natural and economic forces that previously depleted them. Taken together, these challenges have damaged confidence in restoration projects worldwide. And the complexity of rebuilding ecosystems demonstrates how important it is to protect our existing forests. But hopefully, restoring some of these depleted regions will give us the data and conviction necessary to combat climate change on a larger scale. If we get it right, maybe these modern trees will have time to grow into carbon carrying titans.

**P924 2020-10-16 What if there were 1 trillion more trees - Jean-François Bastin**

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翻译人员: Yirong Chen 校对人员: Yolanda Zhang已知地球上现存的最大的一棵树，有近 84 米高，被亲切的称为“谢尔门将军树”。在地球上存活的 2500 年间，这棵巨大的红杉从大气中 吸收了将近 1400 吨的碳。很少有哪棵树能够 达到这样的碳影响力，但是今天，人类每分钟 就会产生超过 1400 吨碳。为了对抗气候变化，我们需要大量减少化石燃料排放，并且降低超量的二氧化碳， 来重建大气中的温室气体平衡。但是，树能在这场斗争中 起到什么作用呢？它们又是怎样减少碳排放的呢？就像所有的植物那样，树通过 光合作用的化学反应从大气中吸收碳。这个反应过程利用了太阳能，将水和二氧化碳转化为氧气和储存能量的碳水化合物。然后植物通过 一个相反的过程——呼吸作用消耗这些碳水化合物， 将它们转化为能量，并且将碳元素释放至大气中。但是对于树来说，其中很大部分 碳元素并不会被释放，而是被储存在 新生长的木质组织中。在它们的生命周期中， 树就像是碳储存库并且只要它们继续生长， 就会持续吸收碳元素。但是，当一棵树死亡并腐烂时，一些碳元素会被释放回空气中。很大一部分二氧化碳 被储存在土壤中，可以存在数千年。但是最终，这一部分碳 也会渗入空气中。所以如果树木要成为长期对抗气候变化问题的一员，它们就需要存活足够长的时间进行固碳，同时要快速繁衍。是否有符合这些标准， 又能够人工种植的树呢？我们是否能将一些生长迅速， 寿命长且有超强固碳效应的种类种遍世界各地？目前已知的还没有。但即使有这样一种树，这也不是一个理想的 长期解决方案。森林是一种错综复杂的生态体，没有一种特定的物种能够在 所有生态环境中繁衍。适合种植且最具有可持续性的树 永远是原生品种；即那些在当地环境中 已有一席之地的品种。初步研究显示， 那些自然形成了树木多样性的生态体系， 对资源的竞争更少，且能更好地应对环境变化。这就说明，我们不能 仅靠植树去固碳；还需要重建已退化的生态环境。目前已发现，有很多地区已经具备了开始重建工作的条件。2019 年，苏黎世 柯劳瑟实验室的一项研究分析了当前地球 植被覆盖的卫星图像。并将这些图像 与气候及土壤数据结合，再去除人类必要的使用区域，他们发现地球能够再多支撑将近 10 亿公顷森林的生长，相当于大约 1.2 万亿棵树。这个惊人的数字震撼了科学界，并激发了更多的研究。现在，科学家开始引用一个更保守， 但是仍然令人瞩目的数字。在修正后的预测中， 这些重建的生态系统能够吸收 1-2 千亿吨碳，相当于人类碳排放量的 1/6。潜在的重建工程产生的 一半以上的森林覆盖会分布在 6 个国家。研究也为现存的重建工程 提供了支持，像是波昂挑战 （TheBonn Challenge），它的目标是在 2030 年前完成 3.5 亿公顷森林的复育。然而问题远没有那么简单。生态系统极其复杂，并且尚不明确它们是否在 人工干涉下可以恢复得更好。或许对于某些地区来说，正确的方法是让它们自行修复。另外，一些研究人员担心，这种规模的森林复育 可能产生不可控的后果，比如自然生化产物的 生产速度到达一定程度后，可能会加速气候变化。即使我们成功重建了这些区域，后代也仍需要从自然、经济等这些 传统的破坏因素中保护它们。综上，这些挑战已经破坏了世界范围内重建工程的信心。而重建生态系统的复杂性也证明了保护我们现存的森林 是多么重要。但是我们仍然希望， 重建一些已退化的区域能够在很大程度上 带给我们抗争气候变化所需的数据和信念。如果我们是正确的，或许， 这些现代的大树会有足够的时间长成固碳的参天巨树。

**P925 2020-10-22 How do steroids affect your muscles— and the rest of your body - Anee**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=925)

They’ve caused global scandals. They’re banned in most athletic competitions. But are steroids actually bad for you? The term “steroids” refers to a broad category of molecules that share a similar molecular structure, but have many different functions. When people talk about steroids in the context of sports, they’re referring to a subset of steroids that resemble testosterone. Though elite athletes and bodybuilders began using these steroids in the 1950s, today, most steroid users are actually not competitive athletes, but people seeking a particular appearance. These steroids have two main effects: androgenic, or masculinizing, and anabolic, or growth-promoting. These effects mimic naturally-occurring testosterone, which drives the development and maintenance of male secondary sex characteristics and general growth in everyone. That means testosterone and the synthetic steroids based on it promote body and facial hair growth, enlargement of the vocal cords and deepening of the voice, increased muscle mass and strength, and increased stature and bone mass. Recreational steroid users are after the anabolic, growth promoting effects. To make muscles grow, steroids first promote protein synthesis— proteins are essential building blocks of all cells, tissues, and organs, including muscles. Steroids also block cortisol, a signaling molecule that drives the breakdown of substances including proteins. Finally, they may push the development of muscle, rather than fat, and boost our metabolism, shrinking fat deposits. These properties make steroids valuable for treating many illnesses and injuries. They can help people with wasting illnesses, like AIDS and certain cancers, maintain muscle mass and help burn victims recover lost muscle tissue. So if steroids are used as medicine, they must be safe to use recreationally, right? Well, it’s not that simple. To create the desired muscle growth, recreational steroid users must typically take doses orders of magnitude higher than those prescribed for a medical condition. Long term, high dose steroid usage can have both undesirable and outright harmful effects— some of them dependent on factors like age, sex, and underlying health conditions. We’re not sure what all the risk factors are, but we do know recreational steroid use is particularly risky for adolescents. During puberty, steroid use can prompt bones to mature before they’re done growing, causing growth defects. Adolescents are also most at risk for the harmful psychiatric effects of steroid use. The most common of these, increased impulsivity and increased aggression, are well-known as “roid rage.” Up to 60% of users experience these effects. But there are also less common, more damaging psychiatric side effects like mania and even psychosis. Steroid use can damage organs including the liver and kidneys, and cause cardiovascular problems like high blood pressure. While some or all of those effects may be reversible, steroid use can also cause liver cancer, especially in males. Though recreational users take steroids for their anabolic effects, they also experience androgenic effects— often undesired. That can mean increased body hair, enlargement of the clitoris, and permanent voice deepening in females. At the same time, excess testosterone-like steroids can cause feminization in males, because the body converts the excess into estrogen. This can lead to breast development and shrinking testicles. These effects are not uncommon— about a third of male steroid users experience them to some degree. Excess steroid use can also reduce fertility in males and females— by reducing the sperm in semen or by causing missed periods and conditions like polycystic ovary syndrome. All these effects may be reversible if steroid use stops— but they may not be. The specific steroid, the duration of use, and other factors could play a role in reversibility. Finally, there’s mounting evidence that users are susceptible to steroid dependence. They can develop tolerance and require increasingly large doses over time. This increases the risk of harmful effects, all of which are increasingly common at higher doses taken for longer durations. Still, there remains little definitive information on how common and how reversible almost any of the harms are at different levels of use. We don’t know enough, about either risk factors or exposure levels, to definitively say any recreational steroid use will be harm-free.

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翻译人员: Anqi Zhao 校对人员: Yolanda Zhang它在国际上恶名远扬，它被体育赛事所禁止，但类固醇真的对你有害吗?“类固醇”是一大类分子的统称，它们结构相似， 却有很多大相径庭的功能。体育界口中的“类固醇”特指一类与睾酮相似的类固醇。虽然顶尖运动员和健美人士从 20 世纪 50 年代 开始服用类固醇，如今，类固醇通常 用于改变身材，而非竞技运动。这种类固醇主要有两种效果： 作为雄性激素起效，即雄性化，以及促进生长的“合成代谢”。这些效果与天然睾酮类似，有助于发展并维持男性第二性征，并对所有人群都有 促进“生长”的作用。具体而言，睾酮和 基于睾酮合成的类固醇可以促进体毛、胡须生长， 使声带变宽变厚、声音变低，增进肌肉质量与力量，以及增高、带来骨量增长。娱乐性类固醇使用者趋之若鹜的是 类固醇的合成代谢，即生长促进功能。类固醇增肌第一步： 促进蛋白质合成。蛋白质是构成所有 细胞、组织、器官的基石，也是肌肉的基本组成部分。类固醇还能拮抗皮质醇。皮质醇分子会发出指令 促进物质分解，蛋白质也不例外。双管齐下，就有可能带来 增肌不增脂的效果，也会增强新陈代谢， 消耗脂肪存储。类固醇的这些特性使其成为了 治疗很多疾病和损伤的特效药。类固醇可以减少 “消耗性疾病”患者肌肉流失，如艾滋病和某些癌症等疾病。也有助于烧伤病人的 肌肉组织再生。既然是安全的医疗药品，娱乐性使用类固醇 也一定安全吧？事情并没有那么简单。增肌所需的剂量极高，娱乐性使用者通常必须服用高于普通医疗用药 若干数量级的类固醇。长期、高剂量使用类固醇会带来令人不快， 甚至有害的副作用——有些副作用与使用者的年龄、性别、健康等状况相关。全部的风险因素尚不明确，但已知青少年爱好者 使用类固醇会尤为危险。类固醇会使青春期 尚未停止生长的骨骼过早成熟，造成发育缺陷。精神方面，类固醇对青少年同样有更大的影响，最常见的是变得冲动、 更具有攻击性，即臭名昭著的 “固醇暴怒”（“roid rage”）。高达六成的使用者 都会出现这些副作用。还有其他相对少见， 但更严重的精神异常，如躁狂、甚至精神错乱。类固醇会造成肝、肾等器官的损伤，也会引起高血压等心血管问题。虽然以上大部分副作用 或许是可以逆转的，但类固醇也会引起肝癌， 特别是对男性而言。尽管爱好者用药是出于 类固醇“促进生长”的功能，但类固醇的“雄性化”作用 也常常不请自来。这往往导致女性 体毛增多，阴蒂变大，以及永久性的声音变化。同时，过多类似睾酮的类固醇 会在体内被转化为雌激素，令男性女性化，可导致胸部发育、睾丸缩小。这些副作用并不罕见：约三分之一男性使用者 都或多或少经历过。过度使用类固醇 会导致男女生殖功能减退，如精液中精子量减少，月经暂停，以及 多囊卵巢综合征等异常。停用类固醇可能逆转上述症状， 但不是所有人都能迷途知返。能否复原取决于所服用的类固醇、 服用时长等因素。最后，越来越多的证据表明，类固醇能导致药物依赖。使用者可以产生耐药性， 所需剂量会越来越高。这也令类固醇的 使用风险显著增高：剂量越高，使用时间越久，副作用就越常见。尽管如此，我们依旧 缺乏更确切的资料，去判断每一种副作用 在各个程度的使用者中有多常见，以及是否可逆。目前，我们对类固醇使用 及其风险因素依然了解不足，无法提供绝对安全的 娱乐性用药方案。

