新东方背诵经典５０篇（带翻译）珍贵值得收藏

>01 The Language of Music
A painter hangs his or her finished picture on a wall, and everyone can see it. A composer writes a work, but no one can hear it until it is performed. Professional singers and players have great responsibilities, for the composer is utterly dependent on them. A student of music needs as long and as arduous a training to become a performer as a medical student needs to become a doctor. Most training is concerned with technique, for musicians have to have the muscular proficiency of an athlete or a ballet dancer. Singers practice breathing every day, as their vocal chords would be inadequate without controlled muscular support. String players practice moving the fingers of the left hand up and down, while drawing the bow to and fro with the right arm -- two entirely different movements.
Singers and instrumentalists have to be able to get every note perfectly in tune. Pianists are spared this particular anxiety, for the notes are already there, waiting for them, and it is the piano tuner's responsibility to tune the instrument for them. But they have their own difficulties: the hammers that hit the strings have to be coaxed not to sound like percussion, and each overlapping tone has to sound clear.
This problem of getting clear texture is one that confronts student conductors: they have to learn to know every note of the music and how it should sound, and they have to aim at controlling these sounds with fanatical but selfless authority.
Technique is of no use unless it is combined with musical knowledge and understanding. Great artists are those who are so thoroughly at home in the language of music that they can enjoy performing works written in any century.
01 音乐的语言
画家将已完成的作品挂在墙上，每个人都可以观赏到。 作曲家写完了一部作品，得由演奏者将其演奏出来，其他人才能得以欣赏。因为作曲家是如此完全地依赖于职业歌手和职业演奏者，所以职业歌手和职业演奏者肩上的担子可谓不轻。
一名学音乐的学生要想成为 一名演奏者，需要经受长期的、严格的训练，就象一名医科的学生要成为一名医生一样。 绝 大多数的训练是技巧性的。
音乐家们控制肌肉的熟练程度，必须达到与运动员或巴蕾舞演 员相当的水平。 歌手们每天都练习吊嗓子，因为如果不能有效地控制肌肉的话，他们的声
带将不能满足演唱的要求。 弦乐器的演奏者练习的则是在左手的手指上下滑动的同时，用右手前后拉动琴弓--两个截然不同的动作。歌手和乐器演奏者必须使所有的音符完全相同协调。 钢琴家们则不用操这份心，因为每个音符都已在那里等待着他们了。
给钢琴调音是调 音师的职责。 但调音师们也有他们的难处： 他们必须耐心地调理敲击琴弦的音锤，不能让
音锤发出的声音象是打击乐器，而且每个交叠的音都必须要清晰。如何得到乐章清晰的纹理是学生指挥们所面临的难题：他们必须学会了解音乐中的每一个音及其发音之道。 他们还

必须致力于以热忱而又客观的权威去控制这些音符。除非是和音乐方面的知识和悟性结合起来，单纯的技巧没有任何用处。
艺术家之所以伟大在于他们对音乐语言驾轻就熟，以致于 可以满怀喜悦地演出写于任何时代的作品。
>02 Schooling and Education
It is commonly believed in the United States that school is where people go to get an education. Nevertheless, it has been said that today children interrupt their education to go to school. The distinction between schooling and education implied by this remark is important. Education is much more open-ended and all-inclusive than schooling. Education knows no bounds. It can take place anywhere, whether in the shower or in the job, whether in a kitchen or on a tractor. It includes both the formal learning that takes place in schools and the whole universe of informal learning. The agents of education can range from a revered grandparent to the

people debating politics on the radio, from a child to a distinguished scientist.
Whereas schooling has a certain predictability, education quite often produces surprises. A chance conversation with a stranger may lead a person to discover how little is known of other religions. People are engaged in education from infancy on. Education, then, is a very broad, inclusive term. It is a lifelong process, a process that starts long before the start of school, and one that should be an integral part of one's entire life. Schooling, on the other hand, is a specific, formalized process, whose general pattern varies little from one setting to the next. Throughout a country, children arrive at school at approximately the same time, take assigned seats, are taught by an adult, use similar textbooks, do homework, take exams, and so on. The slices of reality that are to be learned, whether they are the alphabet or an understanding of the workings of government, have usually been limited by the boundaries of the subject being taught. For example, high school students know that they are not likely to find out in their classes the truth about political problems in their communities or what the newest filmmakers are experimenting with. There are definite conditions surrounding the formalized process of schooling.
上学与受教育
在美国，人们通常认为上学是为了受教育。 而现在却有人认为孩子们上学打断了他们 受教育的过程。 这种观念中的上学与受教育之间的区别非常重要。
与上学相比，教育更具 开放性，内容更广泛。 教育不受任何限制。 它可以在任何场合下进行，在淋浴时，在工作 时，在厨房里或拖拉机上。
它既包括在学校所受的正规教育，也包括一切非正规教育。 传 授知识的人可以是德高望重的老者，可以是收音机里进行政治辩论的人们，可以是小孩子，
也可以是知名的科学家。 上学读书多少有点可预见性，而教育往往能带来意外的发现。 与

陌生人的一次随意谈话可能会使人认识到自己对其它宗教其实所知甚少。
人们从幼时起就 开始受教育。 因此，教育是一个内涵很丰富的词，它自始至终伴随人的一生，早在人们上 学之前就开始了。
教育应成为人生命中不可缺少的一部分。然而，上学却是一个特定的形 式化了的过程。 在不同场合下，它的基本形式大同小异。 在全国各地，孩子们几乎在同一
时刻到达学校，坐在指定的座位上，由一位成年人传授知识，使用大致相同的教材，做作业，考试等等。
他们所学的现实生活中的一些片断，如字母表或政府的运作，往往受到科目范 围的限制。例如，高中生们知道，在课堂上他们没法弄清楚他们社区里政治问题的真情， 也不会了解到最新潮的电影制片人在做哪些尝试。
学校教育这一形式化的过程是有特定的 限制的。
>03 The Definition of "Price"
Prices determine how resources are to be used. They are also the means by which products and services that are in limited supply are rationed among buyers. The price system of the United States is a complex network composed of the prices of all the products bought and sold in the economy as well as those of a myriad of services, including labor, professional, transportation, and public-utility services. The interrelationships of all these prices make up the "system" of prices. The price of any particular product or service is linked to a broad, complicated system of prices in which everything seems to depend more or less upon everything else. If one were to ask a group of randomly selected individuals to define "price", many would reply that price is an amount of money paid by the buyer to the seller of a product or service or, in other words, that price is the money value of a product or service as agreed upon in a market transaction. This definition is, of course, valid as far as it goes. For a complete understanding of a price in any particular transaction, much more than the amount of money involved must be known. Both the buyer and the seller should be familiar with not only the money amount, but with the amount and quality of the product or service to be exchanged, the time and place at which the exchange will take place and payment will be made, the form of money to be used, the credit terms and discounts that apply to the transaction, guarantees on the product or service, delivery terms, return privileges, and other factors. In other words, both buyer and seller should be fully aware of all the factors that comprise the total "package" being exchanged for the asked-for amount of money in order that they may evaluate a given price.
"价格"的定义 价格决定资源的使用方式。 价格也是有限的产品与服务在买方中的配给 手段。
美国的价格系统是复杂的网状系统，包括经济生活中一切产品买卖的价格，也包括 名目繁多的各种服务，诸如劳动力、专职人员、交通运输、公共事业等服务的价格。
所有 这些价格的内在联系构成了价格系统。任何一种个别产品或服务的价格都与这个庞大而复

杂的系统密切相关，而且或多或少地受到系统中其它成份的制约。如果随机挑选一群人，问问他们如何定义"价格"，许多人会回答价格就是根据卖方提供的产品或服务，买方向其付出的钱数。
换句话说，价格就是市场交易中大家认同的产品或服务的货币量。 该定义就其本 身来说自有其道理。
但要获得对价格在任何一桩交易中的完整认识，就必须考虑到大量" 非货币"因素的影响。买卖双方不但要清楚交易中的钱数，而且要非常熟悉交易物的质量和
数量，交易的时间、地点，采用哪种形式付款，有怎样的缓付和优惠，对交易物的质量保证、交货条款、退赔权利等等。
也就是说，为了能估算索价，买卖双方必须通晓构成交易物价 格的通盘细节。
>04 Electricity
The modern age is an age of electricity. People are so used to electric lights, radio, televisions, and telephones that it is hard to imagine what life would be like without them. When there is a power failure, people grope about in flickering candlelight, cars hesitate in the streets because there are no traffic lights to guide them, and food spoils in silent refrigerators.

Yet, people began to understand how electricity works only a little more than two centuries
ago. Nature has apparently been experimenting in this field for millions of years. Scientists are discovering more and more that the living world may hold many interesting secrets of electricity that could benefit humanity.
All living cells send out tiny pulses of electricity. As the heart beats, it sends out pulses of record; they form an electrocardiogram, which a doctor can study to determine how well the heart is working. The brain, too, sends out brain waves of electricity, which can be recorded in an electroencephalogram. The electric currents generated by most living cells are extremely small -- often so small that sensitive instruments are needed to record them. But in some animals, certain muscle cells have become so specialized as electrical generators that they do not work as muscle cells at all. When large numbers of these cells are linked together, the effects can be astonishing.
The electric eel is an amazing storage battery. It can send a jolt of as much as eight hundred volts of electricity through the water in which it lives. (An electric house current is only one hundred twenty volts.) As many as four-fifths of all the cells in the electric eel's body are specialized for generating electricity, and the strength of the shock it can deliver corresponds roughly to the length of its body.
电 当今时代是电气时代。 人们对电灯、收音机、电视和电话早已司空见惯以致很难想 象没有它们生活会变成什么样。
当停电时，人们在摇曳不定的烛光下暗中摸索； 因没有红 绿灯的指示，汽车在道路上迟疑不前；冰箱也停止工作，导致食物变质。人们只是在两个世
纪前一点才开始了解电的使用原理，自然界却显然在这方面经历过了数百万年。 科学家不

断发现许多生物世界里可能有益于人类的关于电的有趣秘密。所有生物细胞都会发出微小的电脉冲。
当心脏跳动时，把它发出的脉冲记录下来就成了心电图，这可让医生了解心脏的 工作状况。大脑也发出脑电波，这可在脑电图上记录下来。
许多生物细胞发出的电流都是 极微小的，小到要用灵敏仪器才能记录和测量。 但一些动物的某些肌肉细胞能转化成一个 个发电机，以致完全失去肌肉细胞的功能。
这种细胞大量地连接在一起时产生的效果将是 非常令人吃惊的。电鳗就是一种令人惊异的蓄电池。 它可以在水中发出相当于 800 伏特电
压电流(家庭用户的电压只有 120 伏特)。 在电鳗的身体里，多至五分之四的细胞都专门用来发电，而且发出的电流的强度大约和它身体的长度成正比。
>05 The Beginning of Drama
There are many theories about the beginning of drama in ancient Greece. The one most widely accepted today is based on the assumption that drama evolved from ritual. The argument for this view goes as follows. In the beginning, human beings viewed the natural forces of the world - even the seasonal changes - as unpredictable, and they sought through various means to control these unknown and feared powers. Those measures which appeared to bring the desired results were then retained and repeated until they hardened into fixed rituals. Eventually stories arose which explained or veiled the mysteries of the rites. As time passed some rituals were abandoned, but the stories, later called myths, persisted and provided material for art and drama.
Those who believe that drama evolved out of ritual also argue that those rites contained the seed of theater because music, dance, masks, and costumes were almost always used. Furthermore, a suitable site had to be provided for performances and when the entire community did not participate, a clear division was usually made between the "acting area" and the "auditorium." In addition, there were performers, and, since considerable importance was attached to avoiding mistakes in the enactment of rites, religious leaders usually assumed that task. Wearing masks and costumes, they often impersonated other people, animals, or supernatural beings, and mimed the desired effect -- success in hunt or battle, the coming rain, the revival of the Sun -- as an actor might. Eventually such dramatic representations were separated from religious activities.
Another theory traces the theater's origin from the human interest in storytelling. According to this view tales (about the hunt, war, or other feats) are gradually elaborated, at first through the use of impersonation, action, and dialogue by a narrator and then through the assumption of each of the roles by a different person. A closely related theory traces theater to those dances that are primarily rhythmical and gymnastic or that are imitations of animal movements and sounds.
戏剧的起源 关于古希腊戏剧的起源存在着多种理论，其中一个最普遍为人接受的理论 假设

认为戏剧从仪式演化而来。
这个观点是这样进行论证的：一开始，人类把世界上的自 然力量，甚至季节的变化都看成是不可预料的。 他们试图通过各种方式去控制这些未知的、
令人恐惧的力量。 那些似乎带来了满意结果的手段就被保留下来并且重复直到这些手段固化为不变的仪式，最后产生了能够解释或者掩盖这些仪式神秘性的故事。
随着时间的推移， 一些仪式被废弃了，但这些后来被称作神话的故事流传下来并且为艺术和戏剧提供了素材。
认为戏剧从仪式演化而来的人们还认为那些仪式包含了戏剧的基本因素，因为音乐、舞蹈、面具和服装几乎经常被使用，而且，必须为演出提供一个合适的地点；如果不是整个社区共同参加演出，经常在"演出区"和"观众席"之间划分出明显的分界。
另外，仪式中还有演员， 而且宗教领袖通常承担演出任务，因为在仪式的执行中避免错误的发生被认为有相当大的重
要性；他们经常带着面具，穿着服装象演员那样扮演其它人、动物或超自然的生灵，用动作来表演以达到所需要的效果，比如打猎的成功或战斗的胜利、将至的雨、太阳的复活。 最 后这些戏剧性的表演从宗教活动中分离了出来。
另一个追溯戏剧起源的理论认为它来自人 们对叙述故事的兴趣。 根据这个观点，故事(关于狩猎、战争或者其它伟绩)是逐渐丰富起 来的。
首先通过一个讲解人来运用模仿、表演和对话，然后再由不同的人扮演各自的角色；
另一个与之紧密相关的理论将戏剧的起源追溯至舞蹈，这些舞蹈大体上是有节奏感的和体操式的那一类，或者是对动物动作和声音的模仿。

>06 Television
Television -- the most pervasive and persuasive of modern technologies, marked by rapid change and growth -- is moving into a new era, an era of extraordinary sophistication and versatility, which promises to reshape our lives and our world. It is an electronic revolution of sorts, made possible by the marriage of television and computer technologies.
The word "television", derived from its Greek (tele: distant) and Latin (visio: sight) roots, can literally be interpreted as sight from a distance. Very simply put, it works in this way: through a sophisticated system of electronics, television provides the capability of converting an image
(focused on a special photoconductive plate within a camera) into electronic impulses, which can be sent through a wire or cable. These impulses, when fed into a receiver (television set), can then be electronically reconstituted into that same image.
Television is more than just an electronic system, however. It is a means of expression, as well as a vehicle for communication, and as such becomes a powerful tool for reaching other human beings.
The field of television can be divided into two categories determined by its means of transmission. First, there is broadcast television, which reaches the masses through broad-based airwave

transmission of television signals. Second, there is nonbroadcast television, which provides for the needs of individuals or specific interest groups through controlled transmission techniques. Traditionally, television has been a medium of the masses. We are most familiar with broadcast television because it has been with us for about thirty-seven years in a form similar to what exists today. During those years, it has been controlled, for the most part, by the broadcast networks, ABC, NBC, and CBS, who have been the major purveyors of news, information, and entertainment. These giants of broadcasting have actually shaped not only television but our perception of it as well. We have come to look upon the picture tube as a source of entertainment, placing our role in this dynamic medium as the passive viewer.

电视电视--以快速变化与发展为标志的最普遍、最具有影响力的一项现代技术，正在步 入一个极端复杂化与多样化的新时代。

这个时代承诺重新塑造我们的生活和我们的世界。 这可以称得上是又一次电子革命，其关键在于电视技术与计算机技术的结合。"电视"这个词来源于希腊语词根(tele：远)和拉丁语词根(vision：景象)，可以从字面上理解为来自远处的 景象。

简单说来，电视是以这种方式工作的，通过一个复杂的电子系统，电视能够将一幅图像(这幅图像被聚焦在一部摄像机内的一块特殊的光导底片上)转换成能经过导线或电缆发送出去的电子脉冲信号。

当这些电子脉冲信号被输入一部接收机(电视机)时，就可以用 电子学的方法把脉冲信号重新恢复成同一幅图像。但是，电视不仅仅是一个电子系统，它还是一种表达工具和传播渠道。因此，电视成了一个对其他人发生影响的强大工具。电视这 个领域可以根据其发射方式分为两类。

第一类为广播电视，通过电视信号的宽带无线电波 发射展现在大众面前；第二类为非广播电视，使用受控的发射技术来满足个人以及某些特殊利益群体的需要。电视早已成为大众媒介。我们熟悉广播电视，因为广播电视已经以类似 目前的方式存在了大约 37 年。

在那些年头中，电视绝大部分一直由 ABC、NBC、CBS 这 些广播电视公司控制着，这些广播电视公司一直是新闻、信息和娱乐的主要提供者。 这些广播业的巨头实际上不仅塑造了电视，而且也塑造了我们对电视的理解。 我们渐渐把显像管看作是娱乐的来源，让自己成为这个生动的媒介的被动观众。

>07 Andrew Carnegie

Andrew Carnegie, known as the King of Steel, built the steel industry in the United States, and, in the process, became one of the wealthiest men in America. His success resulted in part from his ability to sell the product and in part from his policy of expanding during periods of economic decline, when most of his competitors were reducing their investments. Carnegie believed that individuals should progress through hard work, but he also felt strongly that the wealthy should use their fortunes for the benefit of society. He opposed charity, preferring instead to provide educational opportunities that would allow others to help themselves. "He who dies rich, dies disgraced, " he

often said.

Among his more noteworthy contributions to society are those that bear his name, including the Carnegie Institute of Pittsburgh, which has a library, a museum of fine arts, and a museum of national history. He also founded a school of technology that is now part of Carnegie-Mellon University. Other philanthropic gifts are the Carnegie Endowment for International Peace to promote understanding between nations, the Carnegie Institute of Washington to fund scientific research, and Carnegie Hall to provide a center for the arts.

