I was there and the gatekeeper stopped me as I walked through the gate and said, "Passport, passport" M16 rifle pointed at me

I looked at him and said, "It's a passport, hmm.

I don't need to show you my passport, it's in my backpack

I'm Dr. Francis, I'm an Ambassador to the United Nations, and I'm walking around the world."

and i walked away

What made me say that?

the road turned into a jungle

i wasn't shot

And I said - I'm free at last Thank God Almighty, I'm free at last

I asked myself what was that

It took me a hundred miles to understand in myself I was a prisoner

I was a prisoner and had to escape

The prison I was in was the fact that I didn't drive, I didn't drive.

How did that happen?

When I started doing it, not using a car seemed like a good fit.

But the difference was that every birthday I asked myself about my silence, I didn't ask myself about my decision to use only my legs.

I never thought I would become an ambassador to the United Nations

I never thought I would get a Ph.D.

I realized that my responsibilities were broader than my personal concerns and that I had to change.

it is possible

i had to change

But I was afraid to change, because I was used to being just a walker.

I was so used to being that person that I didn't want to stop.

I didn't know what kind of person I would be if I changed.

But I knew I had to

I knew I had to change, because that was the only way I could be here today.

So many times it happens to us that we've finally arrived at a great place, but we have to go somewhere else.

You have to leave the comfort zone you've already reached behind and go where you want to be.

I want to help you get to that next place To get out of the cage you might be in It might feel good Because we have to do something now

we have to change now

A former vice president said we have to be activists.

If my words resonate with you If my actions and my being here resonate with you, please don't stop

Come here, all of you move my heart

So let's go out into the world, take the compassion, the love, the respect that we showed at TED. Take them out into the world.

We are the environment, and how we treat each other is how we treat the environment.

That's why I want to say thank you for coming.I want to finish my talk with five seconds of silence.

thank you

(applause)

This man's name is Bob McKim.

He was one of the researchers in creativity in the '60s and '70s, and he also headed the design program at Stanford University.

In fact, IDEO's founder, my friend David Kelley, who is somewhere in this room, also studied under McKim at Stanford.

McKim loved doing exercises with his students, like giving them a piece of paper and drawing a picture of the person sitting next to them as quickly as possible.

Or rather, from now on, I would like you to do that practice.

Everyone has a piece of cardboard and a piece of paper

with many circles

Flip it over and the back side is pure white, so let's use that side

You also have a pencil

Next, pick the person sitting next to you, and when I say "Go," draw that person within 30 seconds. OK?

Are you ready? ok go

Within 30 seconds. fast, fast

Please draw a masterpiece

OK? Stop. Well then

(Laughter) Yes, there is laughter. Sounds good

There's a lot of laughter going on. A little embarrassed, right?

(Laughs) Do you get asked a few "sorry" too? No, you will definitely hear "I'm sorry"

yes yes i still hear you

And it's a phenomenon that always happens when you do this exercise with adults.

And this happened when McKim did an internship with a student.

He saw exactly the same reaction: so many "I'm sorry"

(Laughter) What he's doing with this is that we fear being judged by our peers, and we feel ashamed to share our own ideas with the peers around us.

And that fear makes us conservative in our thinking.

So we're too scared to share any wild ideas with other people.

But when you do the same exercises with children, they are not ashamed of anything.

The children have so much fun showing their masterpieces to everyone around them.

But as they grow older, they become more sensitive to other people's opinions, lose that freedom, and become shy.

Research on children's play has repeatedly shown that children who are placed in safe and trusting environments play more freely.

So, for example, if you're starting a design company, of course you want to create that kind of safe working environment.

A sense of security that it is okay to take risks

Perhaps there is also a sense of security that it is okay to play

Before founding IDEO, David said he wanted to start a company where every employee was his best friend.

it's never selfish

He knew that friendship was the shortcut to play.

And that friendship gives us confidence and makes it easier for us to take the creative risks we have to take as designers.

IDEO started with the decision to work with friends, who now have 550 friends.

Our studios, and many other creative workplaces, are designed to help people feel relaxed, surrounded by familiarity, and comfortable working with colleagues.

It's more than just decoration, creative companies often have symbols in their workplaces that remind everyone to play, creating a generous work environment.

For example, the minibus conference room in the IDEO building, or the wooden huts and decorated cubicles in the Pixar animator's office, or the Google headquarters, which is famous for its beach volleyball court and this giant dinosaur skeleton with a pink flamingo.

I have no idea what the pink flamingo means... but anyway, it's in the Google courtyard.

Google in Switzerland probably has the weirdest symbol

I think the Swiss guys are trying to show their colleagues in California that they're not boring.

Switzerland Google has a slide and a slide like a fire station

I don't know what to do with it

Every place like this has a symbol

And IDEO's symbols are things, not places.

This is something we invented or created a couple of years ago.

it's a toy it's called a finger blaster

because i forgot to bring

Can someone please take what's under the seat over there, there's something taped up there

That one. if you could pass it to me...thank you

Yes, this is a finger blaster. It's also taped under your chair.

I would like to do another little experiment.

But before I start, let me put this on

thank you. are you OK

So what I'm going to do now is... I can't see it when I'm wearing this. oh i saw

I want to see how many people in this room can fly to the stage.

To use a finger blaster, just put your finger in it, pull it back, and let go.

We advise you not to look back

How many people can fly this far?

Here you go. Feels good, feels good. thank you. thank you

Ah! I have good idea. If you do this...it feels good

(laughs) I like it

(laughs) Thank you. thank you

Not bad. No casualties so far

(Laughter) It's still flying from behind. Still flying to the stage.

I haven't fired a few yet.

There's no such thing as not knowing how to shoot

It's not that difficult. Most kids pick it up and learn how to use it within 10 seconds.

this is pretty good it feels really good

Well then. then for the time being

If I don't clean it up a bit, I'm likely to step on it and fall.

ok ok If you still have it, fire it when I say something stupid

(Laughs) I don't need glasses anymore. It's really hard to see in front of me when I'm wearing these.

Haha it was fun

(laughs) ok

(Applause) Why do we need this?

We got finger blasters and we got dinosaurs

Why do we need such symbols? because we think playfulness is important

So why is it important?

To be honest, we use it in a practical way.

We believe that playing allows us to find more creative solutions.

It makes our work better and makes us feel more comfortable at work.

When an adult is faced with a new situation, we tend to sort it out as quickly as possible when faced with a new situation.

And there's a reason for that. we want to find the answer

Life is complicated and I want to quickly understand what's going on around me

I think evolutionary biologists probably know a lot about why humans like to classify things in this way.

One of the reasons is that if you see something with stripes, it's a tiger that's about to attack and kill you.

Is it just an interesting shape shadow of a tree?

I have to judge such things immediately

It used to be

most of us don't have to do that anymore

This is aluminum foil, isn't it? things to use in the kitchen

That's what it is. of course

But that's not necessarily the case.

(Laughter) Children can see a wider range of possibilities.

When they come across something new, they certainly ask, "What is this?"

But not only that, but I also wonder, "What can I do with this?"

A more creative child will find more interesting ways to use it.

This openness is the beginning of exploratory play.

Anyone with young children? there will be some

Look. You're looking at it, right?

On Christmas morning, there are things that our children end up having more fun with than with the toy they received.

From an exploratory perspective, this behavior makes perfect sense.

Because there are more ways to play with a box than with a toy.

A toy like Tickling Elmo, despite its sophistication, can only do one thing, while there are many ways to play with the box.

This, too, is one of the games we forget and must relearn as we grow up.

Another of Bob McKim's favorite exercises is the 30 circle test.

Let's get back to work. I will start practicing again.

If you turn over the paper you sketched on earlier, you'll see 30 circles on the paper.

You should have a piece of paper like this

I'm going to give you some time now, and I want you to turn as many yen as you can into something.

For example, you can turn it into a soccer ball, or you can turn it into the sun. quantity over quality

I'm going to give you a little time, so change as many circles as you can.

Are you ready? let's start

yes put down the pencil

So who got 5 or more?

It's probably all of you. More than 10?

Raise your hand if you made 10

15 pieces? 20 pieces? All 30 people?

Whoa! Some people were able to do it. wonderful

Who's done something along the lines of a theme? For example, a smiley face

A happy face, a sad face, a sleepy face...anyone there?

who used my example? Like the sun or a soccer ball?

wonderful. quantity is important here

I'm not asking that each one is actually different.

I just wanted you to fill in as many circles as possible.

Editing is what you get to do as an adult

stop doing something

I self-censor even when I have an idea

And in many cases, our desire to be original is actually part of the editing.

In fact this may not look like much play

The ability to persevere and explore many things, even if they're not very different from each other, is what children excel at, and it's a kind of play.

Now, Bob McKim did a little famous experiment with another version of this in the 1960s.

Do you know what this is? This is a plant called peyote cactus

A hallucinogenic compound called mescaline is extracted from this plant.

If you know the 60's, you know

McKim published a paper in 1966 about experiments he and his colleagues had conducted on the effects of drugs on creativity.

He chose 27 people who were experts in different fields: engineers, physicists, mathematicians, architects, furniture designers, artists, and so on, and he brought them together one evening and asked them to come up with a problem they were working on.

McKim gave the subjects mescaline and listened to relaxing music for a short time.

So he did what is called the Purdue Creativity Test.

For example, how many other uses for paper clips can you think of? Etc

It's basically the same test as the "30 circle test" I did earlier

He did tests before and after taking the drug, looking at the difference in the speed and speed with which people came up with ideas.

After that, I told them to work on the assignments they brought.

They came up with a lot of interesting and effective ideas for their problem.

Here are just a few examples of what they came up with: designs for new commercial buildings and homes that were really well received by clients: designs for solar probe experiments, redesigns for linear electron accelerators, technical improvements to tape recorders, you know it's been a while, designing furniture production processes, and even new conceptual models for the quantum of light.

The evening was a great success

Maybe this experiment has something to do with Silicon Valley's breakthrough in innovation.

no one knows

We'll have to ask CEOs if they participated in this experiment.

But the drugs themselves didn't matter here. They just helped them get out of their normal way of thinking, and they made them forget about the adult behavior that gets in the way of idea generation.

But it is very difficult to change our habits, the habits of adults.

At IDEO, we have brainstorming rules written on the wall

For example, "Refrain from judgment" or "Ask for quantity."

may look weird

Are there any rules for creativity?

But I've found that we need rules to prevent old rules and norms from creeping into our creative process.

What we've learned is that playing by the rules leads to much better brainstorming and creative results.

Of course, many designers do this in a looser form.

Eames is a great example when it comes to experimentation.

For a long time, they experimented with plywood without a clear goal.

they've been exploring what they find interesting

Their experience with designing splints for wounded soldiers in World War II or the Korean War led them to the chair.

Through constant experimentation with materials, he developed a wide range of unique products as we know them today, and ultimately gave birth to the legendary lounge chair.