**P926 2020-10-26 Can you outsmart a troll (by thinking like one) - Claire Wardle**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=926)

Your town is holding a mayoral election and the stakes have never been higher: the outcome will decide the fate of a local movement to rely on 100% renewable energy. One mayoral nominee, Joanna B. Greene, is a champion of this movement, while the other, Stannis Quo, staunchly opposes it. He’s announced he’ll use whatever tactics are necessary to win the election. As the municipal cybersecurity expert, you’re on high alert. Election day is near and you suspect that Quo will begin pushing false information to swing the election in his favor. Your job is to inoculate the townspeople against false information before the election. One of the most effective ways to tackle disinformation is to encourage people to think about the strategies used by those who create and spread it. This might seem counter-intuitive— and potentially dangerous— but as long as you don’t create a “how-to manual,” active inoculation is an effective option. A study conducted in 2019 used an online game to train people to think like a disinformation producer. When the participants were next shown the disinformation, their perception of its reliability dropped significantly. But before you can teach your own townspeople, you need to figure it out for yourself. What strategies would you employ if you were Stannis Quo? In order to launch a successful disinformation campaign, you must use evocative, and convincing content that will spread quickly and create confusion. It’ll also help to take advantage of confirmation bias. People are intuitively more inclined to believe information that supports a worldview they already have. Many young voters in your town are in favor of transitioning to renewable energy and sympathize with Greene. Rather than trying to change their minds, Quo will likely focus on suppressing the youth vote. If you were him, how would you start? You might create fake user accounts to spread disinformation on popular social media platforms. You could even make one that impersonates a trusted figure. From these accounts, you can deliver highly shareable, engaging visual content, like memes relating to the imminent election. That’s how you would like to go about spreading disinformation, but what kind of disinformation would be effective in manipulating young Greene supporters? First, you could direct people to vote via text, a webpage, or an app, none of which are viable voting platforms in your town. The claim isn’t too far-fetched. An encrypted digital platform could actually seem safer to young people than the traditional ballot system. Perhaps you could also tell them that the voting day is one day after it actually is. You could then pair this approach with a more emotion-driven one. How about vilifying Greene and appealing to the young voters’ values? You want to share information that taps into people’s sense of civic duty and makes them feel that the election depends on their sharing it as widely as possible. Your fake accounts could circulate false accusations that Greene takes money from local, somehow corrupt renewable energy facilities; treats her staff poorly; or abuses stray kittens for fun. These inflammatory claims could lead people to question Greene’s integrity as a leader and even initiate further conspiracy theories. After you’ve introduced these disinformation campaigns, your fake users should keep repeating them so they stick in people’s minds. Finally, media coverage would further spread your claims and give them perceived legitimacy. You could message a few local journalists asking whether these rumors are true and express your concerns. By the time an article comes out debunking the rumors, people’s experiences of the truth will have become so warped that convincing them otherwise will be difficult. A disinformation campaign like this would pit citizens against one another and exploit their values and fears. You can't personally protect each individual from disinformation, but you can equip them with the insights you have— and encourage them to pass these tools further along. After all, community organizing is what elections often call for.

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翻译人员: Ameerah Arjanee 校对人员: Yu Xie你所在的城市要举行市长选举， 这场选举的赌注达到了历史性的高点：这一结果将决定当地一项 100% 依赖 可再生能源运动的命运。一位市长候选人，乔安娜·格林， 是这项运动的拥护者，而另一位候选人，史坦尼斯·阔， 则坚决反对这项运动。他已经宣布了，为了在选举中获胜， 他将采取一切必要的手段。作为市网络安全专家， 你正处于高度戒备状态。选举临近， 而你怀疑阔会开始通过传播假情报来 为自己选举增加筹码。你的任务是 避免市民在选举前受到假情报的影响。引导人们去思考 那些制造和传播假信息的人使用什么样的手段是对付虚假信息 最有效的方法之一。这看起来可能违反直觉， 而且有潜在的危险，但是只要你不写出 一本“操作手册”，主动免疫就是一种有效的方法。2019 年进行的一项研究， 使用了网络游戏来训练人们像制造虚假信息的人一样去思考。之后再给参与者 提供这些假消息时，他们对其可靠性的看法 明显地下降了。但是在教你的市民这类技巧之前，你首先需要自己弄明白这个问题。如果你是史坦尼斯·阔， 你会采取什么手段？为了发动一场成功的 假情报运动，你必须使用具有煽动性 和令人信服的内容，并且这些信息必须能够 迅速传播而造成混乱。这也会让确认偏误发挥作用。人们直觉上更倾向于相信那些支持他们 已有世界观的信息。你所在城市的 许多年轻选民都因赞成向可再生能源过渡 而支持格林。比起一味地改变他们的想法，阔会集中精力 压制年轻人的投票。如果你是他，你会怎么开始呢？你可能会创建虚假的用户账户，在主流社交媒体平台上 传播虚假信息。你甚至可以创建一个账户 来模仿一个值得信赖的人物。通过这些账号，你可以发布 高度可共享的、引人入胜的视觉内容,比如与即将来临的选举 有关的迷因。这就是你散播假消息的方式，但是，什么样的虚假信息才能有效操纵格林的年轻支持者呢？首先，你可以通过文本、网页 或应用程序引导人们投票,这些在你所在的城市 都不是可行的投票平台。这种方式并不牵强。对年轻人来说， 一个加密的数字平台似乎比传统的投票系统更安全。另外你也可以告诉他们投票日是在实际日期之后的一天。然后，你可以将这种方法 与更情绪驱动的方法结合起来。比如诋毁格林并迎合 年轻选民的价值观，听上去如何？你想要分享那些 能触及人们公民责任感的信息，让他们觉得选举的结果取决于他们是否能快速分享这些信息。你的虚假账户可以散播谣言，说格林从当地腐败的 可再生能源企业拿钱；苛责员工；或者通过 虐待流浪小猫来取乐。这些煽动性的主张可能会导致 人们质疑格林作为领导的诚信，甚至引发进一步的阴谋论。在你推出假情报运动之后，你的虚假用户应该不断重复这些信息， 这样它们就会铭刻在人们的心中。最后，媒体报道 会进一步传播你的主张，并赋予它们公认合法性。你可以联系一些当地记者，询问这些传闻是否属实， 并表达你的关切。等到一篇文章出来 揭穿谣言的时候，人们对真相的看法可能 已经错得根深蒂固，真相将很难再说服他们。像这样的假情报运动 将挑起公民间的对立情绪，挑战他们的价值观， 激发他们的恐惧心理。你不能亲自保护每个人 不受虚假信息的影响，但是你可以 用你的洞察力武装他们，并且鼓励他们 进一步传递这些工具。毕竟，社区的组织 往往是选举的重要因素。

**P927 2020-11-05 How do investors choose stocks - Richard Coffin**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=927)

Every day, billions of stocks are traded on the New York Stock Exchange alone. But with over 43,000 companies listed on stock exchanges around the world, how do investors decide which stocks to buy? To answer this question, it’s important to first understand what stocks are, and what individuals and institutions hope to achieve by investing in them. Stocks are partial shares of ownership in a company. So by buying a stock, investors buy a share in the company’s success— or failure— as measured by the company’s profits. A stock’s price is determined by the number of buyers and sellers trading it; if there are more buyers than sellers, the price will increase, and vice versa. The market price of a share therefore represents what buyers and sellers believe the stock, and by association the company, is worth. So the price can change dramatically based on whether investors think the company has a high potential for increasing profitability— even if it isn’t profitable yet. Investors aim to make money by purchasing stocks whose value will increase over time. Some investors aim simply to grow their money at a faster rate than inflation diminishes its value. Others have a goal of “beating the market,” which means growing their money at a faster rate than the cumulative performance of all companies’ stocks. This idea of “beating the market” is a source of debate among investors— in fact, investors break into two main groups over it. Active investors believe it is possible to beat the market by strategically selecting specific stocks and timing their trades, while passive investors believe it isn’t usually possible to beat the market, and don’t subscribe to stock picking. The phrase “beating the market” usually refers to earning a return on an investment that exceeds the Standard & Poor 500 index. The S&P 500 is a measure of the average performance of 500 of the largest companies in the United States, weighted by company valuation, meaning that companies with a higher market value have a larger effect on the S&P— again, market value corresponds to what investors believe a company is worth rather than actual profits. The S&P doesn’t directly represent the market as a whole— many small and mid-range stocks can fluctuate according to different patterns. Still, it’s a pretty good proxy for the overall market. It’s often said that “the stock market behaves like a voting machine in the short term, and a weighing machine in the long term”— meaning short term fluctuations in stock prices reflect public opinion, but over the longer term, they do tend to actually reflect companies’ profits. Active investors aim to exploit the short term, “voting machine” aspect of the market. They believe the market contains inefficiencies: that stock prices at any given point in time may overvalue some companies, undervalue others, or fail to reflect developments that will impact the market. Active investors hope to exploit these inefficiencies by buying stocks they think are priced low. To identify undervalued stocks, they may investigate a company’s business operations, analyze its financial statements, observe price trends, or use algorithms. Passive investors, by contrast, put their faith in the long term “weighing machine” aspect of the market. They believe that even though markets may exhibit inefficiencies at any given point, over time those inefficiencies balance out— so if they buy a selection of stocks that represents a cross-section of the market, over time it will grow. This is usually accomplished through index funds, collections of stocks that represent the broader market. The S&P 500 index is one of many indexes. The overall goal is the same for all index funds: to hold stocks for the long term and ignore short-term market fluctuations. Ultimately, active and passive investing aren’t mutually exclusive— many investment strategies have elements of each, for example, choosing stocks actively but holding them for the long term as passive investing advises. Investing is far from an exact science: if there was one foolproof method, everyone would be doing it.