Few Americans have been left untouched by Andrew Carnegie's generosity. His contributions of more than five million dollars established 2,500 libraries in small communities throughout the country and formed the nucleus of the public library system that we all enjoy today.

安德鲁?卡内基 被称作钢铁大王的安德鲁?卡内基在美国建立了钢铁工业。 在这个过 程中，他变成了美国最富有的人之一。

他的成功，部分来自于他销售产品的能力，部分来 自于经济萧条时期的扩充策略。 在萧条时期，他的多数对手都在缩减投资。卡内基认为个人应该通过努力工作来获得进展，但他也强烈地感到有钱人应该运用他们的财富来为社会谋取福利。 他反对施舍救济，更愿意提供教育机会，使别人自立。

卡内基经常说："富有着 死去的人死得可耻。"他对社会的较重要的贡献都以他的名字命名。这些贡献包括匹兹堡卡 内基学校。

这个学校有一个图书馆，一个美术馆和一个国家历史博物馆；他还创立了一所 技术学校，这所学校现在是卡内基 梅隆大学的一部分；其他的慈善捐赠有为促进国家间了解的"卡内基国际和平基金"，为科学研究提供经费的华盛顿卡内基学院以及给各种艺术活动提供活动中心的卡内基音乐厅。安德鲁?卡内基的慷慨大度几乎影响到每个美国人的生活。由于他超过五百万美元的捐款，2500 个图书馆得以建立起来，遍布在美国各地的小村镇， 形成了我们今天还在享用的公共图书馆系统的核心。

>08 American Revolution

The American Revolution was not a revolution in the sense of a radical or total change. It was not a sudden and violent overturning of the political and social framework, such as later occurred in France and Russia, when both were already independent nations. Significant changes were ushered in, but they were not breathtaking. What happened was accelerated evolution rather than outright revolution. During the conflict itself people went on working and praying, marrying and playing. Most of them were not seriously disturbed by the actual fighting, and many of the more isolated communities scarcely knew that a war was on. America's War of Independence heralded the birth of three modern nations. One was Canada, which received its first large influx of English-speaking population from the thousands of loyalists who fled there from the United States. Another was Australia, which became a

penal colony now that America was no longer available for prisoners and debtors. The third newcomer -- the United States -- based itself squarely on republican principles.

Yet even the political overturn was not so revolutionary as one might suppose. In some states, notably Connecticut and Rhode Island, the war largely ratified a colonial self-rule already existing. British officials, everywhere ousted, were replaced by a home-grown governing class, which promptly sought a local substitute for king and Parliament.

美国革命 美国革命其实并不算是一场革命，因为它并未导致完全的和彻底的变化。 这次革命并不是对政治和社会框架的一次突然和猛烈的颠覆，象后来在已经是独立国家的法国和俄国所爆发的革命那样。

革命带来了重大的变化，但并非翻天覆地，所发生的只是进化 的加速，而不是一场彻底的革命；在冲突期间，人们仍然上班、做礼拜、结婚、玩耍。 多数人并没有受到实际战斗的严重影响。 许多较闭塞的社区对这场战争几乎一无所知。美国独立战争宣布了三个现代国家的诞生，其中一个是加拿大。

加拿大的第一大批讲英语的流 入人口来自于成千上万英王的效忠者，这些人从美国逃到了加拿大。 另一个国家是澳大利亚，因为美国不再是容纳罪犯和欠债者的国度了，澳大利亚就变成了一个惩治罪犯的殖民地(注：独立战争前，英国政府将罪犯流放到美国)。 第三个国家就是美国，它完全建立在共和原则基础上。即使政治上的颠覆也不如人们可能想象的那样具有革命性。在一些州，特 别是康涅狄格和罗德岛，战争基本上只是承认了已经存在的殖民地的自治。

四处被驱逐的 英国官员都被本土的统治阶级所替代，这个统治阶级迅速地以地方权力机关来替代国王和议 会。

>09 Suburbanization

If by "suburb" is meant an urban margin that grows more rapidly than its already developed interior, the process of suburbanization began during the emergence of the industrial city in the second quarter of the nineteenth century. Before that period the city was a small highly compact cluster in which people moved about on foot and goods were conveyed by horse and cart. But the early factories built in the 1830's and 1840's were located along waterways and near railheads at the edges of cities, and housing was needed for the thousands of people drawn by the prospect of employment. In time, the factories were surrounded by proliferating mill towns of apartments and row houses that abutted the older, main cities. As a defense against this encroachment and to enlarge their tax bases, the cities appropriated their industrial neighbors. In 1854, for example, the city of Philadelphia annexed most of Philadelphia County. Similar municipal maneuvers took place in Chicago and in New York. Indeed, most great cities of the United States achieved such status only by incorporating the communities along their borders.

With the acceleration of industrial growth came acute urban crowding and accompanying social stress -- conditions that began to approach disastrous proportions when, in 1888, the first commercially successful electric traction line was developed. Within a few years the horse-drawn

trolleys were retired and electric streetcar networks crisscrossed and connected every major urban area, fostering a wave of suburbanization that transformed the compact industrial city into a dispersed metropolis.This first phase of mass-scale suburbanization was reinforced by the simultaneous emergence of the urban Middle Class, whose desires for homeownership in neighborhoods far from the aging inner city were satisfied by the developers of single-family housing tracts.

郊区的发展 如果"郊区"指的是比已建好的城市内部发展更为迅速的城市边缘地带，那 么郊区化可以说始于 1825 年至 1850 年工业化城市出现期间。

在这之前，城市只是高度密 集的小聚居群。 在其中，人们步行走动，商品靠马车来运送。但是建于 18 世纪三四十年代的早期工厂位于城边的航道和铁路附近，被工作机会吸引到这里的成千上万的人们需要住房。

渐渐地，在与旧有的主要城区相毗邻的地方，不断涌现出由排房和公寓楼组成的工人聚居区，包围了工厂。作为对这种侵蚀的自卫，也为了扩大它们收税的地域范围，城市吞并了工业化的临近地带，比如 1854 年费城的城区就兼并了费县的绝大部分地区。 相似的城市 化也发生在芝加哥和纽约。 今天很多美国的大城市其实就是靠吞并它们附近的边缘地区而变成大都会的。随着工业化的加速发展，城市里出现了严重拥挤和相伴而来的社会压力。 当

1888 年第一条商业上成功的电气化铁轨被制造出来时，压力开始接近危机的程度。 几年之内，马车就被废弃了，电车网相互交织连接着各个重要的城区，从而形成了一种郊区化的潮流，即密集的工业城市转变成了分散的都市。

此时城市中产阶级的出现进一步加强了第一 波大规模郊区化。这些中产阶级希望在远离老旧城市的地区拥有住宅，单一家庭住宅地区 的开发者满足了他们的愿望。

>10 Types of Speech

Standard usage includes those words and expressions understood, used, and accepted by a majority of the speakers of a language in any situation regardless of the level of formality. As such, these words and expressions are well defined and listed in standard dictionaries. Colloquialisms, on the other hand, are familiar words and idioms that are understood by almost all speakers of a language and used in informal speech or writing, but not considered appropriate for more formal situations. Almost all idiomatic expressions are colloquial language. Slang, however, refers to words and expressions understood by a large number of speakers but not accepted as good, formal usage by the majority. Colloquial expressions and even slang may be found in standard dictionaries but will be so identified. Both colloquial usage and slang are more common in speech than in writing.

Colloquial speech often passes into standard speech. Some slang also passes into standard speech, but other slang expressions enjoy momentary popularity followed by obscurity. In some cases, the majority never accepts certain slang phrases but nevertheless retains them in their collective

memories. Every generation seems to require its own set of words to describe familiar objects and events.
It has been pointed out by a number of linguists that three cultural conditions are necessary for the creation of a large body of slang expressions. First, the introduction and acceptance of new objects and situations in the society; second, a diverse population with a large number of subgroups; third, association among the subgroups and the majority population.
Finally, it is worth noting that the terms "standard" "colloquial" and "slang" exist only as abstract labels for scholars who study language. Only a tiny number of the speakers of any language will be aware that they are using colloquial or slang expressions. Most speakers of English will, during appropriate situations, select and use all three types of expressions.
语言的类型 标准用法包括那些为使用这种语言的大多数人在任何场合下理解、使用和 接受的词和短语，而不论该场合是否正式。
这些词和短语的意义已很确定并被列入了标准 词典中。 相反，俗语是指那些几乎所有讲这种语言的人都理解并在非正式的口头或书面中
使用，却不适用于更正规的一些场合的词和短语。 几乎所有的习惯用语都属于俗语，而俚语指的是为很多讲这种语言的人理解但大多数人不把它们列入好的、正式用法之内的词和短语；俗语甚至俚语都可能在标准字典中查到，但是字典中会标明它们的性质。
俗语和俚语 词汇的应用都是口头较多、笔头较少。俗语用法经常地被接受为标准用法。 一些俚语也变
成了标准用法，但另外一些俚语只经历了短暂的流行，而后就被弃之不用了。 有时候，多 数人从来不接受某些俚语，但是他们把这些俚语保存到集中记忆中。
每一代人似乎都需要 独有的一套词汇来描述熟知的物体和事件。 很多语言学家指出，大量俚语的形成需要三个
文化条件：第一，对社会中新事物的引入和接受；第二，一个由大量子群构成的多样化人口；第三，各子群与多数人口之间的联系。最后需要提到的是，"标准语"、"俗语"和"俚语"这些 术语只是对研究语言的专家才有用的抽象标签。
不论何种语言，只会有很小一部分使用者
能够意识到他们是在使用俗语或俚语。 讲英语的多数人能够在适当的场合中选择使用所有这三种语言类型。
>11 Archaeology
Archaeology is a source of history, not just a humble auxiliary discipline. Archaeological data are historical documents in their own right, not mere illustrations to written texts. Just as much as any other historian, an archaeologist studies and tries to reconstitute the process that has created the human world in which we live -- and us ourselves in so far as we are each creatures of our age and social environment. Archaeological data are all changes in the material world resulting from human action or, more succinctly, the fossilized results of human behavior. The sum total of these constitutes what may be called the archaeological record. This record exhibits certain peculiarities and deficiencies the consequences of

which produce a rather superficial contrast between archaeological history and the more familiar kind based upon written records.

Not all human behavior fossilizes. The words I utter and you hear as vibrations in the air are certainly human changes in the material world and may be of great historical significance. Yet they leave no sort of trace in the archaeological records unless they are captured by a dictaphone or written down by a clerk. The movement of troops on the battlefield may "change the course of history," but this is equally ephemeral from the archaeologist's standpoint. What is perhaps worse, most organic materials are perishable. Everything made of wood, hide, wool, linen, grass, hair, and similar materials will decay and vanish in dust in a few years or centuries, save under very exceptional conditions. In a relatively brief period the archaeological record is reduced to mere scraps of stone, bone, glass, metal, and earthenware. Still modern archaeology, by applying appropriate techniques and comparative methods, aided by a few lucky finds from peat-bogs, deserts, and frozen soils, is able to fill up a good deal of the gap.

考古学

考古学是历史学的一个来源，而不是地位卑微的辅助学科。 考古学资料本身也是一种 历史文献，而不仅仅是文字资料的例证。

正象任何一位历史学家那样，考古学家研究调查 并尽力去重构一个过程。 这个过程创造了我们生活的人类世界，也创造了我们自身，因为

我们都是我们所处的时代和社会环境的产物。 考古学的资料就是人类行为所造成的物质变化。 更简洁地说，是石化了的人类行为。

这些变化的总和构成了我们所说的考古学记录。 这些记录自有其独特和不足之处，因而导致人们对考古历史和更熟悉的文字记载历史进行相

当肤浅的对比。并不是所有的人类行为都留下化石。 我说的话，你通过空气振动听见，这当然是人类造成的物质变化，也可能有重大的历史意义，但这些话在考古学中未留下丝毫痕迹，除非有人用录音机录下来或文书把这些话写了下来。

战场上军队的行动可能"改变历史 的进程"，但从考古学的观点来看，这同样是难以捕捉的；可能更糟的是，多数有机物质会 腐烂。

任何由木头、生皮、绒线、亚麻、草、毛发以及相似物质做成的东西除非在一些非 常特殊的条件下，几年或几个世纪以后，会在尘土中腐烂并消失。

在短时期内，能留下考 古记录的东西也都会退化为石头、骨头、玻璃、金属和陶器的碎片。然而，现代考古学通

过运用适当的技术和比较的方法，在从泥炭、沙漠和冻土中所获得的一些幸运发现的辅助下，能够填充这个空缺的很大部分。

>12 Museums

From Boston to Los Angeles, from New York City to Chicago to Dallas, museums are either planning, building, or wrapping up wholesale expansion programs. These programs already have radically altered facades and floor plans or are expected to do so in the not-too-distant future.

In New York City alone, six major institutions have spread up and out into the air space and neighborhoods around them or are preparing to do so.

The reasons for this confluence of activity are complex, but one factor is a consideration everywhere -- space. With collections expanding, with the needs and functions of museums changing, empty space has become a very precious commodity.

Probably nowhere in the country is this more true than at the Philadelphia Museum of Art, which has needed additional space for decades and which received its last significant facelift ten years ago. Because of the space crunch, the Art Museum has become increasingly cautious in considering acquisitions and donations of art, in some cases passing up opportunities to strengthen its collections.

Deaccessing -- or selling off -- works of art has taken on new importance because of the museum's space problems. And increasingly, curators have been forced to juggle gallery space, rotating one masterpiece into public view while another is sent to storage.

Despite the clear need for additional gallery and storage space, however, "the museum has no plan, no plan to break out of its envelope in the next fifteen years," according to Philadelphia Museum of Art's president.

博物馆 从波士顿到洛杉机，从纽约到芝加哥、到达拉斯，所有的博物馆或者正在筹划、建造或

者正在完成大规模的扩建计划。 这些计划或者已经根本性地改变了博物馆门面与展厅的设计，或者预期在不久的将来会这样做。

单单在纽约市，六个主要机构或者已经向空中和周 围扩展，或者正准备这样做。大家一致行动的原因是复杂多样的，但其中的一个因素是普遍 考虑的空间问题。

随着收藏品的增多，也随着博物馆的需要和功能的变化，空间已经变成 了一项非常珍贵的商品。在我国，也许没有任何其他地方比费城艺术博物馆更符合这个事实。

这个博物馆几十年来一直需要额外的空间，十年前进行了最后一次重大的翻新。 由于空间紧缺，该艺术博物馆在考虑购买与受赠艺术品已越来越谨慎，有时甚至放弃增强艺术收藏的机会。由于博物馆的空间问题，将艺术品脱手或者说卖掉已经有了新的重要意义。 博物馆馆长们被迫巧妙轮换利用陈列馆的空间，轮流着把一些艺术杰作向公众展出，而把另一些送入存储室中。虽然对额外的陈列室和存储室空间需要很明显，但据费城艺术博物馆经理讲：

"博物馆还没有在未来十五年打破这个束缚的计划。"

>13 Skyscrapers and Environment

In the late 1960's, many people in North America turned their attention to environmental problems, and new steel-and-glass skyscrapers were widely criticized. Ecologists pointed out that a cluster of tall buildings in a city often overburdens public transportation and parking lot capacities.

Skyscrapers are also lavish consumers, and wasters, of electric power. In one recent year, the addition of 17 million square feet of skyscraper office space in New York City raised the peak daily demand for electricity by 120, 000 kilowatts -- enough to supply the entire city of Albany, New York, for a day.

Glass-walled skyscrapers can be especially wasteful. The heat loss (or gain) through a wall of half-inch plate glass is more than ten times

that through a typical masonry wall filled with insulation board. To lessen the strain on heating and air-conditioning equipment, builders of skyscrapers have begun to use double-glazed panels of glass, and reflective glasses coated with silver or gold mirror films that reduce glare as well as heat gain. However, mirror-walled skyscrapers raise the temperature of the surrounding air and affect neighboring buildings.

Skyscrapers put a severe strain on a city's sanitation facilities, too. If fully occupied, the two World Trade Center towers in New York City would alone generate 2.25 million gallons of raw sewage each year -- as much as a city the size of Stanford, Connecticut, which has a population of more than 109, 000.

摩天大楼与环境

60 年代后期，许多北美人把注意力转向了环境问题，那些崭新的玻璃钢摩天大楼受到 了广泛的批评。

生态学家指出，城市中密集的高层建筑经常给公共交通与停车场的承载能 力造成过重的负担。摩天大楼还是电能的过度消费者与浪费者。 最近的某一年，纽约市摩天写字楼 1，700 万英尺办公面积的增加使电能的最高日需求量提高了 120，000 千瓦。 这些电能足以供纽约的整个奥尔巴尼市使用一天。玻璃表面的摩天大楼特别地浪费。 通过半英寸的平板玻璃墙壁损失(或增加)的热量是典型的加入绝缘板的石墙所允许的热量损失(或增加)的十倍以上。

为了减轻取暖设备或空调设备的压力，摩天大楼的建造者们已经开始使 用双面上釉的玻璃镶板和涂上了金色或银色反光薄膜的反光玻璃，来减少强光照射和热量的增加；但是，镜面的摩天大楼会提高周围空气的温度并会对附近的建筑物产生影响。摩天大楼也对城市的卫生设施造成了沉重的压力。

单单纽约市的二个世界贸易中心大楼如果完全 被占满的话，每年就会产生 2，250，000 加仑的污水。 这相当于康涅狄格州的斯坦福市这样大的城市一年所产生的污水量，而康州的斯坦福市拥有 109，000 人口。

>14 A Rare Fossil Record

The preservation of embryos and juveniles is a rate occurrence in the fossil record. The tiny, delicate skeletons are usually scattered by scavengers or destroyed by weathering before they can be fossilized. Ichthyosaurs had a higher chance of being preserved than did terrestrial creatures because, as marine animals, they tended to live in environments less subject to erosion. Still, their fossilization required a suite of factors: a slow rate of decay of soft tissues, little scavenging by other animals, a lack of swift currents and waves to jumble and carry away small bones, and fairly rapid burial. Given these factors, some areas have become a treasury of well-preserved ichthyosaur fossils.