If Eames had been satisfied with his first great idea, we wouldn't have benefited from the many great designs we have today.

And they used experimentation everywhere, from buildings to movies, graphics to games.

They are real examples of exploration and experimentation in design.

Eames was exploring those possibilities, but he was also exploring the material.

Always exploring by building prototypes

And I'll talk about this act of assembling next.

The average European first grader spends 50% of their playtime building.

Building play is, of course, play, but it's also a very effective tool for learning.

Children learn a lot about towers when they build them out of building blocks

Learning happens as a sort of by-product of play, over and over again by tearing it down and rebuilding it.

It's learning by typical behavior.

Now, when a designer takes this action, David Kelly says, "I'm thinking with my hands."

They build a lot of prototypes in a short period of time, usually with low-end prototypes, and they often come up with a solution by piecing together the elements they have at hand.

In one of his early projects, the team hit a dead end, and they made a prototype out of a roll-on deodorant.

And it became Apple's Lisa and Macintosh's first commercial mouse.

They prototyped and figured out how to create this device.

Another example is a group of designers working with surgeons to develop surgical instruments.

They met with the surgeons and asked them what they needed for this instrument.

A designer walked out of the room, and taped together a whiteboard marker and a film container -- two things that might be a rare material these days -- and a pair of clothespins, and said, "So this is what it looks like?"

And the surgeon picks it up and says, "I want to do this, or something like this."

All of a sudden, productive conversations about design thrived around what was available.

And in the end, it actually became a medical device.

This action is a quick way to actually build something, and as a result, it pushes the idea forward.

IDEO's work environment has a kindergarten-back-atmosphere

The prototyping toolbox is full of colored paper, clay, glue sticks, and so on, and they kind of create a kindergarten feeling.

But the important thing is that everything is within reach

Any time a designer is working out an idea, they can start building something.

They don't necessarily have to go to a proper working room.

we think this is very important

But sadly, kindergarten is full of these tools, and as we move through the educational system, they disappear.

Children lose these tools that encourage play-style, construction-style thinking.

So by the time we get to the average workplace, Post-it notebooks will be the best tool for us to create. this is bland

When project teams and clients come together and think by hand, even the most complex ideas can sparkle and come to fruition more easily.

This nurse is making a visibly simple clay prototype and explaining to the team of engineers and designers who work with her at the hospital what she wants from a portable information system.

This simple proto allowed her to say what she wanted very convincingly.

Building prototypes quickly allows us to test our ideas with consumers and users much more effectively than we can describe them in words.

But what about when designing something immaterial?

For example, services, experiences,

What about long series of interactions?

You can tackle it by role-playing instead of playing with building

For example, if you're designing the interaction between two people ordering at a fast food restaurant, you have to imagine how that experience will feel over time.

I believe role-playing is the best way to realize this and experience the flaws that exist in the design.

At IDEO, a lot of the work we do is accepted by our clients this way.

They're a little skeptical, but we'll talk about that later.

But I think it's worth trying in environments where people are facing difficult challenges, like education, security, finance, healthcare.

This is another example in healthcare, where doctors and nurses and designers really play a role in patient service.

But many adults are very reluctant to role-play.

Partly because of embarrassment, partly because I don't believe the facts that emerge through this are valid.

Denying interesting interactions by saying it just happened because it was a roleplay

Studies of children's behavior show that it's important to take role-playing seriously.

When children act out roles, they adhere to the social scripts they learn from adults.

If one person is "playing the store" and the other is "playing house", the game will fail.

They quickly grasp the rules of social interaction and are quick to point out when they break down.

When we adults role-play, we already have a huge script we're absorbing.

We go through many things in our lives, and those experiences give us an intuitive sense of whether or not our relationships work.

When we act out solutions, we're very good at finding what's missing.

In short, role-playing has its value when thinking about experiences.

Another way for us designers to explore in roleplay is to put ourselves in the experience we're designing and experience it ourselves.

This is a designer trying to understand what it feels like to try sleeping in the limited space of an airplane.

As you can see, we're using very simple ingredients, and very crude role-plays like this give you an idea of ​​how passengers feel when they're crammed into a tight space on an airplane.

Christian Simsarian, designer of IDEO, wants to experience for himself the experience of an emergency room patient.

This is a real emergency room in a real hospital

One of the reasons he got this big camcorder is because he didn't want the doctors and nurses to think he was really sick and have them come up with something weird and regret it.

Anyway, he went there with his video camera, and it was interesting to see what he brought back with him.

Because in the footage, it was in this state for 20 minutes.

(Laughter) What's great about this video is that you can instantly immerse yourself in this experience.

I know you're waiting in the hospital hallway, and you're worried about what's going on while the doctor is in the room dealing with another urgent patient.

Role-playing, which I'm experiencing in this case, is a very powerful way to create empathy, especially with video.

Ortei Sendil, a designer at IDEO, has waxed her chest, which she did to empathize with the pain long-term care recipients feel when the bandages are removed.

And this kind of hands-on experience and role-playing is very beneficial.

For example, if a child dresses up as a firefighter, he/she tries to approach that identity.

I want to know how it feels to be a firefighter

As designers we do the same

I will try this kind of experience

So roleplaying isn't just a tool for prototyping, it's also a tool for empathy.

At IDEO, we admire colleagues like them

Not only because they bring us insight into an experience, but also because of their willingness to explore, their ability to unconsciously surrender themselves to that experience.

So we admire their willingness to play.

So there's playful exploration, building, and role-playing, and these are the play that designers use in their work.

It might sound like the message to just go outside and play like a child.

To some extent, that is true, but there are two things I would like to say.

The first is that play is not chaotic.

Play has rules, especially in group play

When children play house or play mud police, they are playing according to agreed rules.

This rule-making process leads to productive play.

Did you do the sketch assignment first?

It's a task to draw a portrait of the person next door

Imagine you're drinking in a pub and doing the same task with your friends.

But now let's say everyone agrees to the rule that the person who did the worst must buy everyone's next drink.

And this rule turns an embarrassing and difficult task into a fun game.

As a result, everyone feels completely safe and has a great time because we all know the rules and agree to them.

There are rules not only about how to play, but also rules about when to play.

Children don't play all the time

They switch between on and off. A good teacher spends a lot of time thinking about how to get kids to make this transition.

As designers, we also have to turn it on and off.

For example, when you run a design company, you have to figure out how to let designers switch between different experiences.

I think this is especially true... what makes the design different, in my opinion, is the need to use these two very different modes.

There's a generative stage where you explore lots of ideas, and a stage where you piece them together to find solutions and develop them.

These are two completely different stages: divergence and convergence.

Play is probably needed during the divergence phase.

Seriousness is required in the convergence phase

It is more important to be able to move back and forth between these two stages. So we need a slightly different way of looking at play.

because these stages are considered independent

It's easy to think that you can't do both play and seriousness at the same time.

But it's a little different. We can be serious professional adults and playful at the same time.

It's "and" not "or"

It's both serious and playful at the same time.

So to sum it up, we need confidence that we can play, and we need confidence that we can be creative, and the two are related.

There are a number of behaviors that we learned as children that we've found to be very useful as designers.

It's an act of quantity-seeking exploration that allows us to build, think, and act out our own hands, so that we can empathize with the situations we design and create seamless and authentic services and experiences.

thank you

This is the only time I can smell the perfume you all smell like this

It's called Beyond Paradise, and it's sold in every store in the country.

What's different is that Estée Lauder deconstructed this perfume, done by a perfumer named Caris Becker, thank you.

It is divided according to the smell and fragrance that occur in order.

What I smell now is the top note

The next mellow scent is said to be the middle note.

This is the top note "Eden"

Comes from the Eden Project in the UK

This rich middle note is of melaleuca bark, but it doesn't contain melaleuca because it's completely banned.

And then the whole perfume

The combination that you're smelling right now -- I asked how many molecules there were, and nobody told me,

I put it in the gas chromatograph in my office, and there were about 400 molecules.

So what you're smelling right now is hundreds of molecules that are floating through the air and reaching your nostrils.

don't think this is subjective

you all smell the same

It is said that people perceive smells differently.

it's not

If you look at perfume technology, you'll understand. If people smell differently, it's no longer a technology.

So while the scent is wafting, I'll tell you the beginning of an idea.

Everything you smell is made of atoms in the "Upper East of the periodic table," a neighborhood of peace and safety.

(Laughter) If you want to work in the perfume industry, don't leave this neighborhood.

There were people in the 1920s who tried to add atoms from the bad neighborhoods, but it didn't work.

These five atoms make up most of what we smell in ordinary life, from coffee to perfume.

The first top note that I smelled, it's a weird term, but it's cut grass, as they'd call it in perfumery, because it's called a green note, because it smells like cut grass.

This is cis-3-hexenol. I had to learn chemistry in a rush for the last three years. It was an expensive high school chemistry education.

"Hexa" because there are 6 carbon atoms

It has one double bond and an alcohol behind it, so hexa + alcohol is hexenol.

Once you understand it, you can impress people at the party

This smells like cut grass. This is the skeleton of the molecule.

If you add a hydrogen atom, it looks like this on the computer, but in reality it looks more like this, because the atoms have a certain space that they can't penetrate, and they repel matter.

So how does this smell like cut grass?

Why doesn't it smell like potatoes or violets? There are two theories about this

The first theory is that "it depends on the shape." Most things in biology.

It makes perfect sense because it works based on shape.

Enzymes, antibodies, etc., that break down substrates all depend on the match between the protein and the substrate that they take in, in this case, the smell.

I'll explain later what's wrong with this concept.

Another theory is that "molecular vibrations give off odors"

this is a totally insane idea

When I first heard it in the early '90s, I thought pioneers Malcolm Dyson and Bob Wright were really insane.

But I'm starting to think they might be right, and I'm trying to convince my colleagues.

This is the effect of shape on normal receptors.

As you can see in the picture, a molecule comes in and goes inside the protein, and then it binds to a specific part, and this part switches and turns and moves in some way.

This movement is caused by the attraction of molecules and proteins. This is the concept of shape action.

So here's a slide summarizing what's wrong.

The way we do this is because you're going to have to memorize these synthetics.

This is a chemist who works for a perfume company.

One page of the workbook

We're looking for something that smells like sandalwood, and we've created 45 molecules.

Because sandalwood makes money

Of these 45 molecules, only number 4629 actually smells like sandalwood.

! It's marked. It's a lot of work.

And when you factor in the time it takes, that's roughly $200,000 of labor, assuming you're a low-paid, no-benefits employee.

It's a very inefficient way

I think "theory" isn't just about teaching people, it's about saving labor.

If you have some theory, you can do it with less effort.

Ease is good, so let me give you a simple fact and tell you why shape theory doesn't work.

This is cis-3 hexenol. It smells like cut glass.

This is cis-3-hexanethiol and smells like rotten eggs.