**P927 2020-11-05 How do investors choose stocks - Richard Coffin**

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翻译人员: Cosmo Cao 校对人员: Shu Fei Chow仅仅在纽约证券交易所， 每天就有数十亿的股票被交易。然而，有超过 43000 家公司的股票 都能在全球证券交易所进行交易，投资者该怎么决定 要买哪些股票？为了回答这个问题， 我们首先要了解股票是什么，以及个人和机构 希望通过投资获得什么样的回报。股票，是一个公司 所有权的部分股权。通过购买股票，投资者就 投资了公司的一部分成功——或者一部分失败—— 这取决于该公司的利润。一支股票的价钱取决于股票交易的买卖人数；如果买的人比卖的人多， 股票价格就会增长，反之亦然。股票的市场价格代表了买卖双方对股票的看法，以及对公司价值的看法。因此，股价可能会根据 投资者是否认为该公司有提高盈利能力的 巨大潜力而发生剧烈变化，即使该公司暂时还没有盈利。投资者通常为了盈利而购买随着时间增值的股票。有些投资者只追求 短时间内的利润，从而避免通货膨胀 而导致利润减少。其他投资者则持有 “击败市场” 的目标，也就是让他们的资金增长速度快过所有公司股票的 累计收益表现。这种“击败市场”的想法 引起了很多投资者的争论——事实上，基于这一想法， 投资者可以大致分为两派。积极投资者认为有可能通过选择特定股票 和交易时机来击败市场，而被动投资者认为， 市场几乎不可能被击败，而且不会刻意选择 某些股票进行投资。“击败市场”这个说法通常是指， 在超过标准普尔 500 指数（S&P500）的投资中获得回报。S&P 500 是一个针对美国最大的 500 家公司 平均表现的衡量标准，以公司估值为加权，也就是说，市场价值较高的公司，对 S&P 指数有着更大的影响——重申一下，市场价值反映的是 投资者所认可的公司价值，而不是该公司的实际利润。S&P 并不能直接反应整个市场——很多小型和中小型股票价格 会随着不同趋势而产生波动。即使这样，S&P 500 依然是 评估整体市场的一个有效指标。人们常说，“短期来看，股市就像一台投票机器，而长远来看，则更像一个秤重机。”这就意味着，短期的市场波动 反映了大众的看法，但长远来看，它们往往 能真实地反映出公司的盈利状况。积极投资者的目标就是利用短期内的市场 “投票机器”原理获益。他们认为市场的 整体反应相对迟缓：股价价格在特定时间内 会高估一些公司的价值，低估其他的，或者无法有效地反映出 能够对市场产生影响的发展趋势。积极投资者希望 利用市场的滞后效应，买进价格过低的股票。为了辨认被低估的股票，他们会调查公司的商业营运状况，分析其财务报告，观察价格走势， 或运用计算机算法。反之，被动投资者把希望寄托在长期的、 “秤重机”模式下的市场形势。他们认为，股市虽然 在特定时间点会表现得信息滞后，但随着时间的推移， 这种滞后就会被抵消掉——如果买进的股票能够反映 整个市场的大体趋势，随着时间的推移，就会实现增值。这一过程通常是通过 “指数基金（index fund）”来实现，即一类代表更广泛市场的股票集合。S&P 500 只是众多指数的其中一种。所有的指数基金 都有共同的目标：长期持有股票， 忽视短期市场波动。如此一来，积极式投资 和被动式投资就并非水火不容——不同的投资策略都有各自的原理，比如，被动式投资通常会建议积极选股，但长期持有。投资绝非一门精准的科学学科：如果存在万无一失的投资手段， 那么所有人都会趋之若鹜。

**P928 2020-11-05 How fast is the speed of thought - Seena Mathew**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=928)

Your mortal enemy has captured you and hooked you up to a bizarre experiment. He’s extended your nervous system with one very long neuron to a target about 70 meters away. At some point, he’s going to fire an arrow. If you can then think a thought to the target before the arrow hits it, he’ll let you go. So who wins that race? In order to answer, we have to examine the hardware of thought: neurons. The human brain has about 86 billion of these cells. They transmit signals down their axons by way of electrical impulses, or action potentials. One neuron can then pass that signal to the next at a synapse by way of chemical neurotransmitters. The signal is received by the next neuron’s dendrites, propagated down its axon, and passed further along. So, the key factors that determine how quickly you think include how long it takes to generate an initial action potential; propagate it down the length of the axon; and transport it through the synapse. We must also factor in the number of neurons involved and the distance the signal has to travel. Let’s see what this looks like in a simple pathway— your knee-jerk reflex. A strike to your patellar tendon triggers an electrical impulse that travels up a sensory neuron to your spine. There the signal branches, and for the sake of simplicity, we’ll consider the segment that jumps into a motor neuron to journey back down your leg. The total length of the neurons in that pathway is about 1 meter in someone who is 5 foot 5 inches, and on average it takes 15 to 30 milliseconds from strike to kick. Speed is distance divided by time, so this signal travels somewhere between 120 to 240 kilometers per hour. The initial action potential accounts for 1 to 5 milliseconds and synaptic transmissions only take .1 to .5 milliseconds, so the bulk of that time is spent within the axons. This is consistent with research findings that the average individual neuron sends signals at around 180 kilometers per hour. But speeds can be boosted with myelination and increased axon diameter. Myelin is a fatty sheath that insulates an axon, preventing electrical currents from leaking out. Meanwhile, axons with larger diameters offer less internal resistance. These compounded factors can raise the speed of an action potential as high as 432 kilometers per hour. There’s plenty of variation: some people think faster than others, and your own speed of thought changes throughout your lifetime. In particular, as you reach old age, the myelin sheath covering your axons wears down, and other neuronal structures degrade. Back to the dastardly experiment. Arrows shot from recurve bows fly, on average, around 240 kilometers per hour. Which means that given a sufficiently long, myelinated or large-diameter neuron, your thoughts actually could win the race. But… there’s a wrinkle. The arrow and thought don’t leave the gate at the same time; first the arrow fires, then once you perceive it, your signal can start down its path. Processing images or music, participating in inner speech, and recalling memories all require complicated neural pathways that are nowhere close to the linearity of the knee-jerk reflex. The speed at which these thoughts occur is mostly consistent, with variations based on myelination and axon diameter. But the duration of a thought will vary significantly depending on its routes, pitstops, and destination. In this case, when you perceive a threatening stimulus, you’ll invoke a fear startle response. Similar to the knee-jerk response, a startle can be involuntary and quite fast. If the string twangs loud enough, you might react in less than 65 milliseconds. More likely though, your startle reaction will be based on sight. Our eyes can process an image as quickly as 13 milliseconds, but computation of what you’re seeing and determining the danger it poses can take as long as 180 to 200 milliseconds. In that time the arrow will have gained a head start of about 13 meters. The target is far enough away that you’ve got just enough of a chance to catch up, if you can quickly, and quite literally, think your way out.

**P928 2020-11-05 How fast is the speed of thought - Seena Mathew**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=928)

翻译人员: C Cheng 校对人员: Yolanda Zhang你的死敌抓住了你，并且把你 连到了一个怪异的实验装置上。他用一条非常长的神经元 把你的神经系统延伸到了一个约 70 米以外的靶子上。在某一时刻，他将射出一支箭。如果你的思维 可以在箭之前击中靶子，他就会放了你。那么，谁会在比赛中获胜呢？为了回答这个问题，我们必须 研究一下思维的硬件：神经元。人类大脑中大约有 860 亿个这样的细胞。它们通过电子脉冲或动作电位 把信号向下传递给神经轴突。此后，一个神经元可以把信号 传递到下一个神经元的神经突触。传递通过化学神经递质实现。信号被下一个神经元的 神经树突接收，下传到它的神经轴突， 然后接着传递下去。所以，决定你思考速度的关键因素包括最初产生动作电位，以及将它一路下传到轴突， 再通过突触来进行传输的时间。我们还必须把神经元的数量和信号传输的距离等因素考虑进去。一起来看一看这一过程 在膝跳反射这一简单途径中是怎样的。敲击你的髌骨肌腱 会触发电子脉冲。该脉冲将沿着感觉神经元 上传到你的脊椎。在那里，信号分散开来。 为了简单起见，我们将考虑跳入运动神经元，又下行回到腿部的那部分信号。这条途径中的神经元的总长，就身高为 5 英尺 5 英寸的人而言， 大约是 1 米。从敲击到膝跳， 平均需要 15 至 30 毫秒。速度是距离除以时间，所以这一信号的传递速度 是每小时120 到 240 公里。产生最初的运动电位 占用了 1 到 5 毫秒，突触传播仅需 1 至 5 毫秒，所以大块时间用在了神经轴突上。该数据与研究发现相一致，即平均每个单一神经元发送信号的 速度在每小时 180 公里左右。但是速度可以因髓鞘化和 增加轴突直径而得到提升。髓鞘质是一种脂肪鞘， 它把轴突隔绝起来，以防止电波泄漏。同时，直径较长的轴突 拥有较小的内部阻力。这些复合因素 可以将动作电位提速至每小时 432 公里。这里有很多差异：有些人的 思维速度比其他人快，你的思维速度也 会在一生中发生变化。特别是，当你年纪大了以后，包裹轴突的髓鞘质会发生磨损，其它的神经元结构也会衰退。回到那个歹毒的实验。由反曲弓射出的箭平均飞行速度大约是每小时 240 公里。这就意味着，只要神经元足够长， 且被髓鞘化或有较长直径的话，你的思维实际上可以赢得比赛。但是，这里有一个小问题。箭与思维并不同时出发；首先箭被发射出去， 之后，一旦你看到了它，信号就可以开始沿着它的途径传递。处理图像或音乐，参与内心独白，进行回忆都需要复杂的神经通路，它与线性的膝跳反射截然不同。这些思维的产生速度 大体上是一致的，其间的区别主要基于 髓鞘化和轴突直径。但是，思维的持续时间却会 出现很大变化，取决于它的路径，中途站点，和目的地。在这个例子里，当你察觉到 具有威胁性的刺激时，你会触发恐惧惊吓反应。类似于膝跳反射，惊吓可以是非自主的， 而且发生得非常快。如果弦声足够大的话，你可能会在不到 65 毫秒内做出反应。但是，更有可能的是，你的 惊吓反应将基于你的视觉。我们的眼睛处理一幅图像的 速度可以快至 13 毫秒，但是，估算你所看到的东西， 并决定它的危险性则会需要长达 180 至 200 毫秒的时间。到那时，箭就已经 领先了大约 13 米。靶子足够远，你正好有足够的机会赶上，如果你能切实地 快速“想”出你的出路来。

**P929 2020-11-05 Why do you get a fever when you're sick - Christian Moro**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=929)

In 1917, doctors proposed an outlandish treatment for syphilis, the incurable bacterial infection that had ravaged Europe for centuries. Step 1: Infect patients suffering from the later stages of syphilis with the parasite that causes malaria, the deadly but curable mosquito-borne disease. Step 2: Hope that malarial fevers clear the syphilis. And step 3: Administer quinine to curb the malaria. If all went according to plan, their patient would be left alive and free of both diseases. This killed some 15% of patients, but for those who survived, it seemed to work. It actually became the standard treatment for syphilis until penicillin was widely used decades later. And its driving force was fever. There are many mysteries around fever, but what we do know is that all mammals, some birds and even a few invertebrate and plant species feel fever’s heat. It has persisted for over 600 million years of evolution. But it has a significant cost. For every 1 degree Celsius of temperature increase in the human body, there’s a 12.5 percent increase in energy required, the equivalent of about 20 minutes of jogging for some. So, why and how does your body produce a fever? Your core temperature is maintained via thermoregulation, a set of processes that usually keep you around 37 degrees Celsius. These mechanisms are controlled by the brain’s hypothalamus, which detects minute temperature shifts and sends signals throughout the body accordingly. If you’re too hot, the hypothalamus produces signals that activate your sweat glands or make your blood vessels dilate, moving blood closer to the skin’s surface— all of which releases heat and cools you off. And if you’re too cold, your blood vessels will constrict and you may start to shiver, which generates heat. Your body will disrupt its usual temperature equilibrium to induce a fever, which sets in above 38 degrees Celsius. Meanwhile, it has mechanisms in place to prevent it from exceeding 41 degrees Celsius, when organ damage could occur. Immune cells that are fighting an infection can induce a fever by triggering a biochemical cascade that ultimately instructs your hypothalamus to increase your baseline temperature. Your body then gets to work to meet its new “set point” using the mechanisms it would to generate heat when cold. Until it reaches this new temperature, you’ll feel comparatively cool, which is why you might experience chills. But why does your body do this? While the jury's still out on how higher temperatures directly affect pathogens, it seems that fever's main effect is in rapidly inducing a whole-body immune response. Upon exposure to raised internal temperatures, some of your cells release heat shock proteins, or HSPs, a family of molecules produced in response to stressful conditions. These proteins aid lymphocytes, one of several kinds of white blood cells that fight pathogens, to travel more rapidly to infection sites. HSPs do this by enhancing the “stickiness” of lymphocytes, enabling them to adhere to and squeeze through blood vessel walls so they can reach the areas where infection is raging. In the case of viral infections, HSPs help tell nearby cells to dampen their protein production, which limits their ability to replicate. This stunts the virus’s spread because they depend on their host’s replicative machinery to reproduce. It also protects surrounding cells from damage since some viruses spread by rupturing their host cells, which can lead to large-scale destruction, the build-up of detritus, and potentially even organ damage. The ability of HSPs to protect host cells and enhance immune activity can limit the pathogen’s path of destruction inside of the body. But for all we know about fever’s role in immune activation, some clinical trials have shown that fever suppressor drugs don’t worsen symptoms or recovery rates. This is why there’s no definitive rule on whether to suppress a fever or let it ride. Doctors decide on a case-by-case basis. The fever’s duration and intensity, as well as their patient’s immune status, comfort level, and age will all play a role in their choice of treatments. And if they do let a fever ride, they’ll likely prescribe rest and plenty of fluids to prevent dehydration while the body wages its heated battle.