The deposits at Holzmaden, Germany, present an interesting case for analysis. The ichthyosaur remains are found in black, bituminous marine shales deposited about 190 million years ago. Over the years, thousands of specimens of marine reptiles, fish and invertebrates have been recovered from these rocks. The quality of preservation is outstanding, but

what is even more impressive is the number of ichthyosaur fossils containing preserved embryos.
Ichthyosaurs with embryos have been reported from 6 different levels of the shale in a small area around Holzmaden, suggesting that a specific site was used by large numbers of ichthyosaurs repeatedly over time. The embryos are quite advanced in their physical development; their paddles, for example, are already well formed. One specimen is even preserved in the birth canal. In addition, the shale contains the remains of many newborns that are between 20 and 30 inches long.
Why are there so many pregnant females and young at Holzmaden when they are so rare elsewhere? The quality of preservation is almost unmatched and quarry operations have been carried out carefully with an awareness of the value of the fossils. But these factors do not account for the interesting question of how there came to be such a concentration of pregnant ichthyosaurs in a particular place very close to their time of giving birth.
罕见的化石记录 胚胎与幼体被保存下来在化石记录中是少见的事情。微小纤细的骨骼 通常在石化前就被食腐肉的动物拆散了，或者被风化作用破坏掉了。
鱼龙比起陆地的动物 有更大的几率被保存下来，因为它们作为海洋动物常生活在腐蚀性较小的环境中。 但是它
们的石化需要一系列因素：软组织的腐烂速度缓慢，很少被其他动物残食，缺少混杂、冲走小骨头的快速水流和波浪，以及相当快地被掩埋。
当这些因素存在时，某些地区就会变成 一个充满保存完好的鱼龙化石的宝库。在德国获尔兹梅登，那儿的沉积物给人们提出了一个 有趣的分析案例。
人们在黑色的、含沥青的海洋页岩中发现了约 19，000 年前沉积下来的 鱼龙化石。
几年时间内，在这些岩石中取得了数以千计的海洋爬行动物、鱼类以及无脊椎 动物的标本。它们的保存质量非常的好，但更令人称奇的是保存下来的育有胚胎的鱼龙化 石数目。 在获尔兹梅登附近一个小地区的六个不同的页岩层中分别发现了育有胚胎的鱼龙
化石。 这表明大量的鱼龙经年累月重复使用一个特定的地点。 那些胚胎已经发育得相当完整了。 比如，它们的蹼桨已经完全形成了。
有一个标本甚至被保存在产道中。 而且，那 块页岩包含着很多在 20 到 30 英寸之间的新生幼体的化石。为什么在其他地方那么稀少的怀
孕雌兽和幼体在获尔兹梅登却那么多呢？因为其保存质量几乎举世无双，采集工作的进行一直是一丝不苟的。
大家都认识到这些化石的价值极其珍贵，但这些因素并不能解释这个有 趣的问题： 为什么在一个特定的地点会如此集中地出现即将临产的怀孕鱼龙群呢?
>15 The Nobel Academy
For the last 82 years, Sweden's Nobel Academy has decided who will receive the Nobel Prize in Literature, thereby determining who will be elevated from the great and the near great to the immortal. But today the Academy is coming under heavy criticism both from the without and from within. Critics contend that the selection of the winners often has less to do with true writing ability than with the peculiar internal politics of the Academy and of Sweden itself. According to Ingmar Bjorksten, the cultural editor for

one of the country's two major newspapers, the prize continues to represent "what people call a very Swedish exercise: reflecting Swedish tastes." The Academy has defended itself against such charges of provincialism in its selection by asserting that its physical distance from the great literary capitals of the world actually serves to protect the Academy from outside influences. This may well be true, but critics respond that this very distance may also be responsible for the Academy's inability to perceive accurately authentic trends in the literary world.

Regardless of concerns over the selection process, however, it seems that the prize will
continue to survive both as an indicator of the literature that we most highly praise, and as an elusive goal that writers seek. If for no other reason, the prize will continue to be desirable for the financial rewards that accompany it; not only is the cash prize itself considerable, but it also dramatically increases sales of an author's books.

诺贝尔委员会

过去的 82 年里，瑞典的诺贝尔委员会决定了谁将获得诺贝尔文学奖，因此也就决定了 谁将从伟大或近乎伟大荣升为不朽。

但在今天，该委员会却遭到了评选委员会内外的猛烈 批评。 批评者们争论说："评选获奖者时，起作用更大的不是真实的写作能力，而是该委员
会以及瑞典特有的内部政治。 按照瑞典两家主要报纸之一的文化版编辑 Ingmar Bjorksten 的说法，该文学奖仍然是"人们所说的一种非常瑞典式的做为：反映瑞典口味"。对于其评选过程中目光短浅的指责，该委员会辩护说，该委员会与世界几大文学之都相距遥远，实际上使该委员会免受外来的干扰。

这也许是对的，但批评者们反驳说，也正因为相距如此遥远， 该委员会才不能准确地把握文学界的真正趋势。尽管对评选程序存在着关注，该文学奖将继
续作为世人最为推崇的文学的标志而存在，并将继续是作家们难以达到却又会不断追逐的目标。

如果不考虑其他因素，而仅仅考虑与之俱来的经济利益，该奖也将继续为人所渴求：
这不仅因为该奖本身就是一笔可观的现金收入，而且该奖还将极大地增加一个作家的著作的销量。

>16 The War between Britain and France

In the late eighteenth century, battles raged in almost every corner of Europe, as well as in the Middle East, South Africa, the West Indies, and Latin America. In reality, however, there was only one major war during this time, the war between Britain and France. All other battles were ancillary to this larger conflict, and were often at least partially related to its antagonists' goals and strategies. France sought total domination of Europe. This goal was obstructed by British independence and Britain's efforts throughout the continent to thwart Napoleon; through treaties, Britain built coalitions (not dissimilar in concept to today's NATO) guaranteeing British participation in all major European conflicts. These two antagonists were poorly matched, insofar as they had

very unequal strengths: France was predominant on land, Britain at sea. The French knew that, short of defeating the British navy, their only hope of victory was to close all the ports of Europe to British ships.
Accordingly, France set out to overcome Britain by extending its military domination from Moscow to Lisbon, from Jutland to Calabria. All of this entailed tremendous risk, because France did not have the military resources to control this much territory and still protect itself and maintain order at home.
French strategists calculated that a navy of 150 ships would provide the force necessary to defeat the British navy. Such a force would give France a three-to-two advantage over Britain. This advantage was deemed necessary because of Britain's superior sea skills and technology, and also because Britain would be fighting a defensive war, allowing it to win with fewer forces. Napoleon never lost sight of his goal, because Britain represented the last substantial impediment to his control of Europe. As his force neared that goal, Napoleon grew increasingly impatient and began planning an immediate attack.
英法战争
在 18 世纪后期，战争爆发于欧洲大陆的几乎每一个角落，在中东、南非、西印度群岛、 拉丁美洲亦都是如此。
然而实际上，在这一时期只有一场主要的战争，那就是英法之间的 战争。 所有其他战争都服从于这一更大的争端，至少是与这两个对手的目标和战略有某些 关联。
法国力图统治整个欧洲，而英国的自主及其力图在整个欧洲大陆挫败拿破仑的种种努力都是法国实现这一目标的障碍。英国通过条约建立了联盟(和今天北约的概念没有什么不同)以保证英国插手所有欧洲的主要争端。
这两个对头并不是一对好对手，因为他们的力 量极不均衡：法兰西在陆地上称王，英格兰则在海上称霸。 法国人明白，如果不能击败英国海军，他们胜利的唯一希望就是让欧洲的所有港口都对英国舰船关闭。 于是，法国将其军事占领从莫斯科延伸到里斯本，从尤特兰延伸到卡拉布里亚，企图以此来制服英国。 所有这些行动包含着巨大的风险，因为法国并不具备足够的军事资源，来控制这么多地盘，同时又能保护自己，维持国内的秩序。法国战略家们的算盘是，其海军若拥有 150 艘军舰，则 将足以击跨英国海军。 这样的武力将使法国对英国具有 3 比 2 的优势。这种优势被认为是必不可少的，因为英国人具有超群的海上技能和技术，并且打的是一场防御战争，使它能以少胜多。
拿破仑从未忘却他的目标，因为英国是他统治全欧的最后一个重大的障碍。 随着 他的力量越来越靠近这个目标，拿破仑变得越来越不耐烦起来，开始策划立即攻击。
>17 Evolution of Sleep
Sleep is very ancient. In the electroencephalographic sense we share it with all the primates and almost all the other mammals and birds: it may extend back as far as the reptiles.
There is some evidence that the two types of sleep, dreaming and dreamless, depend on the life-style of the animal, and that predators are

statistically much more likely to dream than prey, which are in turn much more likely to experience dreamless sleep. In dream sleep, the animal is powerfully immobilized and remarkably unresponsive to external stimuli. Dreamless sleep is much shallower, and we have all witnessed cats or dogs cocking their ears to a sound when apparently fast asleep. The fact that deep dream sleep is rare among prey today seems clearly to be a product of natural selection, and it makes sense that today, when sleep is highly evolved, the stupid animals are less frequently immobilized by deep sleep than the smart ones. But why should they sleep deeply at all? Why should a state of such deep immobilization ever have evolved? Perhaps one useful hint about the original function of sleep is to be found in the fact that dolphins and whales and aquatic mammals in general seem to sleep very little. There is, by and large, no place to hide in the ocean.

Could it be that, rather than increasing an animal's vulnerability, the function of sleep is to decrease it? Wilse Webb of the University of Florida and Ray Meddis of London University have suggested this to be the case. It is conceivable that animals who are too stupid to be quiet on their own initiative are, during periods of high risk, immobilized by the implacable arm of sleep. The point seems particularly clear for the young of predatory animals. This is an interesting notion and probably at least partly true.

睡眠的进化

睡眠是古老的。 从脑电图上看，我们人类和所有灵长目动物以及几乎所有的哺乳动物 和鸟类都一样需要睡眠；甚至爬行类动物也有睡眠。

有证据显示，有梦睡眠和无梦睡眠这

两种类型的睡眠取决于该动物的生活方式。 从统计上看，食肉动物比被捕食动物有更多的有梦睡眠，而被捕食动物更多地无梦睡眠。

动物在有梦睡眠时，被有效地解除动作能力， 并且对外界刺激缺乏反应。 无梦睡眠则要浅得多。 我们都看到过猫和狗在显然的酣睡中，

有一点响动耳朵就会竖起来。 被捕食动物很少有深度的有梦睡眠，这看来显然是自然选择的结果。

而且这一点是有道理的：当睡眠高度进化以后，愚笨的动物比聪明的动物更少在 深度睡眠状态下丧失动作能力。

但是动物为什么要进入深度睡眠呢?为什么这样的无动作状 态也会进化出来呢? 海豚、鲸鱼以及水生哺乳动物睡眠都极少，这一事实可以给睡眠的根本

功能提供有用的线索。 海洋中是没有藏身之处的。 会不会是这样，睡眠不但不增加动物受伤害的可能性，反而是减少了这种可能性呢?佛罗里达大学的 Wilse

Webb 和伦敦大学的 Ray Meddis 认为情况就是如此。 可以想像得出，在危险的时刻，那些由于太愚笨而不能自动保

持安静的动物，会不由自主地变得动弹不得。 这一点在食肉动物的幼兽身上表现得特别明显。 这是一个很有意思的看法，它至少部分是正确的。

>18 Modern American Universities

Before the 1850's, the United States had a number of small colleges, most of them dating from colonial days. They were small, church connected

institutions whose primary concern was to shape the moral character of their students.

Throughout Europe, institutions of higher learning had developed, bearing the ancient name of university. In Germany a different kind of university had developed. The German university was concerned primarily with creating and spreading knowledge, not morals. Between midcentury and the end of the 1800's, more than nine thousand young Americans, dissatisfied with their training at home, went to Germany for advanced study. Some of them returned to become presidents of venerable colleges -- Harvard, Yale, Columbia -- and transform them into modern universities. The new presidents broke all ties with the churches and brought in a new kind of faculty. Professors were hired for their knowledge of a subject, not because they were of the proper faith and had a strong arm for disciplining students. The new principle was that a university was to create knowledge as well as pass it on, and this called for a faculty composed of teacher-scholars. Drilling and learning by rote were replaced by the German method of lecturing, in which the professor's own research was presented in class. Graduate training leading to the Ph.D., an ancient German degree signifying the highest level of advanced scholarly attainment, was introduced. With the establishment of the seminar system, graduate students learned to question, analyze, and conduct their own research.

At the same time, the new university greatly expanded in size and course offerings, breaking completely out of the old, constricted curriculum of mathematics, classics, rhetoric, and music. The president of Harvard pioneered the elective system, by which students were able to choose their own courses of study. The notion of major fields of study emerged. The new goal was to make the university relevant to the real pursuits of the world. Paying close heed to the practical needs of society, the new universities trained men and women to work at its tasks, with engineering students being the most characteristic of the new regime. Students were also trained as economists, architects, agriculturalists, social welfare workers, and teachers.

现代美国大学

19 世纪 50 年代以前美国有一些小的学院，大多数成立于殖民时期。 它们是与教会挂钩的小机构，主要目的是培养学生的道德品行。当时在欧洲各地，高等教育机构已经发展 起来，用的是一个古老的名称--大学。

德国已经发展出一种不同类型的大学。 德国大学关 心的主要是创造知识和传播知识，而不是道德教育。 从世纪中叶到世纪末，有 9000 多名美国青年因不满国内所受的教育而赴德深造。 他们中的一些人回国后成为一些知名学府--哈佛、耶鲁、哥伦比亚的校长并且把这些学府转变成了现代意义的大学。

新校长们断绝了和 教会的关系，聘请了新型的教职员，聘用教授根据的是他们在学科方面的知识，而不是正确 的信仰和约束学生的强硬手段。

新的原则是大学既要传播知识也要创造知识。 这就需要由 学者型老师组成教工队伍。 靠死记硬背和做练习来学习的方法变为德国式的讲解方法。 德
国式的讲解就是由教授讲授自己的研究课题。 通过研究生性质的学习可以获得表明最高学术造诣的古老的德国学位--博士学位。
随着讨论课制度的建立，研究生们学会了提问、分 析以及开展他们自己的研究。 同时，新式大学学校规模和课程设置完全突破了过去那种只
有数学、经典著作、美学和音乐的狭窄课程表。 哈佛大学的校长率先推出选课制度，这样学生们就能选择自己的专业。主修领域的概念也出现了。新的目标是使大学对实际社会更有用。
密切关注着社会上的实际需求，新的大学着意培养学生解决问题的能力。 工程系学生
成为新式教育体制下最典型的学生。学生们还被培训成为经济学家、建筑师、农学家、社会工作人员以及教师。
>19 Children's Numerical Skills
People appear to be born to compute. The numerical skills of children develop so early and so inexorably that it is easy to imagine an internal clock of mathematical maturity guiding their growth. Not long after learning to walk and talk, they can set the table with impressive accuracy -- one knife, one spoon, one fork, for each of the five chairs. Soon they are capable of noting that they have placed five knives, spoons and forks on the table and, a bit later, that this amounts to fifteen pieces of silverware. Having thus mastered addition, they move on to subtraction. It seems almost reasonable to expect that if a child were secluded on a desert island at birth and retrieved seven years later, he or she could enter a second-grade mathematics class without any serious problems of intellectual adjustment.
Of course, the truth is not so simple. This century, the work of cognitive psychologists has illuminated the subtle forms of daily learning on which intellectual progress depends. Children were observed as they slowly grasped -- or, as the case might be, bumped into -- concepts that adults take for granted, as they refused, for instance, to concede that quantity is unchanged as water pours from a short stout glass into a tall thin one. Psychologists have since demonstrated that young children, asked to count the pencils in a pile, readily report the number of blue or red pencils, but must be coaxed into finding the total. Such studies have suggested that the rudiments of mathematics are mastered gradually, and with effort. They have also suggested that the very concept of abstract numbers - the idea of a oneness, a twoness, a threeness that applies to any class of objects and is a prerequisite for doing anything more mathematically demanding than setting a table - is itself far from innate.
儿童的数学能力
人似乎生来就会计算。 孩子们使用数字的技能发展得如此之早和如此必然，很容易让 人想象有一个内在的精确而成熟的数字钟在指导他们的成长。
孩子们在学会走路和说话后 不久，就能以令人惊叹的准确布置桌子--五把椅子前面分别摆上一把刀、一个汤匙、一把叉

子。 很快地，他们就能知道他们已在桌面上摆放了五把刀、五个汤匙、五把叉子。 没有多久，他们就又能知道这些东西加起来总共是 15 把银餐具。
如此这般地掌握了加法之后，他 们又转向减法。 有一种设想几乎顺理成章，那就是，即使一个孩子一出生就被隔绝到荒岛
上，七年后返回世间，也能直接上小学二年级的数学课，而不会碰到任何智力调整方面的大麻烦。当然，事实并没有这么简单。
本世纪认知心理学家的工作已经揭示了智力发展所依 赖的日常学习的微妙形式。他们观察到孩子们缓慢掌握那些成年人认为理所当然的概念的
过程，或者是孩子们偶然遇到这些概念的过程。 他们也观察到孩子们拒绝承认某些常识的情况。 比如：
孩子们拒绝承认当水从短而粗的瓶中倒入细而长的瓶子中时，水的数量没有 变化。 心理学家们而后又展示一个例子，
即：让孩子们数一堆铅笔时，他们能顺利地报出 蓝铅笔或红铅笔的数目，但却需诱导才能报出总的数目。 此类研究表明：数学基础是经过 逐渐努力后掌握的。
他们还表示抽象的数字概念，如可表示任何一类物品并且是在做比摆 桌子有更高数学要求的任何事时都必备的一、二、三意识，远远不是天生就具备的。