By the way, no vodka smells like rotten eggs, right?

If you smell like that, you put down your glass and go to another bar, right?

In other words, O-H cannot be mistaken for S-H.

At any concentration, even pure, if you smell ethanol, you won't smell rotten eggs.

Conversely, no sulfur smells like vodka at any concentration

This is very difficult to explain with molecular shape theory.

I showed it to a friend of mine who is a physicist who really hates biology, and he said, "It's easy! The colors are different!"

(Laughter) I have to go a little further, so let me explain why the vibrational theory is relevant to smell.

Moreover, molecules can only vibrate at frequencies that are unique to each molecule and bond.

If you replace the sound that O-H expands and contracts with the audible range, it becomes like this

S-H are quite different frequencies

It's quite interesting, because it means that we should examine the fact that there's nothing in the world that smells like rotten eggs other than S-H.

And "There is nothing in this world that vibrates at this frequency other than S-H"

Look at this piano keyboard

The S-H spring is in the middle part of the keyboard, which feels like it's worn out, and there are absolutely no adjacent notes.

It has a unique smell and a unique vibration.

So when I started getting involved with this, I started researching if there was any plausibility to this nonsense.

I looked for a molecule with the same frequency, and my natural guess was that this molecule must smell like sulfur.

Otherwise, the idea is over, and you'd be better off doing something else.

And after months of combing around, I discovered that there is a molecule called borane, which has exactly the same frequency.

Well, it's good that we have borane available.

The problem is rocket fuel

Most of them explode spontaneously when exposed to air, and even if you try to buy them, they only sell them from 10 tons.

(Laughter) I wouldn't call it a lab-scale experiment.

But in the end I was able to get some borane, and this is it.

Actually calculated and measured, it vibrates at the same frequency as S-H.

Does it smell like sulfur? If you look at the literature, there's a man who knows more about borane than anyone else, and still does: Alfred Stock, who synthesized all kinds of borane.

Where he had a huge 40-page paper written in German, and he translated it for me because his wife is German, he said, "ganz widerlich Geruch."

The fact that borane smells like sulfur has been known since 1910, but was completely forgotten until 1997 or 1998.

Now there's a small problem, and that's that in order to smell molecular vibrations, you have to have a spectroscope in your nose.

This is a spectrometer, it's on my workbench in my lab.

Even if you look inside your nose, it's certain that there's nothing like this

This is the main difficulty with this theory.

"What we smell is vibration." "That's great, but how?"

When people ask questions like this, they forget that physicists, unlike biologists, are very smart.

(Laughter) Just kidding, because I'm a biologist.

I'm laughing at myself

Bob Jaklovich and John Lamb of Ford discovered how to make spectrometers that were structurally nanoscale at a time when the company was spending huge amounts of money on basic research.

So we built a tiny device with no mirrors, no lasers, no prisms.

I could dance to the electron tunneling effect, but I made a more nifty video instead, and it works like this.

Electrons are ambiguous, they can jump between molecules, but only if their energies are equal, otherwise they can't.

Unlike humans, it does not fall down steps

When something absorbs energy, electrons can move.

So there's a mechanism, and this is very common in biology. A substance releases an electron, and the electron tries to jump, but that reaction only happens when a molecule with the exact matching frequency appears, OK?

This is the basis of the device that the two guys at Ford built.

In fact, every part of this mechanism can be biology.

You could say we built a spectrometer out of off-the-shelf elements.

EnglishAnd the nice thing about this idea, if you think about it academically, is that it shows that the nose, the ears, the eyes are all vibratory sensory organs.

Well, both are fine, but they may be different.

But -- (Laughter) there's something that's interesting to people who read all 19th-century German literature.

After that, it was amazing that I was able to leave university research and enter the world of business, where my ideas were used to create companies, and my methods were used to create new molecules.

And one of the first things we did was visit perfume manufacturers and ask them what they needed, because if we could calculate the smell, we wouldn't need chemists.

All you have to do is have a computer, like a Mac, and program it properly. You can test 1,000 or 10,000 molecules in a weekend.

Here's a quick way to create new scents

First, I met a French perfume maker who, to paraphrase Charles Fletcher, said, "You can't make coumarins."

They say, "We can make coumarin."

Coumarin is a very common substance used in perfumery, and it's extracted from a South American bean.

It is also a well-known synthetic fragrance.

To be precise, it's the molecule that's been responsible for smelling men's perfumes since 1881.

But the problem is that it's a carcinogen.

No one likes carcinogenic aftershave lotions

(Laughter) Some people are reckless, but I'd rather not.

So they asked me for a new coumarin, and I started doing the math.

First we're going to do some calculations on the vibrational spectrum of the coumarin to smooth out the numbers, so it's easier to see what the coumarin code looks like.

And then we run the computer to its fullest to find other molecules that have the same vibrations, whether they're related or not.

In this case, unfortunately, it was an accidental discovery.

My chief chemist called me up and said, "I just discovered this amazing chemical reaction. I want to make it, even if it doesn't smell like coumarin. It's a quick one-step process, and the yield is 90 percent. That's a pretty crystalline compound. Can I do it?"

So I said, "Let me do the math for that compound first." It's the coumarin homologue on the bottom right, with an extra pentagon attached to the molecule.

The purple spectrum is the calculated vibrations of the new compound, and the white is coumarin.

My guess is that it should smell like coumarin.

And then it was synthesized... and it smelled exactly like coumarin.

This is our new Tonkene

Scientists are always preaching concepts

But people resist concepts, of course, why new concepts?

must I accept?

But when you put a 10-gram bottle in front of a perfume maker, and it smells like coumarin when it's not coumarin, and you find it in three weeks, it's amazing how much attention everyone has.

(Laughter) (Applause) Is your theory confirmed? I am often asked

to whom? There are three ways of thinking, so to speak, and the most rational way of thinking is, "I don't understand you, but you're right."

"You're right, I don't care about the theory", that is, "Anyway, make a molecule"

And the idea that "You're wrong, you're definitely not"

In any case, our opponent is the world of commerce, as long as it produces results.

I was told I could do it with astrology, as long as I got results.

I'm not actually doing astrology

But for the last three years, I think I've got the best job in the world, because with a little bit of biophysics and some self-taught chemistry, I can help make my hobby, fragrances, and all sorts of wonderful things actually useful.

thank you

(applause)

It was June 2016, the day after the Brexit referendum, and it was a shocking morning for Britain to learn that Brexit had been decided, when the editor of the Observer asked me to go back to my hometown of South Wales and write a report.

So I visited the town of Ebb Vale

the place is here

It's in a special place in the South Wales Valley.

It has a very strong working-class culture, known for the Welsh Men's Choir and rugby and coal.

When I was a teenager, coal mines and steel mills closed, and whole communities declined.

I came here because it was the region with the highest percentage of "leave" votes.

62% of the people in this town voted to leave the EU.

I wanted to know why

When I arrived, I was a little surprised, because on my last visit to Ebb Vale, this is what it looked like.

that's how it is now

It's a £33 million vocational college, mostly funded by the EU.

This new sports complex is the centerpiece of a £350 million redevelopment project, also funded by the EU.

This is a £77 million road project, a new railway, a new station, all funded by the EU.

It's not a secret or anything. There are big billboards all over the place.

[EU fund investment in Wales] (Laughter) I walked through the town with a sense of surrealism.

It culminated when I met a young man in front of a sports facility.

He said he voted to leave because he didn't get anything from the EU.

I've had enough

Everyone in town said in unison

One of the campaign slogans was that we wanted to take back control.

They said it was the immigrants and refugees who were the most annoying.

I'm tired of it

this is weird

Because I walked the streets and met neither immigrants nor refugees.

A Polish woman told me that she was practically the only foreigner in town.

If you look at the statistics, Ebb Vale actually has the lowest immigration rate in the country.

I was a little confused, because I had no idea where people were getting their information from, who was writing this article about immigration.

It used to be a right-wing tabloid, but the town's base is left-wing Labor.

A woman contacted me after the article was published.

She's from Ebb Vale and told me about something she saw on Facebook.

when asked what he saw

He says he's seen horrible stories, especially about Turkish immigration.

i also looked for

but there was nothing left

There's no archive of the ads that people see or the stories that pop up in their news feeds.

It was complete darkness without any trace

On the other hand, this referendum will have profound and lasting consequences for Britain, and it's already having profound effects. Japanese car companies that replaced coal mines in Wales and North East England are starting to pull out because of Brexit.

This referendum took place in the dark because it happened on Facebook.

What's on Facebook stays on Facebook. News Feeds disappear as soon as you see them, so there's no way to investigate them.

Who saw what kind of ad, what kind of impact did it have, and what kind of data narrowed it down

We don't know who put the ad, how much money was spent, or even the nationality of the advertiser.

Facebook knows

Facebook knows the answer but refuses to disclose

On multiple occasions, the British parliament asked Mark Zuckerberg to come and testify in England.

he refused every time

why is this

It's because journalists, including myself, have exposed multiple crimes committed during the referendum.

Facebook was the stage

The UK has limits on how much money can be spent on elections.

It comes from the fact that in the 19th century, people literally walked around with gold in a wheelbarrow to buy votes.

Strict laws were enacted to prevent this.

But these laws no longer work

This referendum happened almost entirely online.

No matter how much money you put into advertising on Facebook, Google, YouTube, nobody knows because it's a black box.

this is what happened

I don't know the actual size

What we do know is that in the days leading up to the Brexit vote, roughly £750,000 of funds from the official Leave campaign group, Vote Leave, were diverted to another campaign group, which the Electoral Commission declared illegal and was reported to the police.

With this illicit cash, "Vote Leave" was flooded with false information.

These ads

[76 million Turkish citizens join the EU] This is a lie, it's complete bullshit.

Turkey has no plans to join the EU

There is no discussion about joining now.

Most of us don't see these ads because we're not the target.

Very few people who assumed "Vote Leave" was a persuasive layer saw these.

And the reason we're seeing this now is because Congress forced Facebook to submit.

You may think, "I just spent too much money."

"It's just a little lie."

But this is the biggest electoral fraud in Britain in the last 100 years.

And it happened in a once-in-a-generation referendum, where only 1% of voters decided the outcome.

This is just one of many crimes that happened during the referendum.

There was another group, this guy, who was headed by Nigel Farage, who's right next to Trump.

His leave group, Leave.EU, also broke the law.

He's been reported to the police for violating the UK's electoral law and data law.

This guy named Aaron Banks funded the campaign.

In another case, he was referred to the National Crime Agency, the FBI in England, after the British Electoral Commission concluded that the money was of unknown origin.

I doubt it's domestic funding.

I won't go into details about the lies Aaron Banks told about his secret ties to the Russian government.

Nigel Farage also met at odd times with Julian Assange and indicted Trump aide Roger Stone, just before two major WikiLeaks disclosures, both of which benefited Donald Trump.