**P929 2020-11-05 Why do you get a fever when you're sick - Christian Moro**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=929)

翻译人员: lu yuan 校对人员: Yolanda Zhang1917 年，医生提出了 一种治疗梅毒的奇特方法，当时，这种无法治愈的细菌感染 曾经在欧洲肆掠了好几个世纪。第一步：使晚期梅毒患者感染 一种能引起疟疾的寄生虫，疟疾虽然致命， 但却是一种能被治愈的，以蚊虫为媒介的疾病。第二步： 希望疟疾引起的发热能够清除梅毒。第三步：服用奎宁来控制疟疾。如果一切都按照计划顺利进行，那么病人的两种病都会被治愈。有 15% 的病人死于这种治疗方法，但是对于其他活下来的病人来说， 这种治疗看起来是有效的。在接下来的几十年， 青霉素被广泛使用之前，这一直都是治疗梅毒的标准方法。推动产生这个方法的动力就是发烧。关于发烧有很多谜团，我们知道的是所有哺乳动物，某些鸟类，甚至一些无脊椎动物 都能感受到发热。发热已经经历了 超过 6 亿年的进化。但是发热也伴随着高昂的代价。人体温度每升高 1 摄氏度，将会增加 12.5% 的能量消耗，相当于慢跑大约 20 分钟。那么，为什么你的身体会发烧？ 又是如何发烧的呢？你的核心体温 是通过体温调节维持的，体温调节是一系列让你的体温 保持在 37 摄氏度的进程。这套机制通过 大脑的下丘脑控制，下丘脑可以检测微小的温度变化，并通过变化向身体发送信号。如果你的体温太高了，下丘脑会产生激活汗腺的信号， 或者使你的血管扩张，让血液更接近皮肤表面——这些都会释放掉多余的热量， 以降低你的体温。如果你的体温太低，血管就会收缩， 你可能会开始发抖，这又会使你的身体产生热量。你的身体会打破正常的 体温平衡来引起发烧，体温会达到 38 摄氏度以上。同时，身体也有一套机制 来防止体温超过 41 摄氏度，在这个温度下， 器官将会受到损害。而与感染作斗争的免疫细胞，将会通过触发一系列 生物化学反应来引发发烧，最终指示下丘脑 提高你的基准体温。然后你的身体就会在这个机制下运作， 以达到新的“温度设定值”，并在感觉冷的时候产生热量。在身体达到一个新温度的时候， 你又会觉得比较冷，这就是你会打寒颤的原因。但是你的身体又为什么 会有这样的生理反应呢？虽然关于较高的体温 如何直接影响病原体还没有定论，但似乎发烧的主要影响是，它会迅速引起全身的免疫反应。暴露于较高的体温下，你的一些细胞会释放热休克蛋白， 也就是 HSPs（Heat Shock Proteins），这是一类在高压条件下产生的分子。HSPs 帮助淋巴细胞 更快地到达感染部位，而淋巴细胞是几种对抗 病原体的白细胞之一。HSPs 通过增强淋巴细胞的 黏性来达到这一目的,使它们能够粘附并通过血管壁，到达传染病肆虐的部位。在病毒感染的情况下，HSPs 的作用是 抑制周围细胞自身蛋白质的产生，以限制它们的复制能力。这就阻碍了病毒的传播，因为病毒依赖于 宿主的复制机制来繁殖。它还能保护周围的细胞免受伤害，因为一些病毒通过破坏宿主的细胞 来传播，会产生大规模的破坏，比如碎屑的堆积， 甚至可能造成器官的损伤。HSPs 保护宿主细胞 和增强免疫活性的能力可以限制病原体 在人体内造成的破坏。但就我们目前所了解到了的 关于发烧在免疫激活中的作用，一些临床试验已经表明，抑制发烧的药物并不会 恶化症状或降低痊愈的概率。这就是为什么 在控制发烧还是任其发展方面，始终没有明确的规定。医生可以根据具体情况做出决定。发烧的持续时间和强度， 以及病人的免疫状况、舒适度和年龄都将影响 他们对治疗方法的选择。就算他们真的不去控制发烧，也会建议病人 充分休息和补充水分，以防止身体在 对抗发烧的过程中脱水。

**P930 2020-11-10 Why is pneumonia so dangerous - Eve Gaus and Vanessa Ruiz**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=930)

Every time you breathe in, air travels down the trachea, through a series of channels called bronchi, and finally reaches little clusters of air sacs called alveoli. There are some 600 million alveoli in the lungs, adding up to a surface area of roughly 75 square meters— the size of a tennis court. These tiny sacs, only one cell thick, facilitate a crucial exchange: allowing oxygen from the air we breathe into the bloodstream and clearing out carbon dioxide. Pneumonia wreaks havoc on this exchange. Pneumonia is an infection of the alveoli that causes them to fill with fluid. There are many different kinds of pathogens that can cause pneumonia. The most common ones are viruses or bacteria. These microscopic invaders enter the body via droplets either in the air we breathe, or when we touch our eyes, noses, or mouths after touching a contaminated surface. Then, they face the respiratory tract’s first line defense: the mucociliary escalator. The mucociliary escalator consists of mucus that traps invaders and tiny hairs called cilia that carry the mucus toward the mouth, where it can be coughed out. But some of these invaders may get past the mucociliary escalator into the lungs, where they meet the alveoli. Because alveoli serve as critical exchange points between the blood and air from the outside world, they have their own specialized types of white blood cells, or macrophages, which defend against foreign organisms by enveloping and eating them. When pathogens enter the lungs, the macrophages work to destroy them. The immune system releases additional white blood cells in the alveoli to help. As these immune cells fight the pathogens, they generate inflammation— and fluid as a by-product of the inflammation. When this fluid builds up, it makes gas exchange inside the alveoli much more difficult. As the level of carbon dioxide in the bloodstream begins to rise, the body breathes more quickly to try to clear it out and get more oxygen in. This rapid breathing is one of the most common symptoms of pneumonia. The body also tries to force the fluid out of the alveoli through coughing. Determining the cause of pneumonia can be difficult, but once it is established, doctors can prescribe antibiotics, which may include either antibacterial or antiviral treatments. Treatment with antibiotics helps the body get the infection under control. As the pathogen is cleared out, the body gradually expels or absorbs fluid and dead cells. The worst symptoms typically fade out in about a week, though full recovery may take as long as a month. Otherwise healthy adults can often manage pneumonia at home. But for some groups, pneumonia can be a lot more severe, requiring hospitalization and oxygen, artificial ventilation, or other supportive measures while the body fights the infection. Smoking damages the cilia, making them less able to clear even the normal amount of mucus and secretions, let alone the increased volume associated with pneumonia. Genetic and autoimmune disorders can make someone more susceptible to pathogens that can cause pneumonia. Young children and the elderly also have impaired clearance and weaker immune systems. And if someone has viral pneumonia, their risk of bacterial respiratory infection is higher. Many of the deaths from pneumonia are due to lack of access to healthcare. But sometimes, even with appropriate care, the body enters a sustained fight against the infection it can’t maintain, activating inflammatory pathways throughout the body, not just in the lungs. This is actually a protective mechanism, but after too long in this state organs start shutting down, causing shock and sometimes death. So how can we prevent pneumonia? Eating well and getting enough sleep and exercise helps your body fight off infections. Vaccines can protect against common pneumonia-causing pathogens, while washing your hands regularly helps prevent the spread of these pathogens— and protect those most vulnerable to severe pneumonia.

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翻译人员: Sherry Zhao 校对人员: Yolanda Zhang每次当你呼吸时， 空气将进入气管，经过一些名为支气管的通道，最后到达一些小的气囊团， 叫做肺泡。肺里有将近 6 亿个肺泡，总面积大约为 75 平方米——面积和一个网球场差不多大。这些只有一个细胞厚的小气囊 促成了一项非常关键的转换：使氧气能成功的进入到血管里，并清理掉二氧化碳。肺炎破坏了这个环节。肺炎是一种肺泡感染， 会导致肺泡充满液体。肺炎可以有许多不同的病因。最常见的是病毒或病菌。这些微小的入侵者要么是通过 吸入的空气中的水气，要么是在我们碰过被感染的平面后，又接触了我们的眼睛、 鼻子，或嘴而进入我们体内。然后它们会面对 呼吸道的第一道防线：粘膜纤毛自动扶梯 （mucociliary escalator）。粘膜纤毛自动扶梯由困住入侵者的 粘液和一些细小的毛发组成，这些毛发叫做纤毛，负责把粘液运送至 嘴巴，使它们可以被咳出去。但是有些入侵者有可能 通过粘膜纤毛自动扶梯并进入到肺里，并接触到肺泡。因为肺泡相当于血液和 来自体外的空气之间的一个临界交换点，它们拥有专门的白血细胞， 又名巨噬细胞，这种细胞通过包络和 吞噬外来细胞来进行防御。当病因抵达肺部时， 巨噬细胞就会开始摧毁它们。免疫系统也会在肺泡中 释放出更多的白血细胞去帮忙。当免疫细胞和病因搏斗时， 它们会制造一些炎症——还有作为副产品的液体。当这些液体积聚起来后，就会使肺泡内的 空气转换更加困难。当血液里的二氧化碳含量增加时，身体会更快的呼吸， 试图把它们清除掉并且吸进更多氧气。急促的呼吸是肺炎的 一种很常见的现象。身体也试图通过咳嗽， 使那些液体脱离肺泡。确定肺炎的源头可能会有些困难，但是当它发生了， 医生就可以开抗生素，含有抗菌或抗病毒的治疗。抗生素的治疗能够 使身体内的炎症得到控制。当病因清除以后，身体会缓慢的驱逐或 吸收液体和死去的细胞残骸。最极端的症状也会 在一星期内消失，但是完全康复可能需要 长达一整个月。除此以外，健康的成年人 在家里就能够使肺炎得到控制。但是对一些群体来说， 肺炎的后果则要严重得多，当身体抗击炎症时， 需要住院治疗和氧气、人工呼吸机，或是其它辅助措施。吸烟会对纤毛造成损伤，使他们难以清除 正常含量的粘液和分泌物，更何况是由肺炎引起的超标含量。遗传和自身免疫的毛病可以使一些人 更加容易感染肺炎。幼童和老年人肺部的 自我清除能力和免疫系统都相对较弱。当一个人患有肺炎时，它们患有细菌性 呼吸感染的风险也更高。许多因肺炎死亡的案例都是 由于没有很好的医疗条件导致的。但是有些时候， 即使有需要的设施和看护，当身体进入了一场自身无法承受的 对抗感染的持久战，就会激活身体各处的炎症途径，不只是在肺里。这其实是一个保护机制，但是这个状态过久， 器官就会开始衰竭，引发休克，甚至是死亡。那么，我们要如何预防肺炎呢？正常饮食，充足的睡眠和运动能帮助你的身体战胜感染源。疫苗可以对抗常见的肺炎病因，同时，勤洗手也可以 抑制这些病因的传播——并保护那些对肺炎 没有抵抗能力的人。