>20 The Historical Significance of American Revolution
The ways of history are so intricate and the motivations of human actions so complex that it is always hazardous to attempt to represent events covering a number of years, a multiplicity of persons, and distant localities as the expression of one intellectual or social movement; yet the historical process which culminated in the ascent of Thomas Jefferson to the presidency can be regarded as the outstanding example not only of the birth of a new way of life but of nationalism as a new way of life. The American Revolution represents the link between the seventeenth century, in which modern England became conscious of itself, and the awakening of modern Europe at the end of the eighteenth century. It may seem strange that the march of history should have had to cross the Atlantic Ocean, but only in the North American colonies could a struggle for civic liberty lead also to the foundation of a new nation.
Here, in the popular rising against a "tyrannical" government, the fruits were more than the securing of a freer constitution. They included the growth of a nation born in liberty by the will of the people, not from the roots of common descent, a geographic entity, or the ambitions of king or dynasty. With the American nation, for the first time, a nation was born, not in the dim past of history but before the eyes of the whole world.
美国革命的历史意义 历史的进程是如此错综复杂，人类行为的动机是如此令人费解，以至于想把那些时间跨
度大，涉及人数多，空间范围广的事件描述成为一个智者或一场社会运动的表现的企图是危险的。
然而以托马斯?杰弗逊登上总统宝座为高潮的那一段历史过程可以被视为一个特殊 的例子。在这段历史时期里不仅诞生了新的生活方式，而且民族主义成为了一种新的生活 方式。 美国独立战争成为联结 17 世纪现代英格兰的自我意识和 18

世纪末现代欧洲的觉醒 的纽带。 历史的行程需要跨越大西洋，这看起来似乎有些奇怪，但却只有在北美殖民地为 民权和自由的斗争才能导致新国家的建立。
这里，反对"暴政"的民众起义的成果不仅是获 得一个包含更多自由的宪法，还包括了一个依照人民的意愿诞生在自由中的国家的成长。这
个国家不是基于血缘、地理、君主或王朝的野心。 由于有了美国，第一次一个国家的诞生不是发生在历史模糊的过去，而是在全世界人们的眼前。
>21 The Origin of Sports
When did sport begin? If sport is, in essence, play, the claim might be made that sport is much older than humankind, for, as we all have observed, the beasts play. Dogs and cats wrestle and play ball games. Fishes and birds dance. The apes have simple, pleasurable games. Frolicking infants, school children playing tag, and adult arm wrestlers are demonstrating strong, transgenerational and transspecies bonds with the universe of animals - past, present, and future. Young animals, particularly, tumble, chase, run, wrestle, mock, imitate, and laugh(or so it seems) to the point of delighted exhaustion. Their play, and ours, appears to serve no other purpose than to give pleasure to the players, and apparently, to remove us temporarily from the anguish of life in earnest. Some philosophers have claimed that our playfulness is the most noble part of our basic nature. In their generous conceptions, play harmlessly and experimentally permits us to put our creative forces, fantasy, and imagination into action. Play is release from the tedious battles against scarcity and decline which are the incessant, and inevitable, tragedies of life. This is a grand conception that excites and provokes. The holders of this view claim that the origins of our highest accomplishments - liturgy, literature, and law - can be traced to a play impulse which, paradoxically, we see most purely enjoyed by young beasts and children. Our sports, in this rather happy, nonfatalistic view of human nature, are more splendid creations of the nondatable, transspecies play impulse.
体育的起源 体育运动开始于何时?如果体育运动的本质就是游戏的话，我们就可以宣称体育运动比
人类古老，因为正如我们所观察到的，野兽也进行嬉戏。 狗和猫会扭抱玩球，鱼和鸟翩翩 起舞，猿类会进行一些简单的、愉快的游戏。
雀跃的幼儿，捉迷藏的学童和成年摔跤者展 示出人与动物界的有力的跨越世代与物种的永恒的联系--特别是幼兽，它们翻筋斗、追逐、
奔跑、扭打、模仿、嬉笑(或者看起来是)，直到愉快地精疲力尽。 他们的玩耍，同我们的一样，似乎并没有别的目的而只是给游戏者以愉悦，暂时把我们从严肃生活的痛苦中拉出来。一些哲学家称我们的嬉戏是我们本质中最崇高的部分。
依他们这些随意性很大的见解，游 戏无害而且实验性地允许我们的创造力、幻想和想象发挥作用。 游戏让人们从永不间断亦
不可避免的生活悲剧-与乏匮和衰退进行的枯燥抗争中得到一种解脱。 这是一个令人兴奋、给人启发的伟大见解。
这种见解的持有者宣称，我们的最高成就如宗教典礼、文学、法律 的起源可以追溯到游戏的冲动。 但令人不解的是我们看到只有幼兽和小孩子才最纯粹地享

受着这种冲动。从这种比较豁达和非宿命的人性观来看，我们的运动是超时代、跨物种的 辉煌的创造。

>22 Collectibles

Collectibles have been a part of almost every culture since ancient times. Whereas some objects have been collected for their usefulness, others have been selected for their aesthetic beauty alone. In the United States, the kinds of collectibles currently popular range from traditional objects such as stamps, coins, rare books, and art to more recent items of interest like dolls, bottles, baseball cards, and comic books.

Interest in collectibles has increased enormously during the past decade, in part because some collectibles have demonstrated their value as investments. Especially during cycles of high inflation, investors try to purchase tangibles that will at least retain their current market values. In general, the most traditional collectibles will be sought because they have preserved their value over the years, there is an organized auction market for them, and they are most easily sold in the event that cash is needed. Some examples of the most stable collectibles are old masters, Chinese ceramics, stamps, coins, rare books, antique jewelry, silver, porcelain, art by well-known artists, autographs, and period furniture. Other items of more recent interest include old photograph records, old magazines, post cards, baseball cards, art glass, dolls, classic cars, old bottles, and comic books. These relatively new kinds of collectibles may actually appreciate faster as short-term investments, but may not hold their value as long-term investments. Once a collectible has had its initial play, it appreciates at a fairly steady rate, supported by an increasing number of enthusiastic collectors competing for the limited supply of collectibles that become increasingly more difficult to locate.

收藏品

从古代开始，收藏品就是文化的一部分。 一些物品因它们的有用性被收藏，而另一些 则纯粹因为它们的美被收藏。

在美国，当今流行的收藏品种类从传统物件，如邮票、硬币、 珍本书籍、艺术品，到更近期一些的有趣的东西，如布娃娃、瓶子、垒球卡、连环漫画册。

对收藏品的兴趣在过去十年中大大地增长，部分原因是一些收藏品显示出了它们的投资价值。

尤其在高通货膨胀时期，投资者尽量购买那些至少会保持他们现有市场价值的有形资 产。一般来说，最传统的收藏品受青睐，因为它们多年后仍保持其价值。

它们拥有完善的 拍卖市场，在需要现金的时候最容易被卖掉。 一些最稳当的收藏品是古老的画作、中国陶器、邮票、硬币、珍本书籍、古代珠宝、银器、瓷器、著名艺术家的作品、亲笔签名和有时代特征的家具。

其它更近期的物品有旧唱片、旧杂志、明信片、垒球卡片、彩色玻璃、布 娃娃、早期汽车、古瓶和连环画册。 作为短期投资这些相对说来较新颖的收藏品的确可能

更快地增值，但作为长期投资则可能不能保值。 一旦一件收藏品有了它第一次交易，它便以一个相当稳定的比率增值，这个增值率受到越来越多的热情的收藏者的支持，他们为有限的而且越来越难找到的收藏品而竞争。

>23 Henry Ford

Although Henry Ford's name is closely associated with the concept of mass production, he should receive equal credit for introducing labor practices as early as 1913 that would be considered advanced even by today's standards. Safety measures were improved, and the work day was reduced to eight hours, compared with the ten-or twelve-hour day common at the time. In order to accommodate the shorter work day, the entire factory was converted from two to three shifts.

In addition, sick leaves as well as improved medical care for those injured on the job were instituted. The Ford Motor Company was one of the first factories to develop a technical school to train specialized skilled laborers and an English language school for immigrants. Some efforts were even made to hire the handicapped and provide jobs for former convicts.

The most widely acclaimed innovation was the five-dollar-a-day minimum wage that was offered in order to recruit and retain the best mechanics and to discourage the growth of labor unions. Ford explained the new wage policy in terms of efficiency and profit sharing. He also mentioned the fact that his employees would be able to purchase the automobiles that they produced -- in effect creating a market for the product. In order to qualify for the minimum wage, an employee had to establish a decent home and demonstrate good personal habits, including sobriety, thriftiness, industriousness, and dependability. Although some criticism was directed at Ford for involving himself too much in the personal lives of his employees, there can be no doubt that, at a time when immigrants were being taken advantage of in frightful ways, Henry Ford was helping many people to establish themselves in America.

亨利?福特 尽管亨利?福特的名字和大生产的概念相连，但他在劳工保护上得到同样的赞誉，因为

他早在 1913 年便实行了用今天的标准来衡量依然是先进的标准。 安全措施得到改进，日工 作时间从当时普遍的 10 或 12 小时减少到 8 小时。

为了适应更短的日工作时间，整个工厂 从双班变成了三班。而且，病假和改善了的工伤医疗得以制度化。 福特汽车公司是最早建

立技术学校来培训专门技工和为移民开设英语学校的工厂之一。 公司甚至为雇佣残疾人和有前科的人而作出了一些努力。最受广泛称赞的革新是实行五美元一天的最低工资。 其目的是招收和留住那些最好的技工并阻碍工会的发展。

福特从效率和利润分享的角度来解释 这项新的工资政策。 他也提到这样一个事实，他的员工可以买他们生产的汽车--这实际上 是为其产品另开辟了一个市场。

为了够资格得到最低工资，员工必须建立一个得体的家庭 并显示出良好的个人习惯，包括节制、俭省、勤勉和可靠。 虽然有人批评福特过多地干涉

了员工的私人生活，但毫无疑问，在移民们被用恶劣的方式剥削的时代，亨利?福特却帮助 了许多人在美国扎下根来。

>24 Piano

The ancestry of the piano can be traced to the early keyboard instruments of the fifteenth and sixteenth centuries -- the spinet, the dulcimer, and the virginal. In the seventeenth century the organ, the clavichord, and the harpsichord became the chief instruments of the keyboard group, a supremacy they maintained until the piano supplanted them at the end of the eighteenth century. The clavichord's tone was metallic and never powerful; nevertheless, because of the variety of tone possible to it, many composers found the clavichord a sympathetic instrument for intimate chamber music. The harpsichord with its bright, vigorous tone was the favorite instrument for supporting the bass of the small orchestra of the period and for concert use, but the character of the tone could not be varied save by mechanical or structural devices.

The piano was perfected in the early eighteenth century by a harpsichord maker in Italy(though musicologists point out several previous instances of the instrument). This instrument was called a piano e forte (soft and loud), to indicate its dynamic versatility; its strings were struck by a recoiling hammer with a felt-padded head. The wires were much heavier in the earlier instruments. A series of mechanical improvements continuing well into the nineteenth century, including the introduction of pedals to sustain tone or to soften it, the perfection of a metal frame, and steel wire of the finest quality, finally produced an instrument capable of myriad tonal effects from the most delicate harmonies to an almost orchestral fullness of sound, from a liquid, singing tone to a sharp, percussive brilliance.

钢琴

钢琴的家系可以追溯至 15 至 16 世纪早期的键盘乐器，包括小型拨弦琴、洋琴和维金娜琴。 17

世纪时风琴、敲弦琴和拨弦琴成为键盘乐器类的主要成员。 这种至高无上的地位 一直为它们所保持，直到 18 世纪末期钢琴将它们取代。

敲弦古钢琴的音调有金属的音质， 缺乏雄劲。 然而由于它的音调变化多，许多作曲家发现对于亲切的室内乐是一种得体的乐 器。

人们最喜欢用具备明快有力音调的拨弦古钢琴来配合当时小型管弦乐团的低音乐器以 及在演奏会上演奏。 但它的音调难以变化，除非使用机械或构件装置。18

世纪早期的意大 利，钢琴在一位拨琴钢琴制造者手中得到完善(尽管音乐理论家们指出有更早的例子)。 这 种乐器被称为 piano eforte

(意大利语，柔和而响亮的)，以显示它有力的多样性。 演奏者用 一个头部带皮毡的弹击乐锤敲击琴弦。 更早的这种乐器之上的金属丝要重得多。 从此，持

续到 19 世纪的一系列机械上的改进，包括引入踏板以维持音调或使其柔和，改善金属框架，以及使用最佳性能的钢丝，最终产生了一种具备无数音调效果的乐器。

这些效果涵盖了从 最精致的和声到几乎全部的管弦乐音响，从明快流畅的吟唱的音调到尖锐的打击乐器的清晰 动人的恢宏气势。

>25 Movie Music

Accustomed though we are to speaking of the films made before 1927 as

"silent", the film has never been, in the full sense of the word, silent. From the very beginning, music was regarded as an indispensable accompaniment; when the Lumiere films were shown at the first public film exhibition in the United States in February 1896, they were accompanied by piano improvisations on popular tunes. At first, the music played bore no special relationship to the films; an accompaniment of any kind was sufficient. Within a very short time, however, the incongruity of playing lively music to a solemn film became apparent, and film pianists began to take some care in matching their pieces to the mood of the film.

As movie theaters grew in number and importance, a violinist, and perhaps a cellist, would be added to the pianist in certain cases, and in the larger movie theaters small orchestras were formed. For a number of years the selection of music for each film program rested entirely in the hands of the conductor or leader of the orchestra, and very often the principal qualification for holding such a position was not skill or taste so much as the ownership of a large personal library of musical pieces. Since the conductor seldom saw the films until the night before they were to be shown (if indeed, the conductor was lucky enough to see them then), the musical arrangement was normally improvised in the greatest hurry.

To help meet this difficulty, film distributing companies started the practice of publishing suggestions for musical accompaniments. In 1909, for example, the Edison Company began issuing with their films such indications of mood as "pleasant", "sad", "lively". The suggestions became more explicit, and so emerged the musical cue sheet containing indications of mood, the titles of suitable pieces of music, and precise directions to show where one piece led into the next.

Certain films had music especially composed for them. The most famous of these early special scores was that composed and arranged for D. W. Griffith's film Birth of a Nation, which was released in 1915.

电影插曲

尽管我们习惯于将 1927 年以前的电影称为"无声电影"，但是就无声这个词完整的意义上来说，电影从未真正的无声过，从最初开始音乐就被视为必不可少的伴奏。当卢米埃尔 的电影在 1896 年 2 月美国首届影片公映展览上放映的时候，影片便用当时的流行曲临场钢 琴伴奏。 最初，这些音乐伴奏与电影没有什么特别的关系，用什么曲子伴奏都行。 但在很短的时间内，为一部庄重的影片演奏快活的音乐所产生的不协调感变得显而易见，因此钢琴家们开始注意将自己的作品与影片的情调结合起来。

随着影剧院在数量上与重要性上的不 断增长，在一些场合，除了钢琴师外，还要加上小提琴师，或许还有一位大提琴师。 较大的影剧院里还组成了小型的管弦乐队。 在很长的时间内，为各部影片选择配乐完全掌握在乐队指挥或队长手中，而通常把持这种职位的资格不是技巧或鉴赏品味，而是拥有一个大的音乐作品的个人收藏。

因为直到电影上映的前一天晚上乐队指挥才能看到影片(如果这个指 挥真正有幸能够看到影片的话)，音乐安排通常是在非常匆忙的情况下临场进行的。为了解

决以上的困难，电影发行公司开办了为音乐伴奏印制提示单的业务。 例如 1909 年爱迪生公
司开始将一些诸如"喜悦的"、"悲伤的"、"活泼的"之类表明影片情调特征的提示与影片一起发行。
这些提示逐渐变得更加具体，并且出现了包括影片情调说明、适用乐曲名称和乐曲 转换点等内容的配乐说明单。 某些影片拥有专门为其创作的音乐。
这些早期特创乐谱中最 著名的便是为 D. W. 格雷夫斯 1915 年上映的影片《一个国家的诞生》所创作的音乐。

>26 International Business and Cross-cultural Communication

The increase in international business and in foreign investment has created a need for executives with knowledge of foreign languages and skills in cross-cultural communication. Americans, however, have not been well trained in either area and, consequently, have not enjoyed the same level of success in negotiation in an international arena as have their foreign counterparts.

Negotiating is the process of communicating back and forth for the purpose of reaching an agreement. It involves persuasion and compromise, but in order to participate in either one, the negotiators must understand the ways in which people are persuaded and how compromise is reached within the culture of the negotiation.

In many international business negotiations abroad, Americans are perceived as wealthy and impersonal. It often appears to the foreign negotiator that the American represents a large multi-million-dollar corporation that can afford to pay the price without bargaining further. The American negotiator's role becomes that of an impersonal purveyor of information and cash.

In studies of American negotiators abroad, several traits have been identified that may serve to confirm this stereotypical perception, while undermining the negotiator's position. Two traits in particular that cause cross-cultural misunderstanding are directness and impatience on the part of the American negotiator. Furthermore, American negotiators often insist on realizing short-term goals. Foreign negotiators, on the other hand, may value the relationship established between negotiators and may be willing to invest time in it for long-term benefits. In order to solidify the relationship, they may opt for indirect interactions without regard for the time involved in getting to know the other negotiator.

Clearly, perceptions and differences in values affect the outcomes of negotiations and the success of negotiators. For Americans to play a more effective role in international business negotiations, they must put forth more effort to improve cross-cultural understanding.