Brexit and Trump go hand in hand.

This man said, "Brexit was an experiment for Trump."

The same people, the same companies, using the same data, using the same technology, using hate and fear alike.

I posted this on Facebook

I don't even want to call it a lie [Immigration without assimilation equals aggression] because it seems more like a hate crime

As you already know, hate and fear are planted through the internet all over the world.

Not just England and the United States, but also France, Hungary, Brazil, Myanmar, New Zealand.

It turns out that we are globally connected by a dangerous undercurrent.

It's a flow through technology platforms.

Only a tiny fraction of its surface is visible

I learned about these dark parts only when I started researching Trump's relationship with Farage and a company called Cambridge Analytica.

I spent months tracking down former employee Christopher Wiley.

He told me that this company, which was involved in both Trump and Brexit, politically profiled people in order to understand their fears and target them effectively with Facebook ads.

We achieved this by illegally obtaining 87 million profiles from Facebook.

It took me a whole year to interview Christopher.

I had to switch from being a feature story to being an investigative reporter.

He was very brave. This company is owned by Robert Mercer, who is the billionaire who finances Trump.

Finally, we have reached the point where there is only one day left until the release.

again threatened with legal action

This time it was from Facebook, not Cambridge Analytica

If you publish the article, they will sue you.

I still published

(Applause) Facebook has historically made mistakes in this regard.

You are also wrong in not providing the answers we seek.

that's why i came here

To appeal directly to you, the gods of Silicon Valley.

(Applause) Mark Zuckerberg.

(Applause) Sheryl Sandberg, Larry Page, Sergey Brin, Jack Dorsey, the employees and investors who work under them.

Because 100 years ago, gas was the biggest danger in the coal mines of South Wales.

Silent, deadly and invisible

That's why we sent the canary first to check the air.

We in England were the canaries in this grand global online experiment in which we live.

When technology turns century-old electoral laws into chaos, Western democracies look like ours.

Our democracy doesn't work, our laws no longer work, and this is not my opinion.

The technology you invented was amazing.

But now it's a crime scene

you have the proof

It's not enough to say that we will improve in the future.

Because we have to know the truth to be able to count on preventing a recurrence.

You might think, "It's just some advertising.

Are people smarter? "and

Let me tell you, it's not that sweet

Because, as the Brexit vote shows, liberal democracy is not working.

it's your fault

This is not democracy, spreading lies under the cover of darkness and receiving illicit money of unknown origin.

This is subversion and you are accomplices

(Applause) The British parliament tried to hold you accountable for the first time in the world, and it failed.

Literally beyond the reach of English law -- and not just English law -- Mark Zuckerberg refused to attend and explain to delegates from the nine parliaments assembled here.

you don't realize this is a bigger problem than you

It's a bigger problem than any of us

It doesn't matter if you're left or right, Leave or Remain, Trump or not.

It's a question of whether we can have free and fair elections again.

It seems impossible at present

I want to ask you, "Is this what you want?"

It's like, "Do you want your name to go down in history like this?" As someone who helped create a tyranny that's gaining power around the world?

In the beginning, it was supposed to be trying to connect people.

Are you unwilling to admit that technology is now pulling people apart?

The question for everyone else is, "Do we want this?" Allow them to escape, is it okay for them to be fiddling with their phones while the darkness is about to cover them?

The history of the South Wales Valley is a history of fighting for rights.

This is not training, it's time for transformation.

Democracy is neither guaranteed nor inevitable; it must be fought for and won, and tech companies should not be given such unconditional power.

It's in our hands, you and me, all of us.

we must take back the initiative

(Applause) (Cheers) (Applause)

Three years ago, when I was in London, a man named Howard Burton approached me and said, "The group I represent wants to start a logical physics laboratory.

The fund is 120 million dollars, and I really want to make it a success.

I want to conduct cutting-edge research and proceed in a different way

Young people have all kinds of ideas, but old people decide the direction of science. Let's get out of the situation."

This is a great idea, I decided in 25 seconds.

Three years later, the Perimeter Institute for Theoretical Physics was founded in Waterloo, Ontario, Canada, and I've never had such an exciting job in my life.

It's the first time I'm afraid to miss work.I'm afraid I might miss something during my week here.

(Laughter) Well, I'm here today to take a moment to share with you some of the things we discuss and think about on a daily basis.

"How does science work?" We often think about this.

The first thing that comes to mind for anyone who knows or has been involved in science is that the scientific method you learn in school is wrong and there is no set method.

On the other hand, as a community, we manage to draw conclusions that we all agree on from incomplete evidence.

This is what should be done in a democratic society as well.

How this works is

In my opinion, this works because there is an ethic that unites the scientific community.

Here are some ethical principles

I won't explain everything.It's not a lecture today.

It's meant to be fun

(Laughter) One of these principles is that anyone in a community can fight and argue for what they believe.

But discipline is maintained by the fact that everyone understands that it will be the next generation of community members in 30, 50 years from now who will decide who is right.

So science is a combination of this tradition, respect for the community, and the rebellious force necessary for that community to move forward.

And I think that participating in this process of sharing facts and drawing conclusions and being part of a community can teach us a lot about democracy.

Not only is there a relationship between the ethics of being a member of the scientific community and the ethics of being a citizen of a democratic society, but historically there is also a relationship between how people think about space, time, how the universe is made up, and how they think about the society in which they live.

So today, I'm going to show you three stages of how these evolved.

In the early cosmology, what could be called science was Aristotle's thought, which was hierarchical thought.

At the center of the universe was the earth, and around it was the planetary sky, where the sun, moon, and other planets were located.

According to Aristotle's laws of motion, all things move toward where they should be. These are the very rules of the society in which Aristotle lived, and more importantly, through Christianity, Aristotle's ideas were widely accepted in medieval society.

This is the idea that everything is defined.

The position of an object is defined in terms of the outermost star heaven, and outside that is a perfect, endless world where God exists and decides everything.

This was Aristotle's cosmology, and in a way it was medieval society.

And in the 17th century, Newton revolutionized the way we think about space, time and motion, and around the same time.

John Locke and his colleagues revolutionized social theory, and they go hand in hand.

these are closely related

In fact, Newton and Locke were friends.

The idea of ​​time and space on the one hand and the idea of ​​society on the other were closely related.

let me explain

Newton's cosmology has no center -- thank goodness.

In this theory, matter moves within fixed space-time coordinates.

Absolutely defining where an object is in space makes a lot of sense, because the absolute space, Newton's god, is the reference regardless of the position of other objects.

Similarly, Locke's society consists of citizens who have certain human rights and property rights, and these rights are abstract and absolute rights and justice regardless of other aspects such as what other people think or what the history of society has been.

defined by the concept

And then there's the all-seeing, all-knowing, all-powerful observer, God. God is in a sense outside the universe, because he doesn't care about what's going on inside. But in a sense, he's everywhere.

This kind of thinking was the foundation of classical liberalism and Newtonian physics.

And in the 20th century there was a revolution, this revolution happened at the beginning of the 20th century and is still going on.

The revolution began with the discovery of relativity and quantum mechanics The revolution began with the discovery of relativity and quantum mechanics

And the quantum gravity theory that combines them is the culmination of that, and research is still ongoing toward the completion of the theory.

In this cosmology, nothing is fixed and absolute, it's zero.

This universe can be explained by a network of relationships.

Space is just one relationship, absolute position doesn't make sense.

Position is only a relative concept.

And as this network of relationships continues to evolve,

We call this the correlative universe.

All the properties of bodies are due to various relationships,

If you are embedded in a network of relationships, the world as you see it all consists of information through the network, an all-knowing, all-powerful observer.

Constructed of information through a network, there is no place for an all-knowing, all-powerful observer or all-knowing, all-creating celestial intelligence.

This is the theory of relativity, this is quantum mechanics.

And when I talk to lawyers, it's more of a new foundation for legal thinking, and they were thinking the same thing.

It's a new foundation for legal thinking, and they were thinking the same thing.

What's more, they often bring up analogies with relativity and quantum mechanics.

It turns into an interesting story

This last cosmological idea is called the correlative perspective.

What it proposes is that "nothing exists outside the universe," meaning that there is no room for anything to exist outside the universe.

In a cosmic universe like this, if you look at things that have order and structure, like this device, that device, beautiful things, like all life, everyone in this room.

(Laughter) I'm sure you're curious about how they're made, because you're human.

According to correlative cosmology, matter cannot be explained except by creating itself.

There must be some mechanism of self-formation in this universe There must be some mechanism of self-formation in this universe

Because there's no room for a creator outside the universe like Aristotle's or Newton's cosmology.

So correlative cosmology requires a process of self-formation.

Darwin gave us enough of a process of self-formation to explain everything we see.

Self-formation is possible, and moreover, if you think about how natural selection works, natural selection can only be explained in relational cosmology.

Because natural selection operates on traits such as fitness that are established by relationships between species and other species.

Darwin's ideas cannot be satisfactorily explained not only by Aristotle's cosmology, but also by Newton's cosmology.

So theories of biology based on natural selection require that the properties of biological systems be correlated.

And if we take it even further, it would be natural to think that in a correlative universe all properties are related to each other.

What's more, Einstein said that gravity exists because everything in the world is related.

Without gravity, there would be no life, because it is the force that causes stars to form, to survive for so long, and for billions of years to keep fragments of the world, like the surface of the Earth, out of thermodynamic equilibrium so that life can evolve.

And in the 20th century, we've seen two major themes in science develop independently.

In biology, he pioneered a new notion that order, complexity, structure, etc., might be self-organizing.

It led to the success of new theories such as Neo-Darwinism.

Slowly, it's making its way into areas like cognitive science, human science, and economics.

At the same time, we physicists have spent time understanding, combining, and developing quantum theory and relativity.

And what we're trying to reveal now is the idea that the universe is made up of relationships.

Science in the 21st century will advance through a combination of two ideas. First, it will reveal the idea that everything in the world is connected.

What's more, in the 21st century, the way we think about space and time and the universe will continue to evolve along with how we think about society.

And that evolution is also moving towards a synthesis of the same two big concepts -- Darwinism and Correlation Theory.

And if we think about democracy from this perspective, the new conception of democracy will be one that recognizes that there are many different people, each with different perspectives, different interests, and different challenges.

Individual existence is imperfect because it is embedded in a network of relationships.

All actors playing democracy are part of the network All actors playing democracy are part of the network

We all have different degrees of understanding about things, so there's no end to pushing and pushing and giving and taking, and that's politics.

And politics, ideally, should always be a way to reach a better life, a better society, by working with networks of relationships.

And I believe that science will never go away, and I'll end with these words.

(A democracy like this should be pluralistic and experimental.) (Laughter) That's it. Science is not going away.

(Chris Anderson) What are your concerns?

You talk openly about Twitter's problems.

What is your number one concern about the current situation?

(Jack Dorsey) Right now is the health of the dialogue.