**P931 2020-11-13 Can you solve the Alice in Wonderland riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=931)

After many adventures in Wonderland, Alice has once again found herself in the court of the temperamental Queen of Hearts. She’s about to pass through the garden undetected, when she overhears the king and queen arguing. “It’s quite simple,” says the queen. “64 is the same as 65, and that’s that.” Without thinking, Alice interjects. “Nonsense,” she says. “If 64 were the same as 65, then it would be 65 and not 64 at all.” “What? How dare you!” the queen huffs. “I’ll prove it right now, and then it’s off with your head!” Before she can protest, Alice is dragged toward a field with two chessboard patterns— an 8 by 8 square and a 5 by 13 rectangle. As the queen claps her hands, four odd-looking soldiers approach and lie down next to each other, covering the first chessboard. Alice sees that two of them are trapezoids with non-diagonal sides measuring 5x5x3, while the other two are long triangles with non-diagonal sides measuring 8x3. “See, this is 64.” The queen claps her hands again. The card soldiers get up, rearrange themselves, and lie down atop the second chessboard. “And that is 65." Alice gasps. She’s certain the soldiers didn’t change size or shape moving from one board to the other. But it’s a mathematical certainty that the queen must be cheating somehow. Can Alice wrap her head around what’s wrong— before she loses it? Pause the video to figure it out yourself. Answer in 3. Answer in 2 Answer in 1 Just as things aren’t looking too good for Alice, she remembers her geometry, and looks again at the trapezoid and triangle soldier lying next to each other. They look like they cover exactly half of the rectangle, their edges forming one long line running from corner to corner. If that’s true, then the slopes of their diagonal sides should be the same. But when she calculates these slopes using the tried and true formula "rise over run," a most curious thing happens. The trapezoid soldier’s diagonal side goes up 2 and over 5, giving it a slope of two fifths, or 0.4. The triangle soldier’s diagonal, however, goes up 3 and over 8, making its slope three eights, or 0.375. They’re not the same at all! Before the queen’s guards can stop her, Alice drinks a bit of her shrinking potion to go in for a closer look. Sure enough, there’s a miniscule gap between the triangles and trapezoids, forming a parallelogram that stretches the entire length of the board and accounts for the missing square. There’s something even more curious about these numbers: they’re all part of the Fibonacci series, where each number is the sum of the two preceding ones. Fibonacci numbers have two properties that factor in here: first, squaring a Fibonacci number gives you a value that’s one more or one less than the product of the Fibonacci numbers on either side of it. In other words, 8 squared is one less than 5 times 13, while 5 squared is one more than 3 times 8. And second, the ratio between successive Fibonacci numbers is quite similar. So similar, in fact, that it eventually converges on the golden ratio. That’s what allows devious royals to construct slopes that look deceptively similar. In fact, the Queen of Hearts could cobble together an analogous conundrum out of any four consecutive Fibonacci numbers. The higher they go, the more it seems like the impossible is true. But in the words of Lewis Carroll— author of Alice in Wonderland and an accomplished mathematician who studied this very puzzle— one can’t believe impossible things.

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翻译人员: Chuqi Hu 校对人员: Yolanda Zhang在仙境经历了许多冒险后，爱丽丝发现自己再一次来到了喜怒无常的红皇后的庭院。正当她要悄悄溜过花园时，她听到了国王和皇后在争论“显而易见，” 皇后说， “64 和 65 是一样的，就这样。”爱丽丝不假思索就插话了。 “胡说，”她说，“64 要是和 65 一样， 它就是 65，根本不是 64 了。”皇后发怒道， “什么？你好大的胆子！”“我现在就来证明， 你就等着掉脑袋吧！”还没来得及反抗，爱丽丝就被拽到了一块空地， 那里有两个棋盘图案——一个是 8x8 的正方形， 另一个是 5x13 的长方形。皇后拍了拍手后， 来了四个外形古怪的士兵他们相邻躺下， 把第一个棋盘盖住了。爱丽丝看见其中两个士兵是梯形的， 斜边以外的边长是 5x5x3，另外两个士兵是三角形， 斜边之外的两个边长是 8x3。“看，这就是64。”皇后又拍了拍手，纸牌士兵们站了起来， 重新排列，然后躺下，盖住了第二个棋盘。“而这就是65。”爱丽丝一惊。她敢肯定士兵们 从一个棋盘移到另一个棋盘时没有改变大小和形状。但从数学角度出发， 皇后肯定以某种方式作弊了。在丢掉脑袋之前， 爱丽丝能想出问题出在哪里吗——【请暂停视频来思考答案】 【答案即将公布：3】【2】【1】就在情况看起来对爱丽丝很不利时， 她想到了几何。她又看了看相邻躺下的梯形和三角形士兵。他们貌似正好盖住了半个长方形，他们的边缘形成了一条 从一个端点到对角端点的长线。如果这是真的， 他们斜边的斜率就应该是一样的。但是当她用斜率公式“竖直位移比水平位移” 计算斜率时，神奇的事情发生了。梯形士兵的斜边是 竖直 2，水平 5，也就是说斜率是 2/5， 或者说 0.4。但三角形士兵的斜边是 竖直 3，水平 8，斜率是 3/8， 或者说 0.375。它们根本就不一样！在皇后的守卫阻止她之前，爱丽丝喝了点缩小药水， 走近瞧了瞧。的确，在三角形和梯形之间 存在一个微小的间隙。形成了一个从棋盘的一角 延伸到对角的平行四边形。这也解释了少掉的方格去了哪里。这些数字还有更奇妙的特征：它们都是斐波那契数列的一部分，也就是说，每个数字 都是之前两个数字的和。斐波那契数列有两个特性 在这里起到了作用：首先，一个斐波那契数的平方比相邻它的两个数的乘积多 1 或者少 1。换句话说，8 的平方 比 5 乘 13 少 1。而 5 的平方比 3 乘 8 多 1。其次，连续的两个 斐波那契数的比率很相近。实际上是非常相近，以至于 最后收敛到了黄金比例的数值。这也是为什么阴险的皇室能构建出看似一致的斜率。实际上，红皇后用任意四个 连续的斐波那契数，都可以设计出类似的谜题。数字越大，不可能的情况 越看起来是真的。但正如爱丽丝梦游仙境的作者， 以及研究了这个谜题的杰出数学家刘易斯·卡罗尔 （ Lewis Carroll）所说，“一个人不能相信不可能的事情。”

**P932 2020-11-13 Which bag should you use - Luka Seamus Wright and Imogen Ellen Napper**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=932)

You’ve filled up your cart and made it to the front of the grocery line when you’re confronted with yet another choice: what kind of bag should you use? If you’ve seen the images of plastic bags strewn across the ocean, it might seem obvious that plastic is bad for the environment. Surely a paper bag or a cotton tote would be the better option. But is that really true? Each of these three materials has a unique environmental impact that’s determined by its carbon footprint, its potential to be reused and recycled, and its degradability. So, to get the full story on these grocery bags we need to look at how they’re made, how they’re used, and where they ultimately go. Let’s start with plastic. The typical thin and flimsy plastic bag is made of high-density polyethylene, commonly known as HDPE. Producing this material requires extracting petroleum from the ground and applying extreme heat. The resulting polymer resin is then transported alongside additional ingredients like titanium oxide and chalk to a bag manufacturing plant. Here, coal powered machines melt the materials down and spin them into sheets of plastic, which are then folded into bags. By the time a bag reaches its final destination, it’s contributed an estimated 1.6 kg of carbon dioxide to the atmosphere. That’s the same amount of carbon a car produces, driving a little over 6 kilometers. But the alternatives actually possess a much larger carbon footprint. Paper is made from wood pulp, and when you account for the carbon cost of removing trees from their ecosystems, a single paper bag can be responsible for about 5.5 kg of carbon dioxide. Meanwhile, growing cotton is an extremely energy and water intensive process. The production of a single cotton tote emits an estimated 272 kg of carbon dioxide. When we compare carbon footprints, plastic bags are the clear winner. But environmental impact is also determined by how the bag is used. Reusing or recycling these bags significantly offsets their environmental toll by reducing demand for new production. To quantify that offset, we can divide the bag’s carbon footprint by the number of times it’s reused. For example, if a typical paper bag is reused three times, it has a lower net impact than a single-use plastic bag. The carbon footprint of a cotton tote can similarly be lowered, if it’s reused 131 times. Of these three options, durable cloth totes are most likely to be reused. Evidence shows paper bags are quickly discarded due to their tendency to tear. This issue plagues HDPE plastic bags as well. But even when they’re made to avoid tearing, their widespread availability makes it easy to treat them as single-use items. Fortunately, researchers estimate that 40% of HDPE bags are reused at least once for throwing out waste. Recycling these bags also offsets their carbon footprint, but it’s not universally possible for each material. Many countries lack the infrastructure to efficiently recycle plastic bags. Cotton totes are perhaps even more difficult to breakdown and process, but since they’re often reused for long periods, they’re still least likely to end up in landfills. Whenever these bags aren’t recycled, the third factor in calculating environmental impact comes into play: degradability. Since HDPE bags are heat-resistant and insoluble, they stick around long after we’re done with them. Partially broken down plastic can circulate in ecosystems for centuries. Cotton on the other hand degrades substantially in a matter of months, and paper bags break down completely in just 90 days. So, which bag should you use? It turns out the most environmentally friendly bags have features of several materials we've discussed. They’re durable and reusable, like cotton, but made of plastic, which has a lower carbon footprint than cotton or paper. These sturdy shopping bags consist of polyester, vinyl and other tough plastics, and are already used worldwide. Most importantly, they should last a lifetime— making them the best option for the planet, and your groceries.