国际商业和跨文化交流 国际贸易和海外投资的增加产生了对具有外语知识和跨文化交 流技巧的经理的需求。
然而，美国人在这两方面未得到良好的训练，因此没有在国际谈判 中象他们的外国对手一

样成功。 谈判是为了达成协议而反复交流的过程。 它包括说服和妥 协。
但是为了去进行说服和妥协，谈判者必须懂得在谈判的文化中怎样说服人和怎样达成 妥协。
在国外的国际商务谈判中，美国人被视为富有和不带个人情感。
在外国谈判者看来， 似乎美国人代表着一个庞大的拥有数百万资财的大企业，不用进一步地讨价还价就能出得起 价钱。
美国谈判者的角色变成了一个没有个人感情的信息及现金的供应者。 对在国外的美国谈判者的研究中，我们找出了损害谈判者能力的几个特点，或许证实这个已成定式的看法。
尤其引起跨文化误解的两个特点是美国谈判者的直截了当和缺乏耐心。
此外，美国谈判者 经常坚持实现短期目标，而外国的谈判者会珍视建立谈判者之间的联系并愿意为长期利益投 入时间。
为了巩固这种联系，他们会选择非直接的交流而不计较投入用于了解对方的时间。 明显地，价值观的不同和理解上的差异影响了谈判的结果和谈判者的成功与否。
美国人要 在国际商务谈判中扮演更为有效的角色，他们就必须投入更多的努力提高跨文化的理解力。

>27 Scientific Theories

In science, a theory is a reasonable explanation of observed events that are related. A theory often involves an imaginary model that helps scientists picture the way an observed event could be produced. A good example of this is found in the kinetic molecular theory, in which gases are pictured as being made up of many small particles that are in constant motion.

A useful theory, in addition to explaining past observations, helps to predict events that have not as yet been observed. After a theory has been publicized, scientists design experiments to test the theory. If observations confirm the scientists' predictions, the theory is supported. If observations do not confirm the predictions, the scientists must search further. There may be a fault in the experiment, or the theory may have to be revised or rejected.

Science involves imagination and creative thinking as well as collecting information and performing experiments. Facts by themselves are not science. As the mathematician Jules Henri Poincare said,"Science is built with facts just as a house is built with bricks, but a collection of facts cannot be called science any more than a pile of bricks can be called a house." Most scientists start an investigation by finding out what other scientists have learned about a particular problem. After known facts have been gathered, the scientist comes to the part of the investigation that requires considerable imagination. Possible solutions to the problem are formulated. These possible solutions are called hypotheses.

In a way, any hypothesis is a leap into the unknown. It extends the scientist's thinking beyond the known facts. The scientist plans experiments, performs calculations, and makes observations to test hypotheses. Without hypothesis, further investigation lacks purpose and direction. When hypotheses are confirmed, they are incorporated into theories.

科学理论

在科学中，理论是对所观察到的相关事件的合理解释。 理论通常包含一个虚构的模型，这个模型帮助科学家构想所观察到的事件是如何发生的。 分子运动理论便是我们能找到的一个很好的例子。
在这个理论中，气体被描绘成由许多不断运动的小颗粒组成。 一个有用 的理论，除了能够解释过去的观测，还有助于预测那些未被观测到的事件。 一个理论公开
后，科学家们设计实验来检验这个理论。如果观察证实了科学家的预言，这个理论则得到 了验证。 如果观察不能证实科学家的预言，科学家就必须进一步的研究。
或许是实验存在 错误，或许是这个理论必须被修改或抛弃。 科学家除了收集信息和操作实验外还需要想象 能力和创/造性思维。 事实本身并不是科学。
正如数学家乔斯?亨利?波恩克尔所说："科 学建立在事实之上，就像房子用砖砌成一样。 但事实的收集不能被称作科学，就像一堆砖 不能被叫作房子一样。
"多数科学家通过找出别的科学家在一个特定问题上的所知来开始研 究。在收集了已知事实之后，科学家开始了研究中需要相当想像力的部分。 他们尔后拟订
对这个问题的可行的解决方法。这些可行的解决方式被称为假设。 在某种意义上，任何假设都是向未知的跳跃。它使科学家的思维超越已知事实。科学家计划实验、计算、观测以检验假定。若没有假设，进一步的研究便缺乏目的和方向。
当假设被证实了，就成为理论的 一部分。

>28 Changing Roles of Public Education

One of the most important social developments that helped to make possible a shift in thinking about the role of public education was the effect of the baby boom of the 1950's and
1960's on the schools. In the 1920's, but especially in the Depression conditions of the 1930's, the United States experienced a declining birth rate -- every thousand women aged fifteen to forty-four gave birth to about 118 live children in 1920，89.2 in 1930，75.8 in 1936, and 80 in 1940. With the growing prosperity brought on by the Second World War and the economic boom that followed it young people married and established households earlier and began to raise larger families than had their predecessors during the Depression. Birth rates rose to 102 per thousand in 1946, 106.2 in 1950, and 118 in 1955. Although economics was probably the most important determinant, it is not the only explanation for the baby boom. The increased value placed on the idea of the family also helps to explain this rise in birth rates. The baby boomers began streaming into the first grade by the mid 1940's and became a flood by 1950. The public school system suddenly found itself overtaxed. While the number of schoolchildren rose because of wartime and postwar conditions, these same conditions made the schools even less prepared to cope with the flood. The wartime economy meant that few new schools were built between 1940 and 1945. Moreover, during the war and in the boom times that followed, large numbers of teachers left their profession for better-paying jobs elsewhere in the economy.
Therefore in the 1950's and 1960's, the baby boom hit an antiquated and

inadequate school system. Consequently, the "custodial rhetoric"of the 1930's and early 1940's no longer made sense that is, keeping youths aged sixteen and older out of the labor market by keeping them in school could no longer be a high priority for an institution unable to find space and staff to teach younger children aged five to sixteen. With the baby boom, the focus of educators and of laymen interested in education inevitably turned toward the lower grades and back to basic academic skills and discipline. The system no longer had much interest in offering nontraditional, new, and extra services to older youths.

公共教育的角色变化 一项重要的、有可能促使人们对公共教育的角色的看法发生转变的社会发展是本世纪五
六十年代的生育高峰对学校的影响。 在 20 年代，尤其是在 30 年代后的大萧条中，美国经 历了一次出生率的下降--1920 年每千名年龄在 15
岁至 45 岁的妇女生下大约 118 个存活婴儿，
1930 年 89.2 个，1936 年 75.8 个，1940 年 80 个。 随着二战带来的持续繁荣以及随之而来
的经济增长，年轻人比大萧条中的同龄人更早地结婚成家，而且比前辈养育更大的家庭。 1946 年出生率上升到 102%，1950 年达 106%，1955 年达 118%。 对于生育高峰，经济有可
能是最重要的决定因素，但它并不是唯一的解释。 不断受到重视的家庭观念也有助于解释出生率的上升。 到 40
年代中期为止，这些生育高峰出生的孩子们开始源源不断地进入小学 一年级。 到了 1950 年，就形成了一股洪流。 公共教育系统突然感到不堪重负了。
由于战 时和战后的状况，使得学龄儿童人数增加，这些状况使得学校面对这股洪流更加措手不及。 战时经济意味着在 1940 年到 1950
年间几乎没有建立新学校。 而且，在战时和随后的经济 增长时期，大量的教师离开岗位去别处从事报酬更为优厚的工作。 因此，在五六十年代，
生育高峰冲击着陈旧而不完备的学校体系。 这样一来，30 年代以及 40 年代早期，"监护理 论"就不再有意义了。 也就是说，通过使 16
岁以上的年轻人留在学校不进入劳动力市场的 做法再也不是教育机构的优先考虑了。因为教育机构不再能找到场地和教师来教育那些更 小的 5-16
岁的孩子。 随着生育高峰，教育者和圈外人士对教育的兴趣和焦点，不可避免地 转向了更低的年级和基础的学术技能和学科上。
这个系统不再有浓厚的兴趣给较年长的年 轻人提供非传统的新式的和额外的服务。

>29 Telecommuting

Telecommuting -- substituting the computer for the trip to the job -- has been hailed as a solution to all kinds of problems related to office work. For workers it promises freedom from the office, less time wasted in traffic, and help with child-care conflicts. For management, telecommuting helps keep high performers on board, minimizes tardiness and absenteeism by eliminating commutes, allows periods of solitude for high-concentration tasks, and provides scheduling flexibility.

In some areas, such as Southern California and Seattle, Washington, local governments are encouraging companies to start telecommuting programs in

order to reduce rush-hour congestion and improve air quality.
But these benefits do not come easily. Making a telecommuting program work requires careful planning and an understanding of the differences between telecommuting realities and popular images.
Many workers are seduced by rosy illusions of life as a telecommuter. A computer programmer from New York City moves to the tranquil Adirondack Mountains and stays in contact with her office via computer. A manager comes in to his office three days a week and works at home the other two. An accountant stays home to care for her sick child; she hooks up her telephone modem connections and does office work between calls to the doctor.
These are powerful images, but they are a limited reflection of reality. Telecommuting workers soon learn that it is almost impossible to concentrate on work and care for a young child at the same time. Before a certain age, young children cannot recognize, much less respect, the necessary boundaries between work and family. Additional child support is necessary if the parent is to get any work done.
Management too must separate the myth from the reality. Although the media has paid a great deal of attention to telecommuting in most cases it is the employee's situation, not the availability of technology that precipitates a telecommuting arrangement.
That is partly why, despite the widespread press coverage, the number of companies with work-at-home programs or policy guidelines remains small.
电子交通
电子交通--用电脑取代上班的往返--作为对各种各样的办公室工作问题的解决办法已受 到了欢迎。
对工作者来说，它承诺不受办公室的约束，更少的时间浪费在交通上和有助于 解决照看小孩的矛盾。
对管理者来说，电子交通有助于挽留高效率的工作者，通过省去办 公室与家之间的来回往返，大大减少工作拖拉和旷工，给予管理者独处的时间来完成需要高度集中精神的任务，为管理者提供灵活的时间安排。 在一些地区，如南加利福尼亚和西雅图、华盛顿，地方政府鼓励公司开始电子交通计划以减少交通高峰时的塞车和提高空气质量。但这些益处也来之不易。
要使电子交通成功需要仔细的计划并且理解电子交通的现实状况 和流行的想象之间的区别。 许多工作者被电子交通的美好幻想所迷惑。 一位电脑程序设计员从纽约市搬到了宁静的阿第伦达克山，用电脑保持与她办公室之间的联系。 一位经理一周三天到办公室，其他两天在家工作；一位会计师在家照顾她生病的孩子，接通电话调制解调器的接头，在同医生通话之余完成办公室工作。
这些是很有震撼力的情景，但也是对现 实有限的反映。 电子交通者很快发现在同一时间专注工作和照看小孩几乎是不可能的。 在某个年龄之前，小孩子不可能意识到，更不可能尊重工作与家庭之间的界限。如果家长要 完成工作，就必须另外照看小孩。 管理阶层必须把现实同神话分开。
虽然传媒对电子交通 投入了极大的关注，但在很大程度上，是员工的实际情况而不是技术

的可能性促成电子交通 的安排。
这就是为什么尽管有广泛的报导，具有在家工作项目或行动纲领的公司数目依然 很少的部分原因。

>30 The Origin of Refrigerators

By the mid-nineteenth century, the term"icebox"had entered the American language, but ice was still only beginning to affect the diet of ordinary citizens in the United States. The ice trade grew with the growth of cities. Ice was used in hotels, taverns, and hospitals, and by some forward-looking city dealers in fresh meat, fresh fish, and butter. After the Civil War (1861-1865), as ice was used to refrigerate freight cars, it also came into household use. Even before 1880, half the ice sold in New York, Philadelphia, and Baltimore, and one-third of that sold in Boston and Chicago, went to families for their own use. This had become possible because a new household convenience, the icebox, a precursor of the modern refrigerator, had been invented.

Making an efficient icebox was not as easy as we might now suppose. In the early nineteenth century, the knowledge of the physics of heat, which was essential to a science of refrigeration, was rudimentary. The commonsense notion that the best icebox was one that prevented the ice from melting was of course mistaken, for it was the melting of the ice that performed the cooling. Nevertheless, early efforts to economize ice included wrapping the ice in blankets, which kept the ice from doing its job. Not until near the end of the nineteenth century did inventors achieve the delicate balance of insulation and circulation needed for an efficient icebox.

But as early as 1803, an ingenious Maryland farmer, Thomas Moore, had been on the right track. He owned a farm about twenty miles outside the city of Washington, for which the village of Georgetown was the market center. When he used an icebox of his own design to transport his butter to market, he found that customers would pass up the rapidly melting stuff in the tubs of his competitors to pay a premium price for his butter, still fresh and hard in neat, one-pound bricks. One advantage of his icebox, more explained, was that farmers would no longer have to travel to market at night in order to keep their produce cool.

冰箱的由来

直到 19 世纪中期，"冰箱"这个名词才进入了美国语言，但冰仅仅只是开始影响美国普 通市民的饮食。 冰的买卖随着城市的发展而发展。

冰被用在旅馆、酒馆、医院以及被一些 有眼光的城市商人用于肉、鱼和黄油的保鲜。 内战(1861-1865)之后，冰被用于冷藏货车， 同时也进入了民用。

甚至在 1880 年前，半数在纽约、费城和巴尔的摩销售的冰，三分之一在波士顿和芝加哥销售的冰进入家庭使用，因为一种新的家庭设备，冰箱，即现代冰箱的前身，被发明了。 制造一台有效率的冰箱不像我们想象的那么简单。

19 世纪早期，关于对 冷藏科学至关重要的热物理知识是很浅陋的。 认为最好的冰箱应该防止冰的融化这样一个
普遍的观点显然是错误的，因为正是冰的融化起了制冷作用。早期为节省冰的努力，包括 用毯子把冰包起来，使得冰不能发挥它的作用。 直到近 19
世纪末，发明家们才成功地找到 有效率的冰箱所需要的精确的隔热和循环的精确平衡。 但早在 1803 年，一位有发明天才的
马里兰农场主，托马斯?莫尔，找到了正确方法。 他拥有一个农场，离华盛顿约 20 英里，那里的乔治镇村庄是集市中心。
当他用自己设计的冰箱运送黄油去市场时，他发现顾客们 会走过装在竞争者桶里那些迅速融化的黄油而给他比市价更高的价格买他仍然新鲜坚硬，整
齐地切成一磅一块的黄油。 莫尔说他的冰箱的一个好处是使得农民们不必在夜里上路去市场以保持他们产品的低温。

>31 British Columbia

British Columbia is the third largest Canadian province, both in area and population. It is nearly 1.5 times as large as Texas, and extends 800 miles (1,280km) north from the United States border. It includes Canada's entire west coast and the islands just off the coast.

Most of British Columbia is mountainous, with long rugged ranges running north and south. Even the coastal islands are the remains of a mountain range that existed thousands of years ago. During the last Ice Age, this range was scoured by glaciers until most of it was beneath the sea. Its peaks now show as islands scattered along the coast.

The southwestern coastal region has a humid mild marine climate. Sea winds that blow inland from the west are warmed by a current of warm water that flows through the Pacific Ocean. As a result, winter temperatures average above freezing and summers are mild. These warm western winds also carry moisture from the ocean.

Inland from the coast, the winds from the Pacific meet the mountain barriers of the coastal ranges and the Rocky Mountains. As they rise to cross the mountains, the winds are cooled, and their moisture begins to fall as rain. On some of the western slopes almost 200 inches (500cm) of rain fall each year.

More than half of British Columbia is heavily forested. On mountain slopes that receive plentiful rainfall, huge Douglas firs rise in towering columns. These forest giants often grow to be as much as 300 feet (90m) tall, with diameters up to 10 feet (3m). More lumber is produced from these trees than from any other kind of tree in North America. Hemlock, red cedar, and balsam fir are among the other trees found in British Columbia.

英属哥伦比亚

英属哥伦比亚是加拿大的第三大省，无论是面积还是人口都是如此。 它几乎是德克萨 斯的 1.5 倍，从美国边境一直向北延伸了 800 英里(1，280
公里)。 它包括了加拿大整个西 海岸及附近岛屿。 大部分英属哥伦比亚多山峦。 绵长而粗犷的山脉贯通南北。 甚至那些
沿海的岛屿都是那些存在于千万年前的山脉的遗迹。 在上一个冰河时期，这些山脉被冰河

冲刷侵蚀，直到大部分山脉被淹没在海中。
它们的峰顶显现为沿着海岸散布的岛屿。 西南 海岸地区有着潮湿温和的海洋性气候。 从太平洋来的温暖的洋流使得从西吹过内陆的海风 变得温暖。
因此这儿冬天平均气温在零上而且夏天也不会酷热。这些温暖的西风同样也从 海洋带来了湿气。
来自太平洋的、从海岸向内陆的风遇到海岸山脉和落基山脉这些山脉屏 障。 当气流升高跨越这些山脉时，风的温度就降低了，风中的水分形成降雨。 在一些朝西
山坡区域每年大约有 200 英寸(500 厘米)的降水。 大部分英属哥伦比亚密布着森林。 在有 充足降水的斜坡，巨大的道格拉斯枞树高耸入云。
这些森林巨人常常长到高达 300 英尺(90 米)，直径粗达 10 英尺(3 米)。 这些树产出了比北美其他任何树都多的木材。 铁杉、红香
椿、香脂冷杉枞都是发现于英属哥伦比亚的其它树种。
>32 Botany
Botany, the study of plants, occupies a peculiar position in the history of human knowledge. For many thousands of years it was the one field of awareness about which humans had anything more than the vaguest of insights. It is impossible to know today just what our Stone Age ancestors knew about plants, but from what we can observe of preindustrial societies that still exist a detailed learning of plants and their properties must be extremely ancient. This is logical. Plants are the basis of the food pyramid for all living things even for other plants. They have always been enormously important to the welfare of people not only for food, but also for clothing, weapons, tools, dyes, medicines, shelter, and a great many other purposes. Tribes living today in the jungles of the Amazon recognize literally hundreds of plants and know many properties of each. To them, botany, as such, has no name and is probably not even recognized as a special branch of "knowledge"at all.
Unfortunately, the more industrialized we become the farther away we move from direct contact with plants, and the less distinct our knowledge of botany grows. Yet everyone comes unconsciously on an amazing amount of botanical knowledge, and few people will fail to recognize a rose, an apple, or an orchid. When our Neolithic ancestors, living in the Middle East about 10, 000 years ago, discovered that certain grasses could be harvested and their seeds planted for richer yields the next season the first great step in a new association of plants and humans was taken. Grains were discovered and from them flowed the marvel of agriculture: cultivated crops. From then on, humans would increasingly take their living from the controlled production of a few plants, rather than getting a little here and a little there from many varieties that grew wild - and the accumulated knowledge of tens of thousands of years of experience and intimacy with plants in the wild would begin to fade away.
植物学
植物学，即对植物的研究，在人类知识的历史中占据了特殊的地位。 这是人类几千年 来超越模糊的认知而真正有所了解的领域之一。