Our goal is to contribute to public dialogue, and we're seeing a lot of attacks there.

Slander and harassment There is also information manipulation Machinery Organized activities There was also incorrect information

All of these developments are things that I didn't anticipate when I started my business 13 years ago.

But it's growing in scale. My number one concern is whether we can systematically address these issues at scale. We need a deep understanding of what we're doing -- a clear understanding of what we're doing, and a rigorous remediation process when we make mistakes, because mistakes happen.

Whitney Pennington Rogers: I'm glad to hear that you're concerned. Many people have been abused and harassed on Twitter in the past, especially women, women of color, and black women.

Data also shows that Amnesty International reported a few months ago that an average of 10% of the tweets received by some of its active black female users were some form of harassment.

So I'd like to ask you about the health of the Twitter community -- the health for all -- specifically women, women of color, groups of black women, how are you going to make Twitter a safer place?

(Jack) Right

It's a pretty awful situation, isn't it, that you're using some service, ideally wanting to learn something about the world, and you're spending most of your time being abused and harassed and reporting it?

What we're delving deeper into right now is the very motivations that platforms and services naturally generate.

We now have a system that makes it very easy to slander and harass others through the service. Unfortunately, the system so far has relied solely on people reporting harassment and harassment.

So in the middle of last year, we decided to use more machine learning, and we decided to apply deep learning to this problem, and we're trying to be more aggressive in the arena of abuse, with the goal of completely removing the burden on the victim.

There has been some recent progress

About 38% of abusive tweets are now automatically detected by machine learning algorithms and no longer need to be reported.

But what we find is subject to human review, and we have not suspended any content or accounts without human review.

But it's a step up from 0% a year ago.

So when it was 0%, everyone who was slandered had to report it, which was a huge burden and very unfair to the person involved and to us.

The other thing we're trying to do as a company is make sure that every community can participate.

To be successful in business, you have to have multiple perspectives inside of you, people who experience these issues every day.

It's not just the team that's working on it, it's also the upper management.

We need to continue to develop empathy for people's experiences, and we need to give them tools to help them take action.

So it's a lot of the technical side of things, but I'm also thinking about what motivates people with the service: What do you want people to do when they open Twitter?

In the past, it has also induced a lot of anger, mob behavior, and collective harassment.

To make big changes, you need a deep understanding of what services are doing.

As I said earlier, there are many small technical changes that can be made, but ultimately you need to have a deep understanding of the dynamics of the network itself, and that's what we're working on.

CA: But the real feeling is, what do you think we can actually do to fundamentally change people's behavior?

CA: When we first started, the basics of the service was "account following." This is just one example, but I don't think that's why people use Twitter.

Twitter excels as an interest-based network

It's being used with a particular interest.

Now it takes a lot of work to find and follow accounts that are relevant to your interests.

Instead, follow interests, follow hashtags, trends, communities, and then you'll be able to see all the accounts, topics, "moments," hashtags, etc. that are related to a particular topic or interest, giving you a much wider field of view.

But moving the entire network from being account-centric to being topic- and interest-centric is a big, fundamental change.

Chris: Isn't one of the reasons you're so content rich is that you've got millions of people around the world competing for followers and attention?

People who just get their information on Twitter might be fine with that change, but I think all the people who create content think, "I want more likes, more followers, more retweets!"

they're trying to make it happen

And what I've found to be the most effective is to be a little more provocative, or to say something offensive. Loud insults get attention on Twitter, and they respond so quickly that you're creating a way to set yourself up for fire.

How do you deal with that?

(Jack) Yeah, that's right, it goes back to motivation.

One of the early choices we made was to display the number of followers.

We've decided to put those numbers in big, bold letters, and the things in big, bold letters are important, and we're going to aim higher.

Was it the right decision at the time?

may be different

If you're rebuilding your service from scratch, I don't think you'd put too much emphasis on follower count.

No emphasis on number of likes

We're not going to create a "like" feature in the first place, because it's not going to help us do what we think is most important right now. It's not going to contribute healthy to the network, it's not going to bring dialogue to the network, it's not going to encourage people to participate in it, it's not going to help them learn from it.

I didn't think about these things 13 years ago, but I think they're very important now.

So we have to think about how we're going to display the number of followers, how we're going to display the number of retweets and the number of likes, and we have to ask deeply: Do we really want this number to be pursued?

Do you want people to open up Twitter and say, "Let's increase this number"?

I don't think so now

(Applause) (Whitney) Let's take a look at some tweets from the audience here.

(Chris) Let's see your question.

And that's one of the great things about Twitter. It's that with your collective wisdom, you can tap into more knowledge, more questions, more perspectives than you can imagine, and many of them are very healthy.

CA: It's been floating around, how are you going to deal with foreign interference in the 2020 U.S. presidential election?

It's a very common problem on the Internet, where we see a lot of automated and malicious activity.

For example, on Twitter, I have a study by Zignal Lab, but let's take a look at a good example of what we're talking about: bots, or malicious, coordinated, automated accounts that are used to influence elections and things like that.

This example from Zignal Lab uses data extracted from Twitter, but what you're really seeing here is -- every dot is an account, and white is a human user.

The more reddish the account, the more likely it is to be automated.

We can see some human users engaging with bots.

This case is related to the Israeli elections, where false information about Benny Gantz is being spread. As you know, the final election result, Netanyahu won by a narrow margin, may have played a role.

What exactly are you doing about these activities on Twitter? What are you doing to prevent false information from being spread unnecessarily, influencing people and swaying democracy?

CA: As a side note, we also asked ourselves: Can we actually measure the health of the dialogue? what does that mean?

I think that just as we as human beings have metrics such as body temperature and complexion to measure our own health, we can also find metrics for the health of our conversations.

So, in collaboration with a lab at MIT called Cortico, we've come up with four proposed metrics to start with, which I think will eventually be measured by the system.

The first is the degree of shared interest.

measures how much of a conversation converges on the same topic

The second is "fact sharing," which measures how often a conversation shares the same fact, not whether the fact is true, but whether the conversation shares the same fact.

The third is receptivity, which measures how receptive and polite a given conversation is, or how offensive it is.

The fourth is "diversity of viewpoints"

It measures whether there's a filter bubble, an echo chamber effect, or whether there's a lot of diversity in dialogue.

What these four have in common is that the higher they are, the healthier the dialogue.

The first step is to see if we can measure these things in situ, and I think we can.

We put a lot of effort into "acceptability"

We've built an offensive model into the system, and we can actually measure the likelihood that people will walk away from a conversation on Twitter because they find it offensive, and it's pretty accurate.

We're working on other things, and the next step is to continue to experiment and come up with solutions and see how these metrics change over time.

The goal is to balance these out, so increasing one may decrease the other.

By increasing the diversity of viewpoints, the degree of commonality of facts may decrease.

CA: I'm going to refer to a question that has been asked a lot.

(Jack) It's a barrage of questions.

Chris: A lot of people are wondering, how hard is it to get the neo-Nazis out of Twitter?

(Jack) (Laughter) We have a policy against violent extremist groups. Most of our work and terms of service are about behavior, not content.

So we focus on action.

This means repeatedly or sporadically harassing someone through the service or using objectionable imagery, such as those associated with the KKK or the American Nazi Party.

I will deal with such things immediately

As it stands, the rules are loosely enforced, and we don't exclude people from the platform for using one of those words to accuse someone.

So our model is based first of all on accounts associated with violent extremist groups?

if so i will deal with it

The KKK, the American Nazi Party, and others have already done so.

And the second thing is whether you're using images or acting in a way that could be associated with those groups.

CA: How many people are involved in content moderation?

(Jack) It's a lot

We want to be flexible, because we want to build algorithms, not hire lots of people first, because we have to be able to do it at scale, and human wave tactics just can't keep up.

So we've worked hard to automatically detect slander so that people can confirm it.

The ideal situation is to have the algorithm constantly scan the tweets and show the most attention-grabbing ones at the top, so that humans can decide whether to remove them based on the terms of service.

Whitney: You mentioned that the scale of the problem is too large for people to handle, but how many people are currently monitoring the accounts? What is the way to decide if it is enough?

(Jack) It's totally flexible.

Sometimes I have to deal with spam

You may be asked to deal with defamatory or harassing behavior

Being flexible about staffing allows us to work on what we need most.

it can be an election

We've had a series of elections in Mexico, and now India, and of course we had the midterm elections in the United States last year, so we want to be flexible about our workforce.

So if someone, let's say, go to the current terms of service, open the page, and see if they can report the harassment they just received as violating the terms of use, the first thing they see when they open the page is about intellectual property rights.

If you scroll down, it's about other things, like slander and harassment.

I don't know exactly when in our company's history that happened, but it's come above what people most want to know and want to act on.

The order itself shows the world what it stands for.

so i want to change

We're going to change the order to what it should be, and we're going to make the rules simpler and easier to read, and we want people to be able to actually understand if they're violating the rules or not.

And what we're working on, then, is to focus on taking the burden off the victim.

We're going to give the technology more discretion and less human work, which means less burden on the person being slandered and less burden on the person verifying it.

What I'm trying to do is not only do more to deal with the very negatives, but also to strike a balance between technology and a place where humans can be creative, not just on the mechanical side of finding and reporting violations, but also on the rule-based decision-making side.

I think so

CA: I'd like to dig into what you just said.

I think it's really good that we're looking at ways to rethink the basic design of systems, either by discouraging reflexive behavior or, in Tristan Harris's terms, appealing to people's reflective thinking.

How far is it going?

What will replace "Like"?

CA: Well, first and foremost, it's a personal goal for this service, and one that I believe in is the importance of public dialogue.

Some of the human existential issues facing the world, not just specific countries but the world as a whole, lend themselves to public debate.

One of the unique strengths of Twitter is that it's completely open, completely public, completely fluid, and anyone can see and participate in any conversation.

There will also be talk of climate change

There will also be talk of artificial intelligence replacing the workforce.

There is also the topic of economic inequality.

No matter what one nation does, it's a problem that can't be solved alone.

We need global cooperation, and I think Twitter can help us do that.

The second thing is that as it stands now, when you go to Twitter, you don't necessarily feel like you've learned anything.

some are learning

I think some of them have very rich networks and are learning every day.

But getting to that stage takes time and effort.

So we want to help people get to those topics and interests faster. And then we want to make sure that people find something. No matter how much time you spend on Twitter -- you don't want to maximize your time on Twitter, you want to maximize what you get out of it -- what you learn from it. Chris: Really?

That's the core question that a lot of people want to ask.

"Jack, I understand there are a lot of restrictions. We're a public company, and there's pressure from investors. Our biggest source of income is advertising, and it's also dependent on user engagement.

Are you willing to sacrifice user time to encourage reflective dialogue if it's really necessary? "and

(Jack) If being more relevant means less time spent on Twitter, that's fine. We want people to be able to quickly learn something and find something to pursue when they're on Twitter.