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翻译人员: Zizhuo Liang 校对人员: C Cheng你已经装满购物车， 到了结账队伍的最前面,此时你又将面临另一个选择：你应该用哪种购物袋？如果你曾看到过 塑料袋布满海洋的画面，塑料对环境有害 似乎是显而易见的。纸袋或棉布手提袋 将无疑是更好的选择。但事实真的是这样吗？这三种材料中的每一种 都有其独特的环境影响，这取决于其碳足迹、可重复利用和再循环的潜力， 以及其可降解性。所以，要完整了解这些购物袋，我们需要看看它们是如何被制造、被使用的，以及最终会流向何处。让我们从塑料开始。这种典型的又轻又薄的塑料袋 是由高密度聚乙烯制成的，俗称 HDPE。生产这种材料需要 从地下开采石油，并对其施以极高的温度。之后，由此产生的聚合物树脂与其它附加成分，如氧化钛和白垩，一起被运到塑料袋制造厂。在这里，靠煤驱动的机器 会将这些材料熔化,再将其纺成一张张塑料，之后它们会被折叠成袋子。当一只塑料袋到达最终目的地时，它向大气排放了大约 1.6 公斤的二氧化碳。这与一辆汽车在行驶超过六公里后所产生的碳排放量相同。但是塑料袋替代品的 碳足迹其实更大。纸是由木浆制成的。如果把树木从生态系统中移除的 碳成本也计算在内的话，一只纸袋就可以产生大约 5.5 公斤的二氧化碳。相比之下，棉花种植是一个 极其耗费能源与水的过程。每生产一只棉质手提包大约会排放 272 公斤的二氧化碳。当我们比较碳足迹时， 塑料袋对环境影响显然最小。但袋子对环境的影响 也取决于它的使用方式。回收或者再次利用这些袋子可以很大程度上 减少对新袋子的需求，从而抵消它们对环境的破坏。想要量化这种抵消效果，我们可以用袋子的碳足迹 除以它被重复使用的次数。举例来说，如果一只典型的 纸袋被重复使用三次，那么它对环境的净影响 就会小于一次性塑料袋。一只棉质手提袋的 碳足迹可以同样被降低，如果它被重复 使用 131 次的话。在这三种选择中，耐用的布质 手提袋最有可能被重复使用。有证据表明， 纸袋因易碎会很快被丢弃。以高密度聚乙烯为原料的 塑料袋也有同样的问题。但即便这些塑料袋 被做得结实耐用，由于供应广泛，它们很容易 被当成一次性物品。幸运的是，研究人员估计， 40% 的高密度聚乙烯袋会被当成垃圾袋 重复使用至少一次。回收这些塑料袋也 可以抵消它们的碳足迹，但并不是每种材料都能被回收利用。许多国家缺乏有效回收 塑料袋的基础设施。棉质手袋可能更难分解和处理，但由于它们经常会 被重复使用很长一段时间，所以它们被扔入 填埋场的可能性最小。每当这些袋子不再被回收了，计算环境影响的第三个因素 就会开始发挥作用：即可降解性。由于高密度聚乙烯袋 耐热且不能溶解，所以在被丢弃之后， 它们仍会存留很久。被部分分解的塑料可以在 生态系统中循环好几个世纪。相比之下，棉花在几个月内 就会基本上被降解；而纸袋在短短 90 天内 就会被完全分解。那么，你究竟该使用 哪种材质的袋子呢？事实证明，最环保的袋子具有我们讨论过的 几种材料的特点。它们像棉花一样 结实且可重复使用，但是却由塑料制成， 其碳足迹低于棉花或纸张。这些坚固的购物袋由聚酯、 乙烯基和其他硬塑料组成，而且已经在世界范围内使用。最重要的是， 它们可以永久使用—这使它们成为了对于地球 和日常购物的最佳选择。

**P933 2020-11-20 The myth of Loki and the deadly mistletoe - Iseult Gillespie**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=933)

Baldur— son of All Father Odin and Queen Frigg, husband of Nanna the Peaceful, and God of truth and light— was the gentlest and most beloved being in all of Asgard. In his great hall of Breidablik, Baldur’s soothing presence eased his subject’s woes. But lately, he was plagued by troubles of his own. Every night, Baldur had gruesome visions foretelling his own imminent death. Determined to protect her son from these grim prophecies, Queen Frigg travelled across the nine realms, begging all living things not to harm Baldur. Her grace moved each being she encountered. Every animal and element, every plague and plant, every blade and bug gladly gave their word. Frigg returned to Breidablik, and threw a great feast to celebrate. Wine flowed freely, and soon the gods took turns testing Baldur’s immunity. Lurking in the corner, Loki rolled his eyes. The trickster god had never cared for Baldur the Bright, and found his new gift profoundly irritating. Surely there was a flaw in Frigg’s plan. Taking the form of an old woman, Loki crept to Frigg’s side and feigned confusion. Why were the gods attacking sweet Baldur, whom they all loved so dearly? Frigg told her of the oaths, but the old woman pressed on. Surely you didn’t receive a vow from everything, she asked. Frigg shrugged. The only being she hadn’t visited was mistletoe. After all, what god could fear a trifling weed? At this, Loki dashed outside to find a sprig of mistletoe. When he returned, the festivities had grown even rowdier. But not every god was enjoying the party. Baldur’s brother Hodur, who was blind and weapon-less, sat dejected. Seeing his opportunity, the trickster slyly offered Hodur a chance to participate. Loki armed him with mistletoe, guided his aim towards his brother, and told Hodur to hurl with all his might. The mistletoe pierced Baldur’s chest with deadly force. The god’s light quickly flickered out, and despair swept over the crowd. Within moments, the impact of Baldur’s death could be felt across the nine realms. But from the weeping masses, Hermod the Brave stepped forward. The warrior god believed that with the help of Odin’s mighty steed, there was no plane he could not reach. He would travel to halls of Hel herself, and bring Baldur home. The god rode for nine days and nine nights, past halls of corpses and over paths paved with bone. When he finally reached the Queen of the Underworld, Hermod begged her to return Baldur to his family. Hel considered taking pity, but she wanted to know the extent of the gods’ mourning. She agreed to relinquish Baldur’s soul— if Hermod could prove that every living thing wept at Baldur’s death. Hermod shot back to the land of the living. He met with every creature that Frigg visited earlier— all of which cried for Baldur and begged for his return. Meanwhile, Loki watched Hermod’s mission with disdain. He would not let his work be so easily undone, but if he interfered too boldly it might reveal his hand in Baldur’s murder. Disguising himself as a ferocious giant, he hid himself at Hermod’s final stop. When the warrior came, the howling wind and craggy rocks each declared their love for Baldur. But the giant within spewed only contempt for the deceased. No matter how much Hermod begged, she would not shed a single tear. With his last hope dashed, the god began to mourn Baldur a second time. But an echo from the cave rang out above his sobs. Loki’s twisted cackle was well-known to every Asgardian, and Hermod realized he’d been tricked. As he leapt to accost the trickster, Loki took the form of a salmon and wriggled into the waterfall. His escape was guaranteed, until Thor arrived at the scene. Dragging Loki back to the cave, the gods bound him with a poisonous serpent. Here, Loki would remain chained until the end of days— the serpent dripping venom on his brow as punishment for dousing Asgard’s brightest light.

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翻译人员: C Cheng 校对人员: Yu Xie巴德尔—— 众神之王奥汀与王后弗丽嘉之子，是真理与光明之神， 也是和平之神楠娜的丈夫——是阿斯加德神域里最温柔， 最受人爱戴的生命体。在他的光明宫的大殿里，巴德尔的存在就能 抚平臣民的苦恼。但是，最近，他却被 因自己的麻烦而备受煎熬。每晚，巴德尔都会看到 预示着死亡的可怕幻象。为了保护儿子免受 这些严酷预言的伤害，王后弗丽嘉穿越九大世界，祈求众生不要伤害巴德尔。她的风度打动了 她所遇到的每一个事物。每个动物、每种元素、每场灾祸、 每棵植物、每刃刀锋、每只虫子都高兴地许下了诺言。弗丽嘉回到光明宫，举行了 盛大的宴会以示庆祝。推杯换盏，众神们很快开始 轮流测试巴德尔的免疫力。隐藏在角落里的 邪神洛基翻着白眼。这个欺骗之神从来没有 关心过光明的巴德尔，而且觉得他的新能力很恼人。可以肯定的是， 弗丽嘉的计划里存在缺陷。洛基化身为一位老妇，悄悄地来到弗丽嘉的身边， 装出一副困惑的样子。为什么众神都在攻击他们 深爱着的温和的巴德尔？弗丽嘉把有关誓言的事告诉了她， 但是老妇人继续追问道：您肯定没有得到 所有事物的誓言吧？弗丽嘉耸了耸肩。她唯一没有拜访到的 是槲寄生枝条。毕竟，神会怕一颗 微不足道的杂草什么呢？听到此处，洛基冲到外面， 去寻找一根带叶的槲寄生枝条。当他回来时， 庆祝活动变得更加混乱。但是，并不是每位神 都在享受这个聚会。巴德尔的兄弟，黑暗之神霍德尔 既看不见也没有武器，正沮丧地坐着。洛基抓到了机会，那个骗子狡猾地为霍德尔 提供了一个参与的机会。洛基用槲寄生枝条把他武装起来， 引导他瞄准了他的兄弟，然后告诉霍德尔用全力 投出槲寄生枝条。槲寄生枝条以致命的力量 刺入了巴德尔的胸腔。他的神光摇曳着熄灭了， 绝望席卷了人群。瞬间，整个九域都 感受到了巴德尔的死所带来的冲击。从哭泣的人群中， 勇敢的赫尔莫德走上前来。这位战神相信, 在奥丁的骏马的帮助下，没有达不成的计划。他将到冥界女神海拉的大殿， 把巴德尔带回家。赫尔莫德骑了 9 天 9 夜，经过了装满尸体的厅室 和用骨头铺就的小路。当他终于见到冥界女王的时候，赫尔莫德恳求她把 巴德尔归还给他的家庭。海拉是想帮助他的， 但是想要知道众神们哀悼的程度。她同意交还巴德尔的灵魂——前提是如果赫尔莫德能够证明 每一个生命都在为巴德尔的死而哭泣。赫尔莫德又迅速返回阳界。他遇到了弗丽嘉早些时候 拜访过的每一个生物——它们都在为巴德尔哭泣， 祈求他的回归。同时，洛基在远处观望着 赫尔莫德的使命。他不会让他这么容易地完成任务,但是，如果他干预得过于显眼，可能 会暴露他在这一场谋杀动的手脚。他假扮成了一个凶恶的巨人， 躲在赫尔莫德的最后一站。当武士到来时，呼啸着的风和嶙峋的岩石 宣告了它们对巴德尔的爱。但是，其间的巨人只 吐露了对逝者的蔑视。不论赫尔莫德如何恳求， 他都不曾洒落一滴眼泪。当他最后的希望破灭时，赫尔莫德 开始再次为巴德尔哀悼。但是，一个从山洞里传出的回声 清晰地响起，压过了他的抽泣。洛基变态的嘎嘎笑声为 阿斯加德神域里每个人所知，于是赫尔莫德意识到，他被骗了。当他跃上前去与那个骗子搭话时，洛基变身成一条鲑鱼， 扭动到了瀑布里。若不是雷神索尔突然出现， 他本可以逃之夭夭。众神把洛基拖回到了山洞里， 用一条毒蛇把他绑了起来。洛基将被绑在这里 直至世界末日——毒蛇把毒汁滴落在他的眉毛上，以惩罚他熄灭了阿斯加德 神域中最闪亮的光芒。

**P934 2020-12-01 The world’s largest organism - Alex Rosenthal**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=934)