我们今天不可能知道新石器时代的祖先们 对植物到底了解多少，但我们在至今仍存在的前工业化社会观察到：人类对植物及其特性的 详细了解应该是非常古老的。
这是理所当然的。 植物是其他生物甚至其他植物食物金字塔 的基础。 它们对人们的生活至关重要，不仅在食物上，而且在衣物、武器、工具、染料、
药物、住所和许许多多其他的用途上。 至今仍生活在亚马逊河丛林中的部落确实能够辨识几百种植物并知道每一种的许多特性。
对他们来说，植物学没有专门的名称，甚至可能根 本未被认为是一种专门知识。 不幸的是，工业化的程度越高，我们距直接与植物接触就越
远，我们的植物学知识的增加也就越微不足道。 然而每个人在不知不觉中拥有大量的植物学知识，很少有人认不出玫瑰、苹果或兰花。
大约一万年前居住在中东的新时代的祖先们 发现某些草能被收获，它们的种子下一季耕种会收获更多时，人类就迈出了人和植物之间的 新关系第一大步。
谷子被发现后，农业的奇迹从此诞生：这就是可栽培的谷物。 从那时起， 人类越来越依赖少数可控制的作物生存，而不再是从众多的野生种类中这里获取一点，那里
获取一点。 这样在千万年中对于野生植物的经验和密切联系中积累起来的知识就开始消失了。

>33 Plankton
Scattered through the seas of the world are billions of tons of small plants and animals called plankton. Most of these plants and animals are too small for the human eye to see. They drift about lazily with the currents, providing a basic food for many larger animals.
Plankton has been described as the equivalent of the grasses that grow on the dry land continents, and the comparison is an appropriate one. In potential food value, however, plankton far outweighs that of the land grasses. One scientist has estimated that while grasses of the world produce about 49 billion tons of valuable carbohydrates each year, the sea's plankton generates more than twice as much.
Despite its enormous food potential, little effect was made until recently to farm plankton as we farm grasses on land. Now marine scientists have at last begun to study this possibility, especially as the sea's resources loom even more important as a means of feeding an expanding world population.
No one yet has seriously suggested that "planktonburgers" may soon become popular around the world. As a possible farmed supplementary food source, however, plankton is gaining considerable interest among marine scientists.
One type of plankton that seems to have great harvest possibilities is a tiny shrimplike creature called krill. Growing to two or three inches long, krill provide the major food for the great blue whale, the largest animal ever inhabit the Earth. Realizing that this whale may grow to 100 feet and weigh 150 tons at maturity, it is not surprising that each one devours more than one ton of krill daily.
浮游生物 数十亿吨的被称为"浮游生物"的小动物、植物散布在世界的海洋中。 这些小 的

动、植物大多太小而难以被人眼看到。
它们随波逐流，为许多较大的动物提供了基本的 食物。 浮游生物曾被描述为生长在大陆陆地上的各种草类的海洋对应物。 这种比喻是恰当
的。 然而就潜在的食物价值而言，浮游生物远胜于草类。 一位科学家曾经估计，世界上的草类每年生产大约 490
亿吨有用的碳水化合物，而海洋里的浮游生物每年生产的碳水化合物 多于此数的两倍。 尽管浮游生物具备巨大的食物潜能，但直到最近人们还很少象种植草类
那样付出努力养殖浮游生物。 现在，海洋科学家们至少已开始研究这种可能性。 全球人口不断扩张，海洋资源作为食品的重要性日益突出。
现在还没有人认真说过"浮游生物汉堡" 会很快在世界上流行起来。 然而，作为一种可能养殖的补充性食物资源，浮游生物正引起 了海洋科学家们相当大的兴趣。
一种似乎具有很大收获可能性的微小的虾状浮游生物被称 为鳞虾。鳞虾长至 2～3 英寸长时即成为地球上曾居住过的最大动物--蓝鲸的主要食物。 成
熟的蓝鲸可以达到 100 英尺长，150 吨重，所以每头鲸每天吞食 1 吨多的鳞虾一点也不让人 吃惊。

>34 Raising Oysters

In the past oysters were raised in much the same way as dirt farmers raised tomatoes - by transplanting them. First, farmers selected the oyster bed, cleared the bottom of old shells and other debris, then scattered clean shells about. Next, they "planted" fertilized oyster eggs, which within two or three weeks hatched into larvae. The larvae drifted until they attached themselves to the clean shells on the bottom. There they remained and in time grew into baby oysters called seed or spat. The spat grew larger by drawing in seawater from which they derived microscopic particles of food. Before long, farmers gathered the baby oysters, transplanted them in other waters to speed up their growth, then transplanted them once more into another body of water to fatten them up. Until recently the supply of wild oysters and those crudely farmed were more than enough to satisfy people's needs.

But today the delectable seafood is no longer available in abundance. The problem has become so serious that some oyster beds have vanished entirely.

Fortunately, as far back as the early 1900's marine biologists realized that if new measures were not taken, oysters would become extinct or at best a luxury food. So they set up well-equipped hatcheries and went to work. But they did not have the proper equipment or the skill to handle the eggs. They did not know when, what, and how to feed the larvae. And they knew little about the predators that attack and eat baby oysters by the millions. They failed, but they doggedly kept at it. Finally, in the 1940's a significant breakthrough was made.

The marine biologists discovered that by raising the temperature of the water, they could induce oysters to spawn not only in the summer but also in the fall, winter, and spring. Later they developed a technique for feeding the larvae and rearing them to spat. Going still further, they

succeeded in breeding new strains that were resistant to diseases, grew faster and larger, and flourished in water of different salinities and temperatures. In addition, the cultivated oysters tasted better!

饲养牡蛎

过去人们饲养牡蛎的方式很大程度上类似于田地里的农夫种植蕃茄--通过移植来饲养 它们。

首先，农夫选好牡蛎苗床，清除底部的旧壳和其它杂物，然后四处撒播干净的壳。 接 着，他们"栽种"已受精的牡蛎卵。 这些卵在 2～3 周内会孵化成幼贝。

幼贝一直漂流直到 粘在苗床底部干净的壳上为止。它们会呆在那儿并逐渐长成小牡蛎。我们称之为种子或贝

苗。 贝苗吸进海水中的微小生物作为食物从而越长越大。 不久之后，农夫将这些小牡蛎收集起来，把它们移种进其他的水域加快其生长，然后再次将它们移种进另外的水域以使其肥壮起来。 直到最近，野生的以及人工饲养的牡蛎完全能够满足人们的需要。

但是今天这种 可口的海味已不再大量存在。这个问题已经变得如此严重以至于一些牡蛎苗床已完全消失。 幸运的是，早在 20

世纪初期海洋生物学家们就意识到如果不采取新的措施，牡蛎将会灭绝 或至少会变为一种奢侈的食品。 因此他们建造了装备良好的孵卵场所并开始工作。 但是他

们尚没有适当的装置或技术来处理牡蛎卵。他们不知道何时、用什么以及如何喂养幼贝。他们对捕食数百万幼小牡蛎的动物天敌也所知无几。

他们失败了，但他们顽强地坚持了下来。 终于，在 20 世纪 40 年代，一个重要的突破性的进展产生了。 海洋生物学家发现，升高水

温能够诱导牡蛎不仅在夏季也在秋季、冬季和春季里产卵。 后来他们发展了一项技术来喂养幼贝至其长成贝苗。

他们进一步成功地培养出了新的品种，可以抵抗疾病、长得更快、 更大并且在不同的盐度和温度的水中都能茁壮生长。 此外，这些培殖出的牡蛎口感更佳!

>35 Oil Refining

An important new industry, oil refining, grew after the Civil War. Crude oil, or petroleum -- a dark, thick ooze from the earth -- had been known for hundreds of years, but little use had ever been made of it. In the 1850's Samuel M. Kier, a manufacturer in western Pennsylvania, began collecting the oil from local seepages and refining it into kerosene. Refining, like smelting, is a process of removing impurities from a raw material.

Kerosene was used to light lamps. It was a cheap substitute for whale oil, which was becoming harder to get. Soon there was a large demand for kerosene. People began to search for new supplies of petroleum.

The first oil well was drilled by E. L. Drake, a retired railroad conductor. In 1859 he began drilling in Titusville, Pennsylvania. The whole venture seemed so impractical and foolish that onlookers called it "Drake's Folly". But when he had drilled down about 70 feet (21 meters), Drake struck oil. His well began to yield 20 barrels of crude oil a day.

News of Drake's success brought oil prospectors to the scene. By the early 1860's these wildcatters were drilling for "black gold" all over western Pennsylvania. The boom rivaled the California gold rush of 1848 in its

excitement and Wild West atmosphere. And it brought far more wealth to the prospectors than any gold rush.

Crude oil could be refined into many products. For some years kerosene continued to be the principal one. It was sold in grocery stores and door-to-door. In the 1880's refiners learned how to make other petroleum products such as waxes and lubricating oils. Petroleum was not then used to make gasoline or heating oil.

炼油

一种重要的新兴工业--炼油业在国内战争后成长起来。 未加工的石油，或原油--一种深 色的地下的稠浆--数百年来一直为大众所知，但是人们却很少使用过它。

在十九世纪五十 年代，萨缪尔?M?科尔，宾西法尼亚西部的一位制造商，开始从当地的溢出物中收集石油

并将它炼成煤油。与冶炼矿石一样，石油提炼是一个从未加工的原料中除去杂质的过程。煤油被用来点灯。

它是鲸油的一种便宜的替代品，而鲸油正变得越来越难以获得。 不久就产 生了对煤油的大量需求。 人们开始寻找新的石油供应。 第一口油井为

E?L?瑞克，一个 退休的火车检票员所钻得。 1859 年他开始在宾西法尼亚的泰特斯维尔钻井。 整个的这项

冒险事业看起来是如此不现实和愚蠢以致旁观者称之为"鸭子的蠢行"。 (译者注：Drake's Folly, drake

在这里意含双关，即指瑞克的名字，又指该词的本义即鸭子。 )但当瑞克往下钻 至 70 英尺(21 米)的时候，他发现了石油。 他的油井从此每天生产

20 桶原油。瑞克成功的 消息将石油勘探者们吸引到现场。截止到 19 世纪 60 年代早期，这些冒险者为寻找"黑色的

金子"钻探遍了整个宾西法尼亚西部。 这项繁荣的事业在刺激性和粗犷的西部气氛上可与 1848 年的加州淘金热相媲美，而且它为勘探者带来了远超过淘金潮的财富。 原油能被提炼成许多产品。 多年以来煤油一直是主要的一种产品。

它在杂货店中出售由人挨户推销。 19 世纪八十九十年代炼油者们懂得了生产其它石油产品，如蜡和润滑油。 那时石油还没有被

用来制造汽油或采暖装置用油。

>36 Plate Tectonics and Sea-floor Spreading

The theory of plate tectonics describes the motions of the lithosphere, the comparatively rigid outer layer of the Earth that includes all the crust and part of the underlying mantle. The lithosphere is divided into a few dozen plates of various sizes and shapes, in general the plates are in motion with respect to one another. A mid-ocean ridge is a boundary between plates where new lithospheric material is injected from belows. As the plates diverge from a mid-ocean ridge they slide on a more yielding layer at the base of the lithosphere.

Since the size of the Earth is essentially constant, new lithosphere can be created at the mid-ocean ridges only if an equal amount of lithospheric material is consumed elsewhere. The site of this destruction is another kind of plate boundary: a subduction zone. There one plate dives under the edge of another and is reincorporated into the mantle. Both kinds of plate

boundary are associated with fault systems, earthquakes and volcanism, but the kinds of geologic activity observed at the two boundaries are quite different.

The idea of sea-floor spreading actually preceded the theory of plate tectonics. In its original version, in the early 1960's, it described the creation and destruction of the ocean floor, but it did not specify rigid lithospheric plates. The hypothesis was substantiated soon afterward by the discovery that periodic reversals of the Earth's magnetic field are recorded in the oceanic crust. As magma rises under the mid-ocean ridge, ferromagnetic minerals in the magma become magnetized in the direction of the geomagnetic field. When the magma cools and solidifies, the direction and the polarity of the field are preserved in the magnetized volcanic rock. Reversals of the field give rise to a series of magnetic stripes running parallel to the axis of the rift. The oceanic crust thus serves as a magnetic tape recording of the history of the geomagnetic field that can be dated independently; the width of the stripes indicates the rate of the sea-floor spreading.

板块结构与海床扩展

板块结构理论描述岩石圈的运动。 岩石圈是相对坚硬的地球外层，包括全部地壳和部 分地幔。

岩石圈被划分为几十个大小不同形状各异的板块，一般而言这些板块都处于相对 运动之中。一道中海脊是板块之间的边界，在那里新的岩石圈的物质从下部注入。

当板块 从中海脊脱离时，它们滑向在岩石圈基部较易变形的地层上。 因为地球的大小本质上是不

变的，只有同等数量的岩石圈物质在其它地方被吞没，新的岩石圈才能生成。 销毁旧岩石圈的地方形成另外一种板块边界：一块潜没的区域。在这里，一块板块潜没到另一板块的 边缘之下并结合入地幔之中。

两种板块边界均与地层系统、地震以及火山活动有关，但在 两种边界处观察到的诸般地质活动却迥然不同。 海床扩展说实际上早于板块结构理论。 在

20 世纪 60 年代它的理论雏形中，描述了海底的生成和毁灭，但没有详细介绍坚硬的岩石圈 板块。 这个假定不久之后为发现所证实。

该发现表明地球磁场周期性的逆转被记录在海洋 地壳中。 当岩浆从中海脊下涌起的时候，岩浆中的磁铁矿物质按地磁场的方向被磁化。 岩

浆冷却并凝固下来后，地磁场的方向和磁极被保留在磁化了的火山岩中。 磁场的逆转形成一系列与断层轴线平行的条形磁区。

这样海洋壳就扮演了磁带的角色，记录下可以鉴定时 间的地磁场的历史。 条形磁区的宽度表明了海底扩展的速度。

>37 Icebergs

Icebergs are among nature's most spectacular creations, and yet most people have never seen one. A vague air of mystery envelops them. They come into being -- somewhere -- in faraway, frigid waters, amid thunderous noise and splashing turbulence, which in most case no one hears or sees. They exist only a short time and then slowly waste away just as unnoticed.

Objects of sheerest beauty they have been called. Appearing in an endless

variety of shapes, they may be dazzlingly white, or they may be glassy blue, green or purple, tinted faintly or in darker hues. They are graceful, stately, inspiring -- in calm, sunlight seas.

But they are also called frightening and dangerous, and that they are -- in the night, in the fog, and in storms. Even in clear weather one is wise to stay a safe distance away from them. Most of their bulk is hidden below the water, so their underwater parts may extend out far beyond the visible top.

Also, they may roll over unexpectedly, churning the waters around them.

Icebergs are parts of glaciers that break off, drift into the water, float about awhile, and finally melt. Icebergs afloat today are made of snowflakes that have fallen over long ages of time. They embody snows that drifted down hundreds, or many thousands, or in some cases maybe a million years ago. The snows fell in polar regions and on cold mountains, where they melted only a little or not at all, and so collected to great depths over the years and centuries.

As each year's snow accumulation lay on the surface, evaporation and melting caused the snowflakes slowly to lose their feathery points and become tiny grains of ice. When new snow fell on top of the old, it too turned to icy grains. So blankets of snow and ice grains mounted layer upon layer and were of such great thickness that the weight of the upper layers compressed the lower ones. With time and pressure from above, the many small ice grains joined and changed to larger crystals, and eventually the deeper crystals merged into a solid mass of ice.

冰山 冰山是大自然最壮观的创造之一，但大多数人却从未看到过冰山，一种朦胧神秘的气氛

笼罩着它们。 冰山形成于久远的、寒冷的水体中，而且伴随着雷声轰鸣般的嘈杂和水花汹涌的风暴，但却无人耳闻目睹。冰山仅存在短短的一段时间就慢慢地悄无声息地融化掉。冰山具有最纯粹的美，人们如是说。

冰山呈现出千姿百态，可能白得耀眼，或者是闪耀着蓝 色、绿色或紫色的玻璃般的光芒，或浓或淡。 它们在平静的阳光照耀的海水中显得优雅堂

皇，令人浮想联翩。 但是人们亦把冰山称为恐怖的和危险的。 它们的确如此--在夜间，雾天和风暴肆虐时。

即便是在晴朗的天气里，与它们保持一段安全距离也是明智的。 冰山的 大部分体积稳藏于水下，因此其水下部分的伸展远远超过可见的顶部。 冰山也可能出人意

料地翻滚，剧烈地搅动周围的水体。冰山是冰川的一部分，从冰川断裂漂流进水中，一段 时间后融化。 今天的冰山由多年前降落的雪花形成。

它们的体内是数百年，或数千年，有 时甚至是数百万年前的降雪。 这些雪花落在极地或寒冷的山上，仅有少量融化或根本不融

化，这样经过许多年或许多世纪后积累了巨大的深度。由于每年的雪花积累在表面之上，蒸发和融化使得雪花慢慢失去其羽状尖端而变成微小的冰粒。

当新的雪花降落到旧的表面 上，也变成了冰粒。 因而雪花覆盖层和冰粒层层堆积起来直到如此之大的厚度以致较上层 的重量压缩较下层。

在时间和压力的作用下，许多小冰粒结合到一起变成更大的晶体，最 终较底层的晶体合并成庞大而坚固的冰块。

>38 Topaz

Topaz is a hard, transparent mineral. It is a compound of aluminum, silica, and fluorine. Gem topaz is valuable. Jewelers call this variety of the stone "precious topaz". The best-known precious topaz gems range in color from rich yellow to light brown or pinkish red. Topaz is one of the hardest gem minerals. In the mineral table of hardness, it has a rating of 8, which means that a knife cannot cut it, and that topaz will scratch quartz.