You can put ads on it

You don't have to stay long to get your ad seen.

And the second thing -- (Chris) -- usage per day, isn't necessarily the amount of content that people value.

Or perhaps they were just drawn to it like moths to a fire.

You become addicted, you see something that makes you angry, and you add more fuel to the fire, and you get more usage per day, more advertising dollars, but people just get more and more angry with each other.

how do you define it?

I think "use per day" is a very dangerous thing to optimize.

(Applause) (Jack) Alone, yes. I haven't talked to you about another metric yet.

I want to encourage voluntary healthy contributions to the network, and I think that means participating in a healthy dialogue as defined by the four metrics I mentioned earlier.

You can't optimize for just one metric

There's a balance to be had, and we need to be constantly looking at what makes a healthy contribution to a network and a healthy experience.

Ultimately, we're aiming for metrics that make people feel like they've learned something from Twitter and had a valuable experience.

That's the ultimate goal, but it's going to take time.

CA: I think a lot of people think you're enigmatic.

It may sound a little daunting, but I woke up the other night and had this picture of what was going on around you.

When people say, "I'm worried about the iceberg ahead,"

You say, "That's a very good point. This ship is honestly not built to steer well."

When I say "Do something about it"

You go to Funabashi Everyone is waiting impatiently You look so calm We're outside shouting "Please turn the rudder!"

do you understand?

(Laughter) (Applause) So -- (Applause) it's democracy that's at risk.

our culture, our world

Twitter is great and helpful

It's small compared to other platforms, but it's used by influential people to point the way. I don't think there's a more important role in the world than --

You're great at listening to people, but do you actually play a key role in doing things with urgency?

(Jack) Yeah, we're making big moves.

There have been several turning points in the history of Twitter.

When I came back to the company, the future prospects were pretty dire, not just in the way the platform was used, but in the way companies were.

So we reworked our foundation as a company and turned around. We did two major restructurings. We were getting too big as a company.

it took effort

And when I actually went deeper into it, I realized that there was a fundamental problem with it.

We can do a lot on the surface to address what we just talked about, but the change must be sustainable. So we have to dig deep and look hard at what we started 13 years ago and ask: How do our systems and frameworks work?

We're responding as quickly as possible, but speed alone won't do it.

It's about how we focus and prioritize, and we have to understand the nature of this network and build a framework that is flexible enough to scale and change.

I'm proud of the framework that we've managed to make it happen.

The same goes for direction.

We could go faster, but we had to stop the stupid mistakes of the past.

(Chris) I see.

I'm sure there are many people in this room who, given the opportunity, would love to help with the agenda for change, and so would Whitney. Jack, thank you for coming up and speaking openly.

I think it took courage.

you said very good things i hope it goes well

(Jack) Thank you

(Applause) Thank you.

For nearly a decade, I've been studying America's response to atrocities and genocide.

Let me give you an anecdote, where I learned what there is to know about America and the reaction of democracy.

April 21, 1994, 14 years ago.

A genocide was underway in Rwanda, where 800,000 people were systematically about to be killed by the government and some extremists.

That day, the New York Times reported that 200,000 to 300,000 people had already been massacred.

It was not a front page article

It's so similar to the Holocaust coverage that it didn't get any attention.

Neither Rwanda nor the genocide was considered newsworthy.

On April 21st, we have this amazingly candid exchange.

When a Colorado Congressman named Patricia Schroeder met with the press.

A reporter asked, "The last two weeks in Rwanda

200,000 to 300,000 people were slaughtered

So what is the US government doing? "and

It's been two weeks since the massacre started, and I didn't know when it would end.

The reporter said, "Why didn't the U.S. government hold public hearings and issue a statement of condemnation?

No one got arrested for demonstrating in front of the embassy or the White House, what's going on? "and

The Senator answered honestly, "That's the problem.

People call me in Colorado and in Washington, but they're talking about endangered gorillas, and they're talking about humans being slaughtered -- nobody talks.

No phone calls about humans."

This episode tells us a deep truth

This is what it was - in the 20th century, the movement to save endangered species began, but we do nothing for people who are in danger.

In school we learned about the Holocaust

Many know the Holocaust as well as nuclear war.

Washington has a Holocaust museum on the National Mall.

Culturally, with proper concern, we've said, "Don't repeat."

But in the world of politics, it didn't matter, there wasn't a concrete movement -- it didn't happen in the 20th century.

What the lawmakers say is that we need a movement like that to end atrocities around the world.

Crimes against humanity require political uproar and political costs to be paid.

but don't worry

I have great news for you that anti-genocide movements and groups that didn't exist in the 20th century will pop up out of nowhere in the 21st century and probably won't go away.

Against the Darfur conflict

The organization started by students has spread to universities all over the country, and there are about 300 chapters from the anti-apartheid movement.

it's a big exercise

About 500 high school chapters trying to stop the genocide in Darfur

Various participants Evangelical Jewish

Some people learned about the genocide by watching "Hotel Rwanda."

This may not be "exercise"

using different methods

There are successes and failures

It's just that we've succeeded in creating something that didn't exist in the 20th century in the sense that we've created a movement for people in crisis.

The purpose of this "movement" is to convince people that if they don't stop the genocide, don't think about it, don't do anything about it, if they just sit on the sidelines, they're going to be blamed in politics.

Some things are great because it's a student movement.

22 states, 55 universities, have a campaign called 1800 GENOCIDE to sell their shares in companies that do business in Sudan.

If you call a number and you can join, that might sound tacky to the apolitical person, but it's a quick way for people who want to do something.

You can appeal directly to the politicians who are discussing the divestment bill.

That makes anti-genocidal action easier.

The most "new" thing I've seen recently is called "genocide assessment."

Students are evaluated

Now, when the House is in session, lawmakers call students in their 20s and say, "I got a D-minus for anti-genocide action. How do I get a C?"

Students and others involved in this movement can answer that, there's always something to do.

This act, at a time when military, economic and diplomatic pressures were tight, made the Bush administration and the nation feel obligated to do something about what happened in Darfur, something no other country could have done.

Bush administration reluctantly takes Darfur war crimes to international tribunal

$3 billion spent on refugee camps to keep people displaced by conflict alive until they receive more lasting assistance.

Six months ago, authorization was granted to deploy 26,000 peacekeepers.

Because of the leadership of the Bush administration, the pressure of the grassroots movement, and the attention that people have had since the outbreak of the conflict.

But sadly evil will not perish

People are surrounded on all sides by militiamen on horseback with spears and automatic rifles in camps.

The problem is that in order to eat the relief supplies, you need to cook, so the women go to pick up firewood to cook and are raped.

Almost no countries were willing to send their troops to dangerous locations even if peacekeeping operations were allowed.

Our movement's achievements are far greater than they were in the 20th century, but they fall far short of the seriousness of the ongoing crime.

why exercise is limited

Why is it not enough to do what is necessary

The reasons are quite diverse, but I'll briefly mention a couple of them.

First of all, it's a grassroots movement, so it stays domestic and doesn't become an international movement.

There aren't many comrades abroad who would encourage their own governments to initiate an anti-genocide movement.

I think because of the Holocaust culture in the United States, there's a strong sense of not repeating it.

The Clinton administration expressed guilt over the Rwandan genocide and created a public opinion that genocide was evil.

In Europe, governments that take responsibility are rare, and there are no anti-genocidal movements.

If it's going to be a sustainable international movement, it needs to transcend national borders and have people in democracies actually take action against genocide instead of relying on governments.

Governments try to ignore crimes of this magnitude.

We've turned a blind eye to issues like defending our ports and controlling our nuclear arsenal.

Will bureaucrats themselves turn their attention to the suffering of distant foreign countries?

The limitation of the movement was the inability to internationalize the problem.

And international organizations, especially now, have problems of credibility and legitimacy.

The big challenge facing the Bush administration is that it has a wide range of challenges. One day you condemn the genocide, the next day you make excuses for torture (in your own country), the next you find countries to send troops to.

There's a reason other countries don't do anything

To put it bluntly

The Bush administration was used as an excuse

But the bottom line is that America leads the rest of the world and regains its position and leadership in the world.

it takes time

Now we have to think: What can we do as a nation, as a people? What can we do for the most oppressed land in the world that has suffered before and may suffer again?

I asked the answer to a man, who many of you may not know, is a Brazilian diplomat, Sergio Vieira de Mello, who was the victim of the first suicide bombing in Iraq in 2003.

I'm the one who exploded

In the summer of 2003, even after the U.S. invasion, despite the looting, Iraqis remained relatively safe.

What kind of person was Sergio?

In 1994, when I met with the Brazilian, I heard him say, "He's a cross between Bond and Bobby Kennedy."

There aren't many people like that in the United Nations.

What resembled Bond was his cleverness and—

Like moths drawn to fire, fascinated by danger, seeking danger

And it's a great place for women

I'm not sure if Bobby Kennedy looked like an idealist realist or a realist idealist, and so did John Kennedy.

He built a nation in the worst and most damaged land in the world, solved problems, quelled conflicts, and did many things.

Countries that are crumbling, countries that have been genocided, countries that are out of control, countries that threaten America and want to erase it from the world, countries where the worst suffering in the world is concentrated.

he was attracted

he was the center of attention

Worked at the United Nations for 34 years from the age of 21

In the 1970s, wars broke out for independence and decolonization.

In Bangladesh, he responded to an outflow of millions of refugees, the largest in history at the time.

At the time of the civil war in Sudan

to Cyprus when Turkey invaded

I was present during the Mozambican War of Independence.

Amazingly, he's in Lebanon, on a UN base, and a Palestinian military attack from behind it.

Israel invaded and overran the base

I was there during the first suicide bombing of the US Embassy.

9/11 marks the beginning of a new era, but what he witnessed in 1983 -- the attack on the embassy and the Marine barracks -- also marked the beginning of this era.

In the 90's he moved from Lebanon to Bosnia.

Ethnic conflict was a problem

Negotiate first with the Khmer Rouge

Evil will not perish, so he is the devil of Cambodia.

against the Serbian army

When he negotiated in the Balkans, he was called "Servio" because he was pro-Serbian because he tried to persuade him that it was okay not to win beyond the task of conversing with evil.

After the genocide in Rwanda and Congo, he had to make a decision: 800,000 people were killed, the genocide was over, and those responsible fled to neighboring countries.

I'm a humanitarian I don't want to feed murderers But let's build refugee camps and distribute humanitarian aid for the two million people who are with them

Because there are killers in the camp

I want to separate it from others

Let's go around the international community and ask the police or the military."

Of course, the response was not very positive.As much as we sent troops to stop the carnage, we couldn't get the killers out of the camps either.

a decision was needed

Do you refuse the help of the international community and endanger the lives of 2 million people?

Are you going to keep feeding the people while the murderers are hiding there ready for battle?

what should I do?