This is Goliath, the krill. Don’t get too attached. Today this 1 centimeter crustacean will share the same fate as 40 million of his closest friends: a life sentence in the belly of the largest blue whale in the world. Let’s call her Leviatha. Leviatha weighs something like 150 metric tons, and she’s the largest animal in the world. But she’s not even close to being the largest organism by weight, which is estimated to equal about 40 Leviatha’s. So where is this behemoth? Here, in Utah. Sorry, that’s too close. Here. This is Pando, whose name means “I spread out.” Pando, a quaking aspen, has roughly 47,000 genetically identical clone trunks. Those all grow from one enormous root system, which is why scientists consider Pando a single organism. Pando is the clear winner of world’s largest organism by weight— an incredible 6 million kilograms. So how did Pando get to be so huge? Pando is not an unusual aspen from a genetic standpoint. Rather, Pando’s size boils down to three main factors: its age, its location, and aspens’ remarkable evolutionary adaptation of self-cloning. So first, Pando is incredibly expansive because it’s incredibly old. How old exactly? No one knows. Dendrochronologist estimates range from 80,000 to 1 million years. The problem is, there’s no simple way to gauge Pando’s age. Counting the rings of a single trunk will only account for up to 200 years or so, as Pando is in a constant cycle of growth, death, and renewal. On average, each individual tree lives 130 years, before falling and being replaced by new ones. Second: location. During the last ice age, which ended about 12,000 years ago, glaciers covered much of the North American climate friendly to aspens. So if there were other comparably sized clonal colonies, they may have perished then. Meanwhile, Pando’s corner of Utah remained glacier-free. The soil there is rich in nutrients that Pando continuously replenishes; as it drops leaves and trunks, the nutrients return to nourish new generations of clones. Which brings us to the third cause of Pando’s size: cloning. Aspens are capable of both sexual reproduction— which produces a new organism— and asexual reproduction— which creates a clone. They tend to reproduce sexually when conditions are unfavorable and the best strategy for survival is to move elsewhere. Trees aren’t particularly mobile, but their seeds are. Like the rest of us, sexual reproduction is how Pando came into the world in the first place all those tens or hundreds of thousands of years ago. The wind or a pollinator carried pollen from the flower of one of its parents to the other, where a sperm cell fertilized an egg. That flower produced fruit, which split open, releasing hundreds of tiny, light seeds. The wind carried one to a wet spot of land in what is now Utah, where it took root and germinated into Pando’s first stem. A couple of years later, Pando grew mature enough to reproduce asexually. Asexual reproduction, or cloning, tends to happen when the environment is favorable to growth. Aspens have long roots that burrow through the soil. These can sprout shoots that grow up into new trunks. And while Pando grew and spread out, so did our ancestors. As Hunter-gatherers who made cave paintings, survived an ice age, found their way to North America, built civilizations in Egypt and Mesopotamia, fought wars, domesticated animals, fought wars, formed nations, built machines, and invented the internet, and always newer ways to fight wars. Pando has survived many millennia of changing climates and encroaching ice. But it may not survive us. New stems are growing to maturity much more slowly than they need to in order to replace the trunks that fall. Scientists have identified two main reasons for this. The first is that we’ve deprived Pando of fire. When a fire clears a patch of forest, Aspen roots survive, and send shoots bursting up out of the ground by the tens of thousands. And secondly, grazers like herds of cattle and mule deer— whose natural predators we’ve hunted to the point of local elimination— are eating Pando’s fresh growth. If we lose the world’s largest organism, we’ll lose a scientific treasure trove. Because Pando’s trunks are genetically identical, they can serve as a controlled setting for studies on everything from the tree microbiome to the influence of climate on tree growth rates. The good news is, we have a chance to save Pando, by reducing livestock grazing in the area and further protecting the vulnerable young saplings. And the time to act is today. Because as with so many other marvels of our natural world, once they’re gone it will be a very, very long time before they return.

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翻译人员: C Cheng 校对人员: Yolanda Zhang这是歌利亚，一只磷虾。不要对它太迷恋了。今天，这只 1 厘米长的 甲壳类动物将会与它 4000 万的亲密 朋友们遭受同样的命运：在世上最大的蓝鲸的 肚子里囚禁终生。让我们称她为利维坦。利维坦重约 150 吨，是世界上最大的动物。但她还远算不上是最重的生物体。后者的重量大约相当于 40 只利维坦。那么这只巨兽在哪里呢？这里，在犹他州。对不起，离得太近了。这里。这是潘多；名字意为 “我分散开来”。它是一种白杨，拥有大约 47000 枝基因相同的克隆树干。这些全部都从同一个 庞大的根茎系统生长出来。这就是什么科学家们 认为潘多是一个单一的生物体。潘多无疑是世界上最重的生物体——600 万公斤的重量 令人难以置信。那么，潘多何以变得如此巨大？从基因角度来看，潘多 并不是一种不寻常的杨树。确切地说，潘多之所以拥有 这样的规模，要归结于三个主要因素：它的年龄、生长地点， 和杨树非凡的自我克隆的进化适应性。首先，因为极其古老， 所以潘多的分布极其辽阔。到底有多古老呢？没人知道。年轮学家估计它的年龄 在 8 万到 100 万年之间。问题就在于，没有用来测量 潘多年龄的简单方法。计算单一树干的年轮 只能算到 200 年左右；而同时，潘多处在生长、 死亡，和更新的持续循环中。每棵树平均会生长 130 年，之后才会倒下，被新的树所取代。其次，地点。最后一次冰川纪大约 结束于 12000 年前。在这期间， 冰川覆盖了北美大部分适于白杨生长的气候区。所以，如果还曾有过其它 规模类似的克隆植物群的话，它们很可能都在那时消亡了。然而，潘多所在的 犹他州的一角却没有冰川。那里的土壤富含养料， 而潘多又在对其不断补充；当它的叶子和树枝掉落时，营养返回土壤，以滋养 新一代的克隆植株。这就将我们引向了潘多形成 如今规模的第三个原因：克隆。白杨既可以有性繁殖——产生出一个新的生物体——也可以进行无性繁殖—— 创造一棵克隆植株。当条件不利时， 它们倾向于有性繁殖，而且最有利于生存的 策略是迁移到其它地方。树木并不具有特别的可移动性， 但是它们的种子可以。与我们一样，有性繁殖是潘多 在几十万或者几百万年前最初来到世上的方式。风或者传粉的昆虫把花粉 从亲本植株中的一棵带到另一棵，在那里精子细胞使卵子受精。那朵花结出果实， 果实再破裂开来，释放出大量轻微的种子。风把一粒种子带到了 现今犹他州的一块湿地上，它在那里生了根，发了芽， 长成了潘多的第一枝主杆。几年后，潘多生长成熟， 足以进行无性繁殖。无性生殖，或者克隆，往往发生在 环境适于生长的时候。白杨有着钻透土壤的长根茎。它们可以抽芽，长出新的树干。在潘多生长蔓延的时候， 我们的祖先也做着同样的事情。作为狩猎采集者，他们创造了 洞穴画，活过了冰川纪，设法到达了北美洲，在埃及和 美索不达米亚创造了文明，发动战争，驯服动物， 再发动战争，建立了国家，制造了机器，还发明了国际互联网，而且 总是能找到新的战争形式。经过几千年的气候变化 和冰川侵蚀，潘多存活了下来。但是，它也许敌不过人类的活动。新主杆的成熟速度大大慢于它所需要的用以 更新倒落枝干的速度。为此，科学家已经 确定了两个主要原因：首先，潘多失去了 发生林火的机会。当大火清除了一片森林时， 白杨的根却可以存活下来，而且，成千上万的新枝会破土而出。第二，食草动物，如成群的 牛和美洲黑尾鹿——它们的天敌已经被我们猎杀 到几近局部灭绝的地步——会啃食潘多新生的枝桠。如果我们失去了世上最大的生物体， 那么我们将失去一个科学宝藏。因为潘多的枝干基因相同，所以它们可以作为一个受控环境，用来研究所有从树的微生物群到气候对树木生长率的 影响的相关课题。好消息是，我们有机会拯救潘多；这要通过减少 在这一区域内放牧的牲畜，和进一步保护脆弱的幼树来实现。行动的时间就在今日,因为，同自然界中 许多其它奇迹一样，一旦消失，它们的回归就会 需要很长很长的时间。

**P935 2020-12-03 Building the world's largest (and most controversial) power plant - A**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=935)

In 2018, a single power plant produced more energy than the world’s largest coal-powered and gas-powered plants combined. And rather than using finite fossil fuels, this massively powerful plant relied on a time-tested source of renewable energy: running water. Stretching over 2.3 kilometers, China’s Three Gorges Dam isn’t just the world’s largest hydroelectric plant. It’s capable of producing more energy than any other power plant on Earth. So what allows Three Gorges to generate all this power? And how do hydroelectric plants work in the first place? A hydroelectric dam is essentially a massive gate, which redirects a river’s natural flow through a large pipe called a penstock. Rushing water flows through the penstock and turns the blades of a turbine, which is attached to a generator in an adjacent power station. The turning of the blades spins coils of wire inside a magnetic field, producing a steady supply of electricity. Because the penstocks can be sealed at any time, a dam can hold back excess water during stormy seasons, and save it for dry ones. This allows hydroelectric dams to produce power regardless of the weather, while simultaneously preventing floods further downstream. These benefits have long appealed to China’s Hubei Province. Located near the basin of the Yangtze River, this region is prone to deadly floods during rainy seasons when the Yangtze’s flow is strongest. Plans to build a dam that would transform this volatile waterway into a stable source of power circulated throughout the 20th century. When construction finally began in 1994 the plans were epic. The dam would contain 32 turbines— 12 more than the previous record holder, South America’s Itaipu Dam. The turbines would supply energy to two separate power stations, each connecting to a series of cables spanning hundreds of kilometers. Electricity from Three Gorges would reach power grids as far away as Shanghai. However, the human costs of this ambition were steep. To create the dam’s reservoir, workers needed to flood over 600 square kilometers of land upstream. This area included 13 cities, hundreds of villages, and over 1,000 historical and archaeological sites. The construction displaced roughly 1.4 million people, and the government’s relocation programs were widely considered insufficient. Many argued against this controversial construction, but others estimated that the lives saved by the dam’s flood protection would outweigh the trauma of displacement. Furthermore, raising the water level upstream would improve the river’s navigability, increase shipping capacity, and transform the region into a collection of prosperous port towns. When the project was completed in 2012, China became the world’s largest producer of electricity. In 2018, the dam generated 101.6 billion kilowatt-hours. That’s enough electricity to power nearly 2% of China for one year; or to power New York City for almost two years. This is a truly astonishing amount of energy. And yet, two years earlier, another dam less than half the size actually generated more electricity. Despite Three Gorges record-setting scale, the Itaipu Dam still produced more power. To understand why Itaipu can outperform Three Gorges, we need to look at the two factors that determine a dam’s energy output. The first is the number of turbines. Three Gorges has the world’s highest installed turbine capacity, meaning it’s theoretically capable of producing over 50% more power than Itaipu. But the second factor is the force and frequency of water moving through those turbines. Three Gorges spans several deep, narrow ravines surging with powerful water. However, the Yangtze’s seasonal changes keep the dam from reaching its theoretical maximum output. The Itaipu Dam, on the other hand, is located atop what was previously the planet’s largest waterfall by volume. Although the dam’s construction destroyed this natural wonder, the constant flow of water allows Itaipu to consistently generate more power each year. This dam rivalry is far from over, and other projects like the Inga Falls Dam in the Democratic Republic of Congo are also vying for the title of most powerful power plant. But whatever the future holds, governments will need to ensure that a power plant’s environmental and human impact are as sustainable as the energy it produces.