The golden variety of precious topaz is quite uncommon. Most of the world's topaz is white or blue. The white and blue crystals of topaz are large, often weighing thousands of carats. For this reason, the value of topaz does not depend so much on its size as it does with diamonds and many other precious stones, where the value increases about four times with each doubling of weight. The value of a topaz is largely determined by its quality. But color is also important: blue topaz, for instance, is often irradiated to deepen and improve its color.

Blue topaz is often sold as aquamarine and a variety of brown quartz is widely sold as topaz. The quartz is much less brilliant and more plentiful than true topaz. Most of it is a variety of amethyst: that heat has turned brown.

黄水晶

黄水晶是一种坚硬、透明的矿物质。 它是铝、硅和氟的化合物。 黄水晶宝石价值不菲。 珠宝商把这种石头称为"黄玉"。

最出名的黄玉有各种颜色如深黄色、淡棕色、浅红色等。 黄 水晶是最坚硬的宝石矿中的一种。 在矿石硬度表上，它的硬度为 8，这表明刀子不能割开它而它可在石英上划痕。 金黄色的黄玉品种非常罕见。 世界上大多数的黄水晶是白色或蓝色的。 这些白色或蓝色的黄水晶晶体很大，常常有数千克拉重。

由于这个原因，黄水晶的 价值不像钻石和许多其它宝石那样主要依赖于其大小，重量翻一番价值即上升约四倍。 黄水晶的价值很大程度上取决于其品质，但颜色也很重要。举例来说，蓝色的黄水晶常需放 射处理以加深和改善其颜色。

蓝色的黄水晶常被作为海蓝宝石出售，许多种棕色石英被当 作黄水晶广为贩卖。 石英光亮度远小于黄水晶，矿藏储量也远较黄水晶丰富。 大多数石英是一种紫水晶，高温使其变为棕色。

>39 The Salinity of Ocean Waters

If the salinity of ocean waters is analyzed, it is found to vary only slightly from place to place. Nevertheless, some of these small changes are important. There are three basic processes that cause a change in oceanic salinity.

One of these is the subtraction of water from the ocean by means of evaporation - conversion of liquid water to water vapor. In this manner the salinity is increased, since the salts stay behind. If this is carried to the extreme, of course, white crystals of salt would be left behind.

The opposite of evaporation is precipitation, such as rain, by which water is added to the ocean. Here the ocean is being diluted so that the

salinity is decreased. This may occur in areas of high rainfall or in coastal regions where rivers flow into the ocean. Thus salinity may be increased by the subtraction of water by evaporation, or decreased by the addition of fresh water by precipitation or runoff.

Normally, in tropical regions where the sun is very strong, the ocean salinity is somewhat higher than it is in other parts of the world where there is not as much evaporation. Similarly, in coastal regions where rivers dilute the sea, salinity is somewhat lower than in other oceanic areas.

A third process by which salinity may be altered is associated with the formation and melting of sea ice. When sea water is frozen, the dissolved materials are left behind. In this manner, sea water directly beneath freshly formed sea ice has a higher salinity than it did before the ice appeared. Of course, when this ice melts, it will tend to decrease the salinity of the surrounding water. In the Weddell Sea Antarctica, the densest water in the oceans is formed as a result of this freezing process, which increases the salinity of cold water. This heavy water sinks and is found in the deeper portions of the oceans of the world.

海水盐度 如果我们分析海水的盐度，会发现地区间只有轻微的变化，然而有些小的变化是重要的。

导致海洋的盐度变化的基本过程有三个，其中之一是通过蒸发的方式即把液态水转化为水蒸气来减少海洋中的水分。 这样由于盐留了下来，所以盐度增大。

当然，如果这种方式走向 极端，将会余下白色的盐晶体。 与蒸发相反的是降水，如降雨，由此水被加入海中，海水 被稀释，从而盐度降低。

这种情形会发生在大量降雨的地区，或江河入海岸处。 因此，盐 度通过蒸发减少水分而上升或通过降水或径流增加淡水成分而下降。 一般来说，在阳光很

强烈的热带地区，海水的盐度略高于世界上其它没有热带那样多的蒸发的地区。同理，在 江河稀释海水的海岸地带，海水盐度略低于其它海区。

第三个可以变更盐度的过程与海洋 中冰的形成和融化有关。 海水冻结时，溶于其中的物质被留了下来。 这样，在新形成的海

水冰面的正下方的海水比在冰形成之前有更高的盐度。当然，当冰融化的时候，会降低周 围水中的盐度。

在南极洲边缘的威德尔海中，结冰过程增加低温海水的盐度，从而形成了 浓度最大的海水。这些大密度的海水下沉，可以在世界海洋的深水域发现。

>40 Cohesion-tension Theory

Atmospheric pressure can support a column of water up to 10 meters high. But plants can move water much higher; the sequoia tree can pump water to its very top more than 100 meters above the ground. Until the end of the nineteenth century, the movement of water in trees and other tall plants was a mystery. Some botanists hypothesized that the living cells of plants acted as pumps. But many experiments demonstrated that the stems of plants in which all the cells are killed can still move water to appreciable

heights. Other explanations for the movement of water in plants have been based on root pressure, a push on the water from the roots at the bottom of the plant. But root pressure is not nearly great enough to push water to the tops of tall trees. Furthermore, the conifers, which are among the tallest trees, have unusually low root pressures.

If water is not pumped to the top of a tall tree, and if it is not pushed to the top of a tall tree, then we may ask: how does it get there? According to the currently accepted cohesion-tension theory, water is pulled there. The pull on a rising column of water in a plant results from the evaporation of water at the top of the plant. As water is lost from the surface of the leaves, a negative pressure, or tension, is created. The evaporated water is replaced by water moving from inside the plant in unbroken columns that extend from the top of a plant to its roots. The same forces that create surface tension in any sample of water are responsible for the maintenance of these unbroken columns of water. When water is confined in tubes of very small bore, the forces of cohesion (the attraction between water molecules) are so great that the strength of a column of water compares with the strength of a steel wire of the same diameter. This cohesive strength permits columns of water to be pulled to great heights without being broken.

内聚压力理论

大气压能够支持 10 米高的水柱，但植物可将水送得更高。 美洲红杉就能把水泵到地面 以上 100 多米高的树顶。 直到 19

世纪末，水在树木和其它高大植物中的输送还是一个谜。 一些植物学家假定植物中的活细胞充当了水泵的角色。 但许多实验表明细胞都已死亡的植

物茎干仍能将水输送到相当可观的高度。 对于植物中输送水的其它解释都基于根压--植物底端的根对水的推动。 但根压完全不足以将水推到树顶。

况且，最高树木中的松柏只有很 低的根压。 如果水不是被泵到高树的树顶，也不是被推到树顶，那么我们会问：它是怎样

到达树顶的呢?根据目前为人们所接受的内聚压力的理论，水是被拉到上面去的。 一株植物中作用于一个正在升高的水柱之上的拉力来自该植物顶部水的蒸发。

由于水从叶子表面丧 失，一个负压力，或张力就得以产生。 蒸发出去的水被植物里流动的水代替。 这些水形成

水柱从植物顶端一直延伸到根部。在任何水样中造成表面张力的力支持着这些不断的水柱。当水被限制在内径很小的管道中时，内聚压力(水分子之间的相互吸引力)是如此之大以致一支水柱的强度相当于一根直径相同的钢丝的强度。

这种内聚压力使得水柱被拉到非常高的 地方而不会断裂。

>41 American Black Bears

American black bears appear in a variety of colors despite their name. In the eastern part of their range, most of these bears have shiny black fur, but in the west they grow brown, red, or even yellow coats. To the north, the black bear is actually gray or white in color. Even in the same litter, both brown and black furred bears may be born.

Black bears are the smallest of all American bears, ranging in length from

five to six feet, weighing from three hundred to five hundred pounds. Their eyes and ears are small and their eyesight and hearing are not as good as their sense of smell.

Like all bears, the black bear is timid, clumsy, and rarely dangerous, but if attacked, most can climb trees and cover ground at great speeds. When angry or frightened, it is a formidable enemy.

Black bears feed on leaves, herbs, roots, fruit, berries, insects, fish, and even larger animals. One of the most interesting characteristics of bears, including the black bear, is their winter sleep. Unlike squirrels, woodchucks, and many other woodland animals, bears do not actually

hibernate. Although the bear does not eat during the winter months, sustaining itself from body fat, its temperature remains almost normal, and it breathes regularly four or five times per minute.

Most black bears live alone, except during mating season. They prefer to live in caves, hollow logs, or dense thickets. A litter of one to four cubs is born in January or February after a gestation period of six to nine months, and they remain with their mother until they are fully grown or about one and a half years old. Black bears can live as long as thirty years in the wild, and even longer in game preserves set aside for them.

美国黑熊

美国黑熊虽然被叫做黑熊但却有各种各样的颜色。 在它们生活区域的东部，大部分黑 熊长有富有光泽的黑毛，但在西部，他们则长着棕色、红色甚至是黄色的毛。

在北部，黑 熊其实长着灰色或白色的毛。 就是在一胎所生的小熊中，都可能混杂棕毛和黑毛。 黑熊是 所有美洲熊中最小的，5～6 英尺长，300～500

磅重。 它们的眼睛和耳朵都很小，他们的视 力和听觉不如嗅觉那样好。 像所有的熊一样，黑熊胆小，笨拙，很少具有危险性。 但如果

受到攻击，大部分黑熊会以很快的速度爬上树和奔跑。当发怒或受惊吓时，黑熊会成为可 怕的对手。

黑熊以树叶、草、树根、水果、浆果、昆虫、鱼，甚至更大的动物为食。 熊类， 包括黑熊的最有趣的一个特点是他们的冬眠。

与松鼠、旱獭和其它别的林地动物不同，熊 并不真正地冬眠。 虽然熊在冬天的几个月中不吃东西，靠体内脂肪维持生命，但它们的体

温保持正常，并有规律地一分钟呼吸 4 或 5 次。除交配季节外，大多数黑熊独自生活。 他们喜欢住在洞里、空心的大木头里或茂密的树丛里。 经过 6

到 9 个月的怀孕期后一胎 1～4 个小熊在 1 月或 2 月出生。 它们同母熊住在一起，直到它们完全长大，即 1 岁半左右。 黑

熊在野外可以活到长达 30 年，在专门的保护区中甚至能活得更长。

>42 Coal-fired Power Plants

The invention of the incandescent light bulb by Thomas A. Edison in 1879 created a demand for a cheap, readily available fuel with which to generate large amounts of electric power. Coal seemed to fit the bill, and it fueled the earliest power stations (which were set up at the end of the nineteenth century by Edison himself). As more power plants were constructed

throughout the country, the reliance on coal increased. Since the First World War, coal-fired power plants have accounted for about half of the electricity produced in the United States each year. In 1986 such plants had a combined generating capacity of 289, 000 megawatts and consumed 83 percent of the nearly 900 million tons of coal mined in the country that year. Given the uncertainty in the future growth of nuclear power and in the supply of oil and natural gas, coal-fired power plants could well provide up to 70 percent of the electric power in the United States by the end of the century.

Yet, in spite of the fact that coal has long been a source of electricity and may remain one for many years (coal represents about 80 percent of United States fossil-fuel reserves), it has actually never been the most desirable fossil fuel for power plants. Coal contains less energy per unit of weight than natural gas or oil; it is difficult to transport, and it is associated with a host of environmental issues, among them acid rain. Since the late 1960's problems of emission control and waste disposal have sharply reduced the appeal of coal-fired power plants. The cost of ameliorating these environmental problems along with the rising cost of building a facility as large and complex as a coal-fired power plant, have also made such plants less attractive from a purely economic perspective.

Changes in the technological base of coal-fired power plants could restore their attractiveness, however. Whereas some of these changes are evolutionary and are intended mainly to increase the productivity of existing plants, completely new technologies for burning coal cleanly are also being developed.

火力发电厂托马斯?爱迪生 1879 年发明的白炽灯导致对便宜、易得、可生产大量电能 的燃料的需求。

煤似乎符合这个要求，并成为第一批电厂的燃料(正是爱迪生本人在 19 世 纪末建造了第一批电厂)。 全国到处兴建电厂时，对煤的依赖加深了。

自第一次世界大战 以来，美国每年约有一半的电力是以煤为燃料的电厂提供的。 1986 年这些电厂的总发电能 力达到 28，900

千瓦并且消耗了当年全国开采的九亿吨煤的 83%。 考虑到核能发展以及石 油、天然气供应中的不确定因素，到本世纪末，火力发电厂仍可能为美国提供多达

70%的 电力。 然而，尽管煤长期以来一直是电力的原料之一并且可能会继续如此(煤占美国化石燃 料储量的 80%)，它却不是电厂的理想燃料。

煤的单位能量含量低于石油和天然气，而且会 导致包括酸雨在内的一系列环境问题。 从 1960 年以来，排放控制和垃圾处理的问题极大地

削弱了燃煤电厂的魅力。 由于减轻这些环境问题需要大量资金，而且建造庞大复杂的燃煤电厂的费用不断上涨，也使得这些电厂从经济角度上不具备吸引力。

改变火力发电厂的基 础技术却可能恢复它们的吸引力。 虽然某些技术改进是渐进的，其目的只是提高现有电厂 的生产率，但人们正在开发全新的清洁燃煤的技术。

>43 Statistics

There were two widely divergent influences on the early development of

statistical methods. Statistics had a mother who was dedicated to keeping orderly records of governmental units (state and statistics come from the same Latin root status) and a gentlemanly gambling father who relied on mathematics to increase his skill at playing the odds in games of chance. The influence of the mother on the offspring, statistics, is represented by counting, measuring, describing, tabulating, ordering, and the taking of censuses -- all of which led to modern descriptive statistics. From the influence of the father came modern inferential statistics, which is based squarely on theories of probability.
Descriptive statistics involves tabulating, depicting and describing collections of data. These data may be quantitative such as measures of height, intelligence or grade level -- variables that are characterized by an underlying continuum -- or the data may represent qualitative variables, such as sex, college major or personality type. Large masses of data must generally undergo a process of summarization or reduction before they are comprehensible. Descriptive statistics is a tool for describing or summarizing or reducing to comprehensible form the properties of an otherwise unwieldy mass of data.
Inferential statistics is a formalized body of methods for solving another class of problems that present great difficulties for the unaided human mind. This general class of problems characteristically involve attempts to make predictions using a sample of observations. For example, a school superintendent wishes to determine the proportion of children in a large school system who come to school without breakfast, have been vaccinated for flu, or whatever. Having a little knowledge of statistics, the superintendent would know that it is unnecessary and inefficient to question each child: the proportion for the entire district could be estimated fairly
accurately from a sample of as few as 100 children. Thus, the purpose of inferential statistics is to predict or estimate characteristics of a population from a knowledge of the characteristics of only a sample of the population.
统计学
统计方法的早期发展受到两种截然不同的影响。 统计学有一个"母亲"，她致力于井井有条地记录政府机构的文件(国家和统计学这两个词源于同一个拉丁语词根，status)，还有一个有绅士般的赌博"父亲"，他依靠数学来提高赌技，以便在几率的游戏中取胜。 "母亲"对其子女统计学的影响表现在计数、测量、描述、制表、归类和人口普查。 所有这些导致了 现代描述统计学的诞生。
由于"父亲"的影响则产生了完全基于概率论原理的现代推理统计 学。 描述统计学涉及对所收集数据的制表、制图和描述。 这些数据可以是数量性的数据，
如高度、智商、或者是层级性的数据--具有连续性的变量--或数据也可以代表性质变量，如 性别、大学专业或性格类型等等。
数量庞大的数据通常必须经过概括或删减的程序才能为 人所理解。描述统计学就是这样一个工具，它对极其庞杂的数据进行描述、概括或删减，

使其变成能为人理解的东西。 推理统计学是一套已定形了的方法体系，它解决的是光凭人脑极难解决的另一类问题。
这类问题的显著特点是试图通过取样调查来作出预测。 例如， 有一位教育督察想知道在一个庞大的学校系统中，不吃早饭就上学的学生、已经做过防感冒
免疫的学生，或其它任何类型的学生占多大比例。若具备一些统计学的知识，这位督察应 明白，询问每个孩子是没有必要而且没有效率的，只要用 100
个孩子为样本，他就可以相当 精确地得出这些孩子占整个学区的比例了。 因此，推理统计学的目的就是通过了解一个群
体中一些样本的特性，从而对整个群体的特性进行推测和估算。

>44 Obtaining Fresh Water from Icebergs

The concept of obtaining fresh water from icebergs that are towed to populated areas and arid regions of the world was once treated as a joke more appropriate to cartoons than real life. But now it is being considered quite seriously by many nations, especially since scientists have warned that the human race will outgrow its fresh water supply faster than it runs out of food.

Glaciers are a possible source of fresh water that has been overlooked until recently. Three-quarters of the Earth's fresh water supply is still tied up in glacial ice, a reservoir of untapped fresh water so immense that it could sustain all the rivers of the world for 1,000 years. Floating on the oceans every year are 7,659 trillion metric tons of ice encased in 10,000 icebergs that break away from the polar ice caps, more than ninety percent of them from Antarctica.

Huge glaciers that stretch over the shallow continental shelf give birth to icebergs throughout the year. Icebergs are not like sea ice, which is formed when the sea itself freezes, rather, they are formed entirely on land, breaking off when glaciers spread over the sea. As they drift away from the polar region, icebergs sometimes move mysteriously in a direction opposite to the wind, pulled by subsurface currents. Because they melt more slowly than smaller pieces of ice, icebergs have been known to drift as far north as 35 degrees south of the equator in the Atlantic Ocean. To corral them and steer them to parts of the world where they are needed would not be too difficult.

The difficulty arises in other technical matters, such as the prevention of rapid melting in warmer climates and the funneling of fresh water to shore in great volume. But even if the icebergs lost half of their volume in towing, the water they could provide would be far cheaper than that produced by desalinization, or removing salt from water.