A fallen country is a nest of small villains

In the latter half of the 1990s, the movement toward national reconstruction became conspicuous.

He held national leadership positions in Kosovo and East Timor.

Taxes, currency, border security, policing, everything - as governor he has to decide.

he speaks 7 languages ​​brazilian

The wars I've experienced14 probably made better decisions than those who haven't.

Even for him, it was uncharted territory: how can you do good in the worst country in the world with little help?

After the 9/11 attacks, I became the United Nations High Commissioner for Human Rights, and I had to consider freedom and security, and I had to be clear whether the largest country in the United Nations would condemn the Geneva Conventions -- when it said it didn't abide by international law.

If you complain, you will probably be removed from the membership

Or do you just try to win over Bush without saying a word? He did so, and was unfortunately sent to Iraq where he died.

What's notable about his death is that the Bush administration, which invaded Iraq, had not prepared for terrorism, even though it predicted the Iraq War and established a link between Hussein and the 9/11 attacks.

For three and a half hours, Sergio, a man who knew all about evil, negotiation, and nation-building, was left unrescued under the rubble.

Just like the refugees I saved

I lost my country

Because it is the representative of the "whole" that is the United Nations

don't belong anywhere

The most powerful American army in human history could muster only two brave soldiers to his rescue, and they entered the swaying building.

One had lost a companion on 9/11, but he took the risk to enter the building.

All I have is a women's handbag. It's just a bag. I tied it to the curtain cords of my office. I built a pulley system in a building that was about to collapse. At a time when so many people feel they've lost their way, what we can do is help the leader we need most.

All I had to do was prepare that pulley

It's too late, but when 22 people, including Sergio, were killed in a terrorist attack on the United Nations, a search-and-rescue force was set up, equipped with the cutters, supports, and heavy equipment needed for the rescue.

but he won't come back

The last thing I would like to share with you is four things that I learned from his life that made me think about how we can prevent evil from flourishing.

What can we learn from a man who spent 34 years thinking about the problems that we, as a nation and as a people, are grappling with today?

There's something we can learn from his relationship with evil.

he was a man who kept changing

It had its flaws, but it was adaptable.

that was my greatest strength

At first, he was blaming evildoers, blaming international law-breakers, saying, "You're violating the Charter of the United Nations.

Don't you know you're making a mistake

But without the backing of the state, the military, and the police force, they were ignored.

his weapons were rules and norms

And in 1982, in Lebanon, he declared, "I will never say 'unacceptable' again."

Aim for it, but don't use the word

he ran in the opposite direction

Even when he was in the same room with the bad guys, he didn't condemn them, even seemed to flatter them. When he was nicknamed Servio, when he negotiated with the Khmer Rouge, he didn't question their past misdeeds.

In his later years, he managed to balance idealism and reality, something the United States should emulate.

When negotiating with an enemy, don't be afraid of dialogue, don't ignore events that precede negotiations.

Don't leave history obscure, don't leave firm principles behind

Nixon and China, Khrushchev and Kennedy, Reagan and Gorbachev, and so on, sit down at the table.

Negotiations have advanced relations between the United States and adversaries.

Negotiation is not an act of the weak

For the international community to unite against evil, it's better to show that it's not the United States that's the problem, but our negotiating partners.

The second thing we learn from Sergio's life is

Most importantly, he respected dignity, which is very rare.

Personal dignity, which directly corresponds to

was attentive

At the international level, the promotion of democracy sometimes undermines human dignity.

He boasts that he "spends $3 billion" on humanitarian aid.

The point is that while US funding has saved the lives of Darfur refugees, it has no dignity.

If, as an American citizen and as an individual, we can respect the dignity of those closest to us, and as a nation, if we can consider the dignity of other nations, that is revolutionary.

And thirdly, he used to say, "Don't be afraid."

What to fear, the true threat is

We have a lot

"Let's change the way we deal with fear," he said.

"Don't make noise, let's see the true form"

There's Reason to Fear Sea Level Rise

Soviet nuclear material goes unchecked, and there's reason to fear it.

Instead of making bad decisions because of fear, let's think about sensible ways to deal with threats.

He used to say, "Fear gives bad advice."

We go to extremes when governments fail or when we try to fix relations with other countries.

And finally, number four, he worked in the worst of circumstances, and he was humble and aware of the complexity of the world.

i knew how cruel it would be

The mission to rebuild the nation seemed endless, and despite knowing its complexity, he remained humble and didn't stop.

As Americans, we've experienced crises of confidence, competence and legitimacy, and the temptation to run away is tempted to say, "I don't know what I'm doing."

but you can't escape

It is a matter of relationship with the world

The lesson I mentioned earlier about the anti-genocide movement was that it was partially successful, but it didn't achieve its goals. It's going to take decades to get there, but if you want change, you have to make it happen.

We can't rely on state institutions to voluntarily engage in dialogue with our enemies. We need to make that happen, instill dignity, humility and a strong sense of responsibility in our relations with other nations.

Will evil die?

The answer is no, we will perish if we don't forgive

thank you

(applause)

(Chris Anderson) Thank you for coming.

The plane landed in Vancouver literally two hours ago.

Thank you very much

Can you explain how the Einstein equations showed the existence of black holes?

(Shepard Dollman) Over a hundred years ago, Einstein discovered a geometric theory of gravity that warped space.

Matter warps space-time, while space-time determines the motion of matter around it.

When you have a lot of matter in a very small area, you create a hole in space-time where even light can't get out, and gravity starts trapping light.

CA: So what you're saying is that the Earth revolves around the Sun not because the Sun is pulling on the Earth, but because the shape of space is changing, and the Earth is kind of falling around the Sun.

DOLLMAN: Yes, the geometry of space-time determines how the Earth moves around the Sun.

A black hole is about to pierce spacetime, but when it gets really deep, light begins to orbit the black hole.

CA: So that's what's happening here.

This is not a photograph, but a computer simulation of an event horizon around a black hole.

DOLLMAN: Until last week, I had no idea what a black hole really looked like.

The best we could do was simulate it on a supercomputer, and again you can see the ring of light, which is the orbit of the photon.

Photons are moving around the black hole, and there's hot gas there that's attracted to the black hole, and the heat is due to friction.

A lot of gas gets hot trying to get into a small space.

CA: A few years ago, you embarked on a mission to photograph a black hole.

We focused on this galaxy far, far away

tell me about this galaxy

DOLLMAN: As you zoom in, this is a galaxy called M87, 55 million light years away.

(Anderson) 55 million light years!

(Dollman) Far away

At its center is a black hole with a mass 6.5 billion times that of the sun.

It's a little hard to imagine

6.5 billion suns condensed into one point.

That's what governs the energetics at the center of this galaxy.

CA: Even something that big would be so far away that it would be difficult to see.

you need great resolution

DOLLMAN: Black holes are the tiniest beings in the known universe.

It will have a huge impact on the entire galaxy.

To see it, you'd need a telescope the size of Earth.

It constantly emits a tremendous amount of electromagnetic waves.

(Anderson) You made that earth-sized thing.

DOLLMAN: That's right, we used telescopes around the world, perfectly synchronized with atomic clocks, to capture the light from the black hole, and stitched all the data together to create a single image.

CA: In order to do that -- all the telescope sites have to have good weather at the same time, right?

DOLLMAN: We had to be lucky in many ways.

Sometimes good luck is more important than being good

I'd like to think we were both.

You have to have light come from the black hole.

It's going through intergalactic space, through the Earth's atmosphere, but it's absorbed by water vapor, and so on. Everything just meshed together. The Earth was just the right size to get the resolution to see that black hole, 55 million light-years away, at the wavelength of that light, one millimeter.

It was like the universe was telling me what to do

CA: And we're starting to capture massive amounts of data—

That's half the data from one telescope.

DOLLMAN: He's Lindy Blackburn from the team, in front of half of the data recorded by the Large Millimeter Telescope on top of a 4,600-meter mountain in Mexico.

0.5 petabytes

To put it in a way that everyone can understand, it's enough space for 5,000 lifetime selfies.

(Laughter) (Anderson) Too much.

They couldn't send it over the internet, so they delivered the disc.

All the data was collected in one place and analyzed by computers.

I didn't really know what was going to come out of it.

DOLLMAN: The method we used is sort of like shattering a mirror and putting each piece in a different place.

A normal mirror reflects light off a perfect surface and converges to a single point.

We took each record with atomic clock precision, and then used a supercomputer to perfectly time it.

That's how we created an Earth-sized lens.

Airplanes were the only way to transport data.

No line can beat a 747 with a full hard disk.

(Laughter) (Anderson) And a few weeks or months ago, it started showing up on computer screens.

this moment

(Dollman) It took a long time.

(Anderson) Take a look—

This one!

This is the first image of a black hole

(Applause) Can you explain what this is?

(Dollman) I still feel the emotion

(Laughter) What you're seeing is the final trajectory of the photon.

Einstein's geometry is showing up.

The hole in space-time is so deep that the light is circling. As you will see later, the light behind the black hole wraps around and becomes parallel lines at that orbit and comes to us.

The radius of that orbit is the square root of 27 multiplied by some fundamental constant of physics.

It's amazing to think

(Anderson) Speaking of black holes,

I thought it was an event horizon with a lot of matter and light spinning in that shape.

it's actually more complicated

Can you explain with this animation how light bends around it?

DOLLMAN: Some of the light coming from behind is bent like a lens, and some circles around the black hole.

If there's enough light from the hot gas that's spinning around the black hole, that ray of light will converge on this screen -- that ray of light will converge on this screen -- and this will be for us.

This ring begins to emerge

That's what Einstein predicted over a hundred years ago.

(Anderson) That's amazing.

I'd like to ask you a little more about what you're seeing here.

Why are some parts brighter than others?

(Dollman) This black hole is spinning.

On the bottom side the gas is moving toward us, and on the top side it's moving away.

Just as the whistle of an approaching train becomes high-pitched, the gas approaching you has more energy than the gas receding.

The bottom side is brighter because the light is being pushed toward us.

(Anderson) How big is it?

(Dollman) The solar system fits perfectly in that dark part.

That dark area is evidence of the existence of an event horizon That dark area is evidence of the existence of an event horizon

You can't see the light from over there because the light coming from over there is swallowed up by the event horizon.

I mean— that's what

CA: There's a lot of light coming out of the area around the black hole, and it's supposed to be pointing at us.

why can't you see it?

DOLLMAN: This is a very powerful black hole.

By cosmic standards, it's not, but jets are thought to emanate from the black hole's north and south poles.

It's too close to see the entire structure of the jet, but it's the root of the jet that illuminates this space-time.

It's bent around a black hole.

CA: If you were in a spaceship that would go around that circle, how long would it take you to go around it?

(Dollman) First of all, if I can get on that spaceship, I'll give anything.