**P935 2020-12-03 Building the world's largest (and most controversial) power plant - A**

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翻译人员: Zizhuo Liang 校对人员: Yolanda Zhang2018 年，一座发电厂的 发电量超过了世界上最大的燃煤发电厂和 燃气发电厂发电量的总和。与其使用有限的化石燃料，这座巨大的发电厂依靠的是 一种经过时间考验的可再生能源：流动水源。绵延 2.3 公里，中国的三峡大坝 不仅仅是世界上最大的水电站，它比地球上任何一个 发电厂产生的能量都要多。那么，是什么能让三峡大坝 产生如此多的电能呢？水电站到底是如何运作的呢？水电站大坝的本质 是一个巨大的闸门，它让河流的天然水流通过一个叫做 压力水渠（penstock）的大管道。湍急的水流流过压力管道 并转动涡轮的叶片，这些涡轮与 相邻发电站的发电机相连。叶片的转动使线圈在磁场中旋转，从而产生稳定的电力供应。由于压力管道可以随时密封，大坝可以在暴雨季节 阻挡住多余的水，并将这些水保存起来， 待到干旱季节备用。这使水电站可以在任何天气情况下发电，同时也可以防止下游洪水泛滥。这些好处一直吸引着 中国的湖北省。位于长江流域附近的这一地区，在雨季 长江的水流最强的时候容易发生致命的洪水。在此建造一座大坝的计划 将这条动荡不安的水道转变成一个稳定的能源来源， 满足整个二十世纪的供电需求。当 1994 年该项目最终启动时， 这些计划算得上是史诗级的。大坝将容纳 32 台涡轮机， 比之前的记录保持者，南美洲的伊泰普大坝 还要多 12 台。这些涡轮机将为 两个独立的电站提供能源，每个电站连接一系列 横跨数百公里的电缆。三峡的电可以送达 和上海一样远的电网。然而，这一雄心壮志的 人力成本是巨大的。为了建造大坝的水库，工人们需要淹没上游 600 多平方公里的土地。这一地区包括 13 个城市、数百个村庄和 1000 多个历史和考古遗址。建筑工程使大约 140 万人流离失所，政府的搬迁计划 被普遍认为不够完善。许多人反对这一有争议的建设，但其他人估计， 大坝防洪所挽救的生命的数量将超过流离失所造成的创伤。此外，提高上游水位将改善河流的通航能力，增加航运能力， 并将该地区转变为繁荣的港口城镇。2012 年该项目建成后，中国成为世界上 最大的电力生产国。2018 年，大坝发电量为 1016 亿千瓦时。足以为中国近 2% 的地区 提供一年的电力；或者给纽约市提供近两年的电力。大坝的发电量的确让人难以置信。然而就在两年前，有一座规模 仅为三峡大坝一半的水坝实际发电量比三峡大坝还要多。尽管三峡的规模创下了历史纪录， 但伊泰普大坝比它发的电更多。为了理解伊泰普的 性能为什么优于三峡，我们需要看看决定大坝 能量输出的两个因素。首先是涡轮机的数量。三峡拥有世界上 最大的水轮机装机容量，这意味着，理论上 它的发电能力要比伊泰普高出 50% 以上。但第二个因素是， 水流通过这些涡轮机的力量和频率。三峡跨越了好几个深谷， 狭窄的峡谷中涌动着强大的水流。然而，长江的季节性变化 使大坝无法到达它的理论最大输出。另一方面，伊泰普大坝，位于地球上体积最大的瀑布顶端。尽管大坝的建设破坏了 这一自然奇观，但是源源不断的水流 使伊泰普大坝每年都能持续发电。这场水坝之争远未结束，刚果民主共和国的因加瀑布大坝等 其他水利工项目也在争夺最强发电厂的称号。但无论未来如何， 各国政府都需要确保发电厂对环境和人类的影响和电厂产生的能源 一样可持续。

**P936 2020-12-04 Can you solve the monster duel riddle - Alex Gendler**

[播放链接](https://www.bilibili.com/video/BV1Gf4y1y7wc?p=936)

You’ve come a long way to compete in the great Diskymon league and prove yourself a Diskymon master. Now that you’ve made it to the finals, you’re up against some tough competition. As you enter the arena, the referee explains the rules. There are three Diskydisks you can use. Disk A will always summon a level 3 Burgersaur. Disk B summons a Churrozard that has a 56% chance of being level 2, a 22% chance of being level 4, and a 22% chance of being level 6. Disk C will summon a level 5 Wartortilla 49% of the time, and a level 1 Wartortilla 51% of the time. All Diskymon fully heal between battles, and the higher level Diskymon always wins, no matter what type it is. In round one, you’ll face a single opponent and get to choose your disk before she picks from the remaining two. Which one gives you the best chance of winning? Pause here to figure it out yourself Answer in 3 Answer in 2 Answer in 1 Before you start calculating probabilities, take a look at the disks themselves. Disks B and C each have a more than 50% chance of summoning a level 2 or a level 1 Diskymon, respectively. This means that disk A’s guaranteed level 3 Burgersaur will always have better than even odds of winning. If you choose B or C, your opponent could pick A and gain an advantage over you. And C fares worst of all, being more than 50% likely to lose to any opponent. So you choose A, hoping for the best, and sure enough, your level 3 Burgersaur triumphs over the level 2 Churrozard. Now it’s time for round two, and while you’ve prepared for trouble, you didn’t anticipate they’d make it double. You get to choose any one of the three disks again, but this time, you’ll be in a battle royale against two opponents, each using one of the other disks. Whoever summons the highest level Diskymon wins. Should you stick with A, or switch? Pause now to figure it out yourself Answer in 3 Answer in 2 Answer in 1 For many Diskymon trainers, it seems intuitive that if A is the best at beating B or C, it should also be the best at beating B and C. Strangely enough, that couldn’t be further from the truth. Let’s calculate the odds. For A to win, B has to summon a level 2 Diskymon, and C has to summon a level 1. Those are independent events, so their odds are 56% times 51%, or 29%. For disk B, a level 2 Churrozard would automatically lose to the Burgersaur. But you’d have two ways to win. The 22% chance of summoning a level 6 would give you an outright win, while a level 4 could still win if C summons a level 1. Adding up those mutually exclusive possibilities gives you odds of about 33%. Finally, C will win with a level 5 Wartortilla as long as B doesn’t summon its level 6, giving C a 38% chance overall. So while disk A’s middling consistency was an advantage in a single matchup, multiple fights increase the odds that one of the other disks will summon something better. And although C was the worst first-round option, its decent chance of summoning a strong level 5 gives it an advantage when facing two opponents simultaneously. This sort of counterintuitive result is why misleading statistics are a favored tool of unscrupulous politicians and nefarious Diskymon trainers alike. Fortunately, your Wartortilla comes out level 5 and makes short work of its foes. You’re about to celebrate when your rivals capture the referee and announce a surprise third round. You’ll have to repeat each of the previous matches in succession, with all the same rules except for one: you must keep the same disk throughout. Which should you choose to give yourself the best chance at becoming that which no one ever was?

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翻译人员: Boyu Yang 校对人员: Yolanda Zhang你在“轮盘大师（Diskymon）” 大战里一路过关斩将，已经证明自己是 一名合格的“轮盘大师”。现在你进入了决赛圈， 你将面临艰难的挑战。你进入竞技场后， 裁判正在解释规则。每位训练师有三个 神奇轮盘可以使用。轮盘 A 一定会 召唤出一个 3 级“汉堡怪”。轮盘 B 会召唤出一只油条蜥， 56 % 的机率会召唤出 2 级的，有 22% 的机率 召唤出 4 级或 6 级的。轮盘 C 有 49% 的机率 召唤出等级 5 的玉米饼战争机器，并有 51% 的机率召唤出一个 等级 1 的玉米饼战争机器。战斗过后，所有轮盘怪 都会完全恢复战斗力，无论它们是什么品种， 拥有更高等级的总会获胜。在第一轮，你只需面对一个对手，并且你可以先挑选轮盘， 对手会从剩下的两个中挑选一个。哪一个的获胜几率最大？【请暂停视频，自行解题】【答案将在三秒后揭晓】 3，2，1。在你开始计算概率之前，我们先来看看 3 个轮盘的功能。轮盘 B 和轮盘 C 都有超过一半的概率召唤出一个 等级 2 或等级 1 的怪兽。这意味着轮盘 A 会保证召唤出一个 3 级汉堡怪，并永远有超过一半的机率获胜。如果你选择 B 或 C， 你的对手可能会选 A 来战胜你。C 是最差的，用它会有 超过一半的可能性输给任何对手。所以你选了 A ， 并希望有最好的结果。果不其然，你等级 3 的汉堡怪 战胜了等级 2 的油条蜥。现在来到了第二轮， 虽然你准备好面对困难，出乎意料的是， 你的挑战难度加倍了。你可以再次选择 三个轮盘中的任何一个，但是这次，您将与两个对手 （每个都使用另一个轮盘）进行一场大逃杀。召唤出等级最高的轮盘怪的 则是本轮的赢家。那么，你应该继续 用 A 还是换轮盘？【请暂停视频，自行解题】【答案将在三秒后揭晓】 3，2，1。对于许多训练师来说，如果选 A，目的是 逐个打败 B 或 C的话，一定也可以同时打败 B 和 C。但奇怪的是，这并不是事实。让我们来计算一下概率。如果 A 要赢， B 必须要召唤出一个 2 级怪兽，并且 C 必须召唤出 一个 1 级怪兽。这些是独立事件，因此发生的几率 是 56％ 乘以 51％，即 29％。轮盘 B 这边，等级 2 的油条蜥 肯定会输给汉堡怪。但你有两种方法来赢。第一，22% 的机率召唤出 等级 6 的怪兽让你大获全胜，其二，召唤出等级 4 的怪兽，只要 C 召唤出等级 1 的怪兽，你也能够胜出。加总这两个互相独立的机率， 可以得出 33% 的胜率。最后，轮盘 C 可以召唤出 一个等级 5 的战争机器，只要轮盘 B 不召唤出一个 6 级怪兽， 你就有 38 % 的胜率。所以尽管轮盘 A 的中等一致性 在单一比赛中是一种优势，但多次战斗会增加其他轮盘召唤出 等级更高的怪兽的几率。虽然 C 是第一轮最糟糕的选择，但当它同时面对两个对手时，它有机会召唤出 一个强大的 5 级怪兽。这种违反直觉的结果就是 为什么误导的统计数据成了不择手段的政客 和邪恶的轮盘怪兽训练师更喜欢使用的工具。幸运的是，你的 5 级玉米饼战争机器 很快就干掉了它的敌人。当你正准备庆祝胜利时， 你的对手抓住裁判，把比赛拖入了第三轮。你必须重复前面的每一轮比赛， 所有规则都相同，只有一个例外： 你必须使用相同的轮盘。这样的话， 你应该选择哪一个轮盘，让自己更有可能成为 史无前例的轮盘大师呢？

通配标题 P[0-9]{1,3} [0-9]{4}?\*^13