从冰山中获取淡水 把冰山拖到世界上人口稠密的地区和干旱地带，再从中获取淡水，这个想法曾一度被认
为是一个笑话，更适合于卡通画，而非现实生活。 然而现在，许多国家正相当认真地考虑 这件事情，特别是在科学家们发出警告之后。
科学家们认为人类将在耗尽粮食之前首先耗 尽淡水资源。冰川是一个直到最近以前一直被忽视的可能的淡水源。 全球四分之三的淡水 还锁在冰川的冰块中。

冰川就是一个蓄水池，其中未开发的淡水量是如此巨大，足够支持 全世界的江河 1000 年。每年有 7，659 万亿公吨冰漂流在海洋中。
它们包含在 10，000 座从极地冰帽中断裂出来的冰山中。 这些冰山的 90%以上来自南极。一年四季里，覆盖
在浅层大陆架上的巨大冰川生成了众多冰山。 冰山和海水的冰不同，后者是海水自身结冰形成的，而冰山则完全是在陆地上形成的。
当冰川伸展到海水中时，冰山就断裂下来。 当 漂离极地地区时，冰山有时会在底层洋流的推动下颇为神秘地逆风移动。 由于冰山比小块
的冰融化要慢，因此有的冰山在大西洋中向北飘到了赤道以南 35°的地方。 把冰山蓄拦起来并拖到世界上需要它们的地方将不会太困难。
有困难的是其它的技术事宜。 比如，如何 防止冰山在较暖的气候中迅速融化以及如何把大量的淡水收集到岸上去。 但是，即便在拖
的过程中冰山失去了一半体积，这样做也远比从海水中脱盐取得淡水便宜。
>45 The Source of Energy
A summary of the physical and chemical nature of life must begin, not on the Earth, but in the Sun; in fact, at the Sun's very center. It is here that is to be found the source of the energy that the Sun constantly pours out into space as light and heat. This energy is liberated at the center of the Sun as billions upon billions of nuclei of hydrogen atoms collide with each other and fuse together to form nuclei of helium, and in doing so, release some of the energy that is stored in the nuclei of atoms. The output of light and heat of the Sun requires that some 600 million tons of hydrogen be converted into helium in the Sun every second. This the Sun has been doing for several thousands of millions of years. The nuclear energy is released at the Sun's center as high-energy gamma radiation, a form of electromagnetic radiation like light and radio waves, only of very much shorter wavelength. This gamma radiation is absorbed by atoms inside the Sun to be reemitted at slightly longer wavelengths. This radiation, in its turn is absorbed and reemitted. As the energy filters through the layers of the solar interior, it passes through the X-ray part of the spectrum eventually becoming light. At this stage, it has reached what we call the solar surface, and can escape into space without being absorbed further by solar atoms. A very small fraction of the Sun's light and heat is emitted in such directions that after passing unhindered through interplanetary space, it hits the Earth.
能量的来源
概说生命的物理和化学特性必须始于太阳--确切地说，是太阳的核心，而非地球。 能 量来自太阳的核心。
在这里，太阳不停地以光和热的形式向空间倾泻出能量。 数十亿计的 氢原子核在太阳的核心碰撞并且聚变生成氦。 在此过程中一部分原本储存于原子核中的能
量被释放出来。 太阳所产生的光和热需要每秒将六亿吨氢转化为氦。 这样的转化在太阳中已经持续几十亿年了。 核能在太阳的核心被释放为高能的伽马射线。 这是一种电磁射线，就象光波和无线电波一样，只是波长要短得多。
这种伽玛射线被太阳内的原子所吸收，然 后重新释放为波长稍长一些的光波。 这新的射线

再次被吸收，而后释放。 在能量由太阳内
部一层层渗透出来的过程中，它经过了光谱中 X 射线部分，最后变成了光。 在此阶段，能
量到达我们所称的太阳表层，并且离散到空间而不再被太阳原子所吸收。 只有很小一部分太阳的光和热由此方向释放出来，并且未被阻挡，穿越星空，来到地球。

>46 Vision

Human vision like that of other primates has evolved in an arboreal environment. In the dense complex world of a tropical forest, it is more important to see well than to develop an acute sense of smell. In the course of evolution members of the primate line have acquired large eyes while the snout has shrunk to give the eye an unimpeded view. Of mammals only humans and some primates enjoy color vision. The red flag is black to the bull. Horses live in a monochrome world. Light visible to human eyes however occupies only a very narrow band in the whole electromagnetic spectrum. Ultraviolet rays are invisible to humans though ants and honeybees are sensitive to them. Humans have no direct perception of infrared rays unlike the rattlesnake which has receptors tuned into wavelengths longer than 0.7 micron. The world would look eerily different if human eyes were sensitive to infrared radiation. Then instead of the darkness of night, we would be able to move easily in a strange shadowless world where objects glowed with varying degrees of intensity. But human eyes excel in other ways. They are in fact remarkably discerning in color gradation. The color sensitivity of normal human vision is rarely surpassed even by sophisticated technical devices.

视觉

人类的视觉，和其它灵长目动物的一样，是在丛林环境中进化出来的。 在稠密、复杂 的热带丛林里，好的视觉比灵敏的嗅觉更加重要。

在进化过程中，灵长目动物的眼睛变大， 同时鼻子变小以使视野不受阻碍。 在哺乳类动物中，只有人和一些灵长目动物能够分辨颜 色。

红旗在公牛看来是黑色的，马则生活在一个单色的世界里。 然而，人眼可见的光在整个光谱中只占一个非常狭窄的频段。人是看不到紫外线的，尽管蚂蚁和蜜蜂可以感觉到。与响尾蛇不同，人也不能直接感受到红外线。

响尾蛇的感觉器可以感受波长超过 0.7 微米的 光线。 如果人能感受到红外线的话，这世界看上去将十分不同，而且恐怖。 到那时，将与
夜的黑暗相反，我们能轻易地在一个奇异的没有阴影的世界里走动。 任何物体都强弱不等地闪着光。 然而，人眼在其它方面有优越之处。

事实上，人眼对颜色梯度具有非凡的分辨 能力。 普通人类的视觉感受色彩的灵敏程度，甚至连精密的技术装备都很难超越。

>47 Folk Cultures

A folk culture is a small isolated, cohesive, conservative, nearly self-sufficient group that is homogeneous in custom and race with a strong

family or clan structure and highly developed rituals. Order is maintained through sanctions based in the religion or family and interpersonal relationships are strong. Tradition is paramount, and change comes infrequently and slowly. There is relatively little division of labor into specialized duties. Rather, each person is expected to perform a great variety of tasks, though duties may differ between the sexes. Most goods are handmade and subsistence economy prevails. Individualism is weakly developed in folk cultures as are social classes. Unaltered folk cultures no longer exist in industrialized countries such as the United States and Canada. Perhaps the nearest modern equivalent in Anglo America is the Amish, a German American farming sect that largely renounces the products and labor saving devices of the industrial age. In Amish areas, horse drawn buggies still serve as a local transportation device and the faithful are not permitted to own automobiles. The Amish's central religious concept of Demut "humility", clearly reflects the weakness of individualism and social class so typical of folk cultures and there is a corresponding strength of Amish group identity. Rarely do the Amish marry outside their sect. The religion, a variety of the Mennonite faith, provides the principal mechanism for maintaining orders.
By contrast a popular culture is a large heterogeneous group often highly individualistic and constantly changing. Relationships tend to be impersonal and a pronounced division of labor exists, leading to the establishment of many specialized professions. Secular institutions of control such as the police and army take the place of religion and family in maintaining order, and a money-based economy prevails. Because of these contrasts, "popular" may be viewed as clearly different from "folk". The popular is replacing the folk in industrialized countries and in many developing nations. Folk-made objects give way to their popular equivalent, usually because the popular item is more quickly or cheaply produced, is easier or time saving to use or leads more prestige to the owner.
民间文化民间文化是小型的、孤立的、紧密的、保守的、近乎自给自足的群体，具有同 样的习俗、同样的人种和强有力的家庭或部族结构以及高度发展的宗教仪式。
秩序由宗教 或家庭的约束来维持，成员间的关系非常紧密，传统至高无上，很少有变动且变动缓慢。 劳 动专业分工相对较少。
每个人都要做各类活计，尽管男女两性分工不同。 绝大多数物品是 手工制造的，经济一般为自给自足型。 个人主义和社会阶层在民间文化群体中的发展十分
薄弱。在象美国和加拿大这样的工业化国家里，一成不变的民间文化群体已不复存在了。在当代美洲的英语区，与民间文化最相似的群体也许算是 Amish。
Amish 是美国的德裔农耕 部落，他们基本上拒绝接受工业时代的大多数产品和节省劳力的设施。 在 Amish 地区，轻
便马车仍是当地的交通工具，信徒们不允许拥有汽车。Amish 宗教中的核心观念 Demut 即谦卑典型地反映了在民间文化群中个人主义和阶级的不发达。
而与此同时，Amish 对群体 的认同性却十分强。 Amish 人很少和他们宗派以外的人通婚。其宗教，作为 Mennonite 信

仰的一种，提供了维护秩序的主要机制。 相反，大众文化是包含不同种族的大群体，通常 高度个性化而且不断在变化。
人际关系冷漠，劳动分工明确，由此产生了许多专门的职业。 世俗的控制机构，比如警察和军队，取代了宗教和家庭来维持秩序，而且实行的是货币经济。
由于存在着这些差异，"大众的"与"民间的"可谓大相径庭。 在工业化国家以及许多发展中国家里，大众文化正在取代民间文化。
民间制造的物品正让位于大众化产品，这通常是因 为大众化的物品制造起来更快、更便宜，用起来更容易、更方便或者是能给其所有者带来更 多的威望。
>48 Bacteria
Bacteria are extremely small living things. While we measure our own sizes in inches or centimeters, bacterial size is measured in microns. One micron is a thousandth of a millimeter: a pinhead is about a millimeter across. Rod-shaped bacteria are usually from two to four microns long, while rounded ones are generally one micron in diameter. Thus if you enlarged a rounded bacterium a thousand times, it would be just about the size of a pinhead. An adult human magnified by the same amount would be over a mile (1.6 kilometers) tall.
Even with an ordinary microscope, you must look closely to see bacteria. Using a magnification of 100 times, one finds that bacteria are barely visible as tiny rods or dots. One cannot make out anything of their structure. Using special stains, one can see that some bacteria have attached to them wavy-looking "hairs" called flagella. Others have only one flagellum. The flagella rotate, pushing the bacteria through the water.
Many bacteria lack flagella and cannot move about by their own power, while others can glide along over surfaces by some little-understood mechanism.
From the bacterial point of view, the world is a very different place from what it is to humans. To a bacterium water is as thick as molasses is to us. Bacteria are so small that they are influenced by the movements of the chemical molecules around them. Bacteria under the microscope, even those with no flagella, often bounce about in the water. This is because they collide with the water molecules and are pushed this way and that. Molecules move so rapidly that within a tenth of a second the molecules around a bacterium have all been replaced by new ones; even bacteria without flagella are thus constantly exposed to a changing environment.
细菌细菌是极其微小的生物体。 我们用英寸或厘米来测量自己的大小，而测量细菌却 要用微米。 一微米等于千分之一毫米。 针头直径大约一毫米。
棒状细菌通常有 2～4 微米 长，而圆形细菌的直径一般只有 1 微米。 因此，即使你把一个圆形细菌放大 1000 倍，它也 不过一个针头那么大。
可是如果把一个成年人放大 1000 倍，就会变成 1 英里(或 1.6 公里) 多高。 用一般的显微镜观察细菌时，你必须仔细观察才能看见它们。 使用
100 倍的显微镜 时，你会发现细菌不过是隐约可见的小细棒或小点点，而它们的结构你却根本看不出来。 使

用特殊的着色剂后，你会发现有的细菌上长着不少波状的"毛发"即鞭毛，而有的细菌只有一根鞭毛。 鞭毛的旋转可以推动细菌在水中行进。
不少细菌没有鞭毛，因而不能自己行进。 还有些细菌却能通过某些鲜为人知的机制沿物体表面滑动。 我们所熟知的世界在细菌眼中 完全是另一个样子。
对于细菌来说，水就同糖浆之于人类一样稠密。 细菌是如此的微小， 周围化学分子的一举一动都会对它们产生影响。 在显微镜下，细菌，甚至包括那些没有鞭
毛的细菌，经常在水中跳来跳去。 这是因为它们与水分子相撞后，被弹向各个方向。 分子移动很迅速，仅 0.1
秒之隔，一个细菌周围的分子就会完全更新。 因此，即使是没有鞭毛 的细菌也暴露在一个不断变化的环境中。
>49 Sleep
Sleep is part of a person's daily activity cycle. There are several
different stages of sleep, and they too occur in cycles. If you are an
average sleeper, your sleep cycle is as follows. When you
first drift off into slumber, your eyes will roll about a bit, your
temperature will drop slightly, your muscles will relax, and your
breathing well slow and become quite regular. Your brain waves slow down a
bit too, with the alpha rhythm of rather fast waves predominating for the
first few minutes. This is called stage 1 sleep. For the next half hour or
so, as you relax more and more, you will drift down through stage 2 and
stage 3 sleep. The lower your stage of sleep, the slower your brain waves
will be. Then about 40 to 60 minutes after you lose consciousness you will
have reached the deepest sleep of all. Your brain waves will show the large
slow waves that are known as the delta rhythm. This is stage 4 sleep.
You do not remain at this deep fourth stage all night long, but instead
about 80 minutes after you fall into slumber, your brain activity level
will increase again slightly. The delta rhythm will disappear, to be
replaced by the activity pattern of brain waves. Your eyes will begin to
dart around under your closed eyelids as if you were looking at something
occurring in front of you. This period of rapid eye movement lasts for some
8 to 15 minutes and is called REM sleep. It is during REM sleep period,
your body will soon relax again, your breathing will grow slow and regular
once more, and you will slip gently back from stage 1 to stage 4 sleep -
only to rise once again to the surface of near consciousness some 80
minutes later.
睡眠
睡眠是人每天日常活动循环的一部分。人的睡眠分几个阶段，而这些阶段也是循环发 生的。如果你是一个正常的睡眠者，你的睡眠循环会这样进行。
在你开始昏昏入睡时，你 的眼睛会滚动几下，体温略有下降，肌肉放松，呼吸变得缓慢而有节奏。 除了开始几分钟 比较快的α节奏外，脑电波也稍有减缓。
这被称为第一阶段睡眠。 在随后约半小时内，你 进一步放松，进入第二和第三阶段睡眠。睡眠越深入，脑电波就越缓慢。 大约在开始睡眠 后的 40 到
60 分钟，你将进入沉睡状态。 这时的脑电波表现为巨大的缓波，被称为δ节奏。 这就是第四阶段睡眠。 但你并不是整夜都保持这种沉睡状态。 入睡后约

80 分钟左右，你 的大脑运动水平会再度略有提高。 δ 节奏消失，并被脑电波的运动图形取代。 你的眼睛会
在闭着的眼睑下迅速转动，就好象你在看着眼前发生的什么事情。 这种迅速的眼球运动持续约 8～15 分钟，这一阶段睡眠被称之为快速眼动(REM)睡眠。
在 REM 睡眠阶段，你的肢 体会很快再度放松，呼吸也再次放慢并变得有节奏，你会轻松地从第一阶段滑入第四阶段睡 眠-直到大约 80
分钟后重新接近清醒状态。
>50 Cells and Temperature
Cells cannot remain alive outside certain limits of temperature, and much narrower limits mark the boundaries of effective functioning. Enzyme systems of mammals and birds are most efficient only within a narrow range around 37 ℃; a departure of a few degrees from this value seriously impairs their functioning. Even though cells can survive wider fluctuations, the integrated actions of bodily systems are impaired.
Other animals have a wider tolerance for changes of bodily temperature. For centuries it has been recognized that mammals and birds differ from other animals in the way they regulate body temperature. Ways of characterizing the difference have become more accurate and meaningful over time, but popular terminology still reflects the old division into "warm blooded" and "cold blooded" species; warm-blooded included mammals and birds whereas all other creatures were considered cold-blooded. As more species were studied, it became evident that this classification was inadequate. A fence lizard or a
desert iguana -- each cold-blooded -- usually has a body temperature only a degree or two below that of humans and so is not cold. Therefore the next distinction was made between animals that maintain a constant body temperature, called homeotherms, and those whose body temperature varies with their environment, called poikilotherms. But this classification also proved inadequate, because among mammals there are many that vary their body temperatures during hibernation. Furthermore, many invertebrates that live in the depths of the ocean never experience a change in the chill of the deep water, and their body temperatures remain constant.
细胞与温度 细胞只能在一定的温度范围内存活，而进一步保证它们有效工作的温度范围就更小了。
哺乳动物和鸟类的酶系统只能在 37℃左右的很小范围内才能有效工作。与此相差仅几度的温度都会大大削弱它们的工作效率。
尽管温度变化更大时细胞仍能存活，但机体系统的整 体运行能力却被削弱了。 其它动物对体温的变化有更强的适应性。 几个世纪以来，人们就
认识到哺乳动物和鸟类调节体温的方式与其它动物不同。 随着时间的推移，人们对这种差异的描述越来越精确和有意义，但是"暖血动物"和"冷血动物"这一古老的分类方式至今仍在大众词汇中有所反映。
暖血动物包括哺乳动物和鸟类，其它动物统统被视为冷血动物。 但 是对更多物种进行的研究表明这种分类显然是不适当的。 美洲一种小型蜥蜴和沙漠鬣蜥同
属冷血动物，但实际上它们的体温通常只比人类的体温低 1～2 度，因此并不是真正的冷血。

因此又出现了恒温动物(即保持恒定体温的动物)和变温动物(即体温随外界环境的变化而改变的动物)这一区分方式。 但这种分类也不恰当。
因为有不少哺乳动物在冬眠期间会改变 体温，而许多生活在深海的无脊椎动物在寒冷的深海水域中体温并不变化，而是恒定的。