(laughs) please give me a ride

It's a little rough, but there's something called the innermost circular orbit, which is the innermost orbit that matter can orbit without falling into a black hole.

For this black hole, between three days and one month.

CA: It's very powerful, and it's also weirdly slow on some levels.

If you were there, you would fall on the event horizon, but you wouldn't even notice

DOLLMAN: You may have heard of something called the "spaghettification phenomenon," where when you fall into a black hole, the gravitational field at your feet is much stronger than at your head, and you get torn off.

This black hole is so big that it won't turn into spaghetti.

It's just going through the event horizon.

CA: It's like a giant tornado.

When Dorothy was swallowed by a tornado, she ended up in the Land of Oz.

Where would you end up if you fell into a black hole?

(Laughter) (Dollman) Vancouver, I think.

(Laughter) (Anderson) Wow my head spins.

(Applause) So this was the red part.

No, seriously

DS: Black holes are one of the great mysteries of our time, where the quantum world meets the gravitational world.

Inside is the singularity

All forces become one, because gravity becomes stronger than any other force.

But it's hidden from us. The universe has the ultimate invisible cloak.

I don't know what's going on there

CA: We have a little one in our galaxy too.

Can you show us our beautiful galaxy?

Even in the middle of this Milky Way

I hear there's another black hole and you're trying to find it.

DOLLMAN: We know it's there, and we've got the data.

I'm working on that data now.

I can't say when, but hopefully we'll get something in the not too distant future.

CA: It's much closer, but it's much smaller, so it looks about the same size.

DOLLMAN: That's right. The black hole in M87 that you saw earlier has the mass of 6.5 billion suns.

But it's far away so it looks small

The black hole at the center of our galaxy is a thousand times less massive, but nearly a thousand times more massive.

I can see it in the same viewing angle in the smooth sky

CA: And finally, let me introduce you to the people on this incredible team.

who are they?

(Dollman) This is part of the team.

I've been amazed at the response to black hole pictures.

You wouldn't have believed me if you told me you were going to be on the front page, but you did.

It's a great mystery and a gripping one, and I hope you all feel the same way.

this is just part of the team

We have over 200 members, 60 organizations from 20 countries and regions.

If you want to build a global telescope, you need a global team.

The methods we've used to connect the world's telescopes can easily circumvent some of the issues that divide us.

As scientists, we naturally come together to do things like this.

CA: It's been really inspiring for TED as well.

Thank you for what you have done and for coming.

(Dollman) Thank you

(applause)

A secret book of forbidden legends A disturbing secret that runs through the family Unspeakable terror that drives you crazy just by imagining it

These have become standard elements in today's horror stories.

It was sparked by just one writer, and his name became a term to describe the particular fear he instilled in people.

Born in Providence, Rhode Island in 1890, Howard Phillips Lovecraft grew up on the gothic horror of Edgar Allan Poe and Robert W. Chambers.

But by the time he began writing in 1917, World War I had cast a long shadow over his art.

People saw real horror, and fantastical folklore was no longer something to fear.

Lovecraft sought to invent new forms of terror to match the rapid scientific developments of his time.

He frequently used scientific elements in the production of plausible and macabre stories.

In "Colors from Outer Space," a mysterious meteorite falls near the farmhouse, turning it into a nightmarish hellscape.

Some stories used the scientific method.

"At the Mountains of Madness" takes the form of an Antarctic expedition report and tells the story of unearthing objects that it would have been better not to find.

In some stories, mathematics itself was a source of terror, and in others, improbable geometric shapes completely shattered the mind of the beholder.

Like the then-newly discovered subatomic particles and X-rays, the forces in Lovecraft's work, while powerful, were often invisible and difficult to name.

"Lovecraftian" terror has been left to the depths of our imagination rather than relying on direct descriptions of visible monsters, raw violence, and frightening shocks.

Many of Lovecraft's dozens of short stories, novellas and poems took place in the same fictional world, recurring characters, places and myths.

At first glance, it looks like it's set in New England during the time of Lovecraft.

Beneath the surface of a world that resembles reality lurks evil rulers, for whom the creatures of the earth are nothing more than comfort.

More primal than a god, Lovecraft's "Old Ones" lurk in the corners of our reality.

The god Yog-Sothoth, for example, "bubbles in primordial slime form in the depths of time and space, in nuclear chaos," whereas in the case of the blind and foolish god Azathoth, the only thing that can stop its destructive impulses is "the maddening thump of a vile drum, and the thin, monotonous tone of a magic flute." enigmatic

Many of Lovecraft's heroes are researchers, anthropologists, and curio collectors who stumble upon signs that the Old Ones are real.

But even an indirect glimpse is enough to drive you crazy.

Wherever they endure, the reader is not intoxicated by success, but is left with the feeling of the cosmic pettyness of their own existence, that they are nothing more than a point of insignificance, at the mercy of an immeasurable power.

But the most powerful force of such beings may have captivated Lovecraft's contemporaries.

Lovecraft corresponded with other writers and encouraged them to use elements and characters from his fictional world in their work.

The gods and secret books of Lovecraft's world appeared in many of the stories written by his correspondents, such as Robert E. Howard and Robert Bloch.

Today, this shared worldview is called the "Cthulhu Mythos," after Lovecraft's infamous dragon-octopus hybrid "Cthulhu."

Unfortunately, Lovecraft's fear of the unknown was reflected in his personal views in unhealthy ways.

He holds strongly racist views, and some of his work contains blatant stereotypes and racist terms.

But the rich world he created has outlived his own prejudices.

After Lovecraft's death, the Cthulhu mythos were inherited by a wide range of writers, many of whom were reimagined from a variety of perspectives that transcended the prejudices of the original authors.

Despite his literary legacy, Lovecraft never achieved financial success in his lifetime.

At the age of 46, he died obscure and penniless, prey to his idea that the universe was indifferent to man.

But his work has spawned short stories, novels, board games and cultural icons.

As long as people fear the unknown, Lovecraftian horror will remain in the darkest corners of imagination.

I have a little problem with sleep-

I'm an insomniac. For a long time, I struggled with the ill effects of insomnia.

I think it's good to stay up late in a way

After years of insomnia, this insomnia may be the driving force behind my creativity.

Lie down and think... or wander around

Sometimes there are many people who walk in the middle of the night

Walking around during the day and trying to pick up interesting people

(Laughter) And sometimes... actually, this was in the gossip column of the Post, and I was kind of following this guy because he was wearing really nice shoes, and I just followed him.

They let me take a picture of the shoes, thanked each other and said goodbye.

The real inspiration for my designs is

It often comes from misunderstandings and optical illusions.

There are a lot of images and clothes in the world.

Especially good things come from a little misunderstanding or something that surprises me.

If you're in a taxi and you see a hole in your shirt or something that's really interesting -- nice and functional -- and you've never seen it before.

When I stop the car, I can't help but get close to it. Sometimes it's not actually a hole, it's an optical illusion. Or it's just a shadow.

If it's actually a hole

someone got ahead of me

You can't imitate other people's ideas.

You never know where your inspiration comes from

In my case, it's not research.

I don't get much out of research.

I actually did something really, really, really fun this Christmas at the Guggenheim in New York.

I did a Juilliard ensemble and "Peter and the Wolf," and I acted as the narrator.

I have a dear friend of mine there, a critic, and he's very intelligent, Joao Acochera.

They come backstage and ask, "Isaac, what do you think of Stalinism?"

I said, "I don't know what Stalinism is."

I know "birds" and "wolves." The wolf eats the bird, and in the end you can hear the bird in your belly—beeping, right?

So I don't know about Stalin, I have my own research methods.

For example, if I were to start working on 18th-century opera costumes, I would do a lot of research, because it's not something I should be doing, it's interesting.

Movies really inspire me

Colors used in movies How colors appear due to lighting

The lighting behind the projection and the lighting from the projection create some amazing colors.

Anyway, let me show you this short video clip.

I stay up late and watch movies. I often see women in movies.

I think about their roles, as if they were my daughters.

I'm always looking at how they're portrayed in the movies, whether they're glorified in a way -- whether they're glorified in a way that's comical -- whether they're demeaned in a way, or demeaningly.

color is very important

Colors often inspire me

It's hard to find colors in nature - but when you put them next to artificial colors, natural colors are very beautiful.

That's why I study color a lot.

I've often wondered, "How in the world can I make something as beautiful as Natalie Wood?"

"How can I make something as beautiful as Greta Garbo?"

That's impossible, isn't it?

Maybe that's what I think about all the time, and it keeps me up late at night.

There's something I want you to see... I often go to fortune-telling and tarot reading.

A fortune teller tells you to do this and that, right?

(Laughter) When I was 21, a fortune teller told me, "You're going to meet your destiny, and that man's name will be Eric."

So I went to bars for years, and just meeting someone named Eric made my heart flutter.

(Laughter) When I was in despair, I would yell, "Eric!"

(smile)

A long time ago, a tarot fortune teller said something interesting.

The last card I drew meant my destiny, and it was a man with a cane, a boater, and spats, like a bard.

Now, let's take a look at the clip, at the show -- they're doing this crazy thing.

so let's see

I'm so embarrassed

thank you i will do whatever you want

The show's name comes from -- it's about my mom, and it's kind of a quote from her line.

I had a boyfriend...

I swear it's a happy story, so please don't worry

I was dating someone for about a year, and we both got serious -- we invited each other's parents to dinner.

We introduced each other, and my mother was a little nervous about his mother.

His mom was a little negative about the unusual lifestyle, yes, about gays.

My mom got a little offended and said to his mom, "Do you really think so? They're living a really good life--

go to a restaurant together, enjoy a show

dining out and theater

(Laughter) That's the title of this show. This line is going to be engraved on my grave.

I couldn't be bold enough to put this clip of myself singing in a pub.

So if you want to see it, come see it because it's really bad...

how should i tell you

I think it's a good thing to be a little restless

At least in my case, because I'm always doing something, otherwise I get bored very quickly.

I can't do anything well

I just dabble in a lot of things

And yet I won't look back

The exception is that you can't sleep at night, and when you look back and think about it, you're like, "What a fool."

But there is that too, right?

When you have too many things to do, you get bored with everything, not just one thing.

I stop worrying about one thing

exactly like that

Now I'm going to show you this. Speaking of opera costumes --

work with various choreographers

I work a lot with Twyla Tharp. I work a lot with Mark Morris. He's my best friend.

I worked with him on three opera costumes, most recently "King Arthur."

I've been immersed in the world of dance since I was a teenager.

I was an actor there, and I had a lot of friends who were ballet dancers.

Where does the inspiration really come from?

where does it really come from?

I made finger puppets when I was a kid.

Maybe that finger puppet was the beginning of it all

So I went to theater high school-

So I went to drama high school, where I met dancers and actors.

From there, somehow, I became interested in design.

I enrolled at Parsons School of Design, and that's where my career as a designer began.

I don't think of myself as a designer, I don't necessarily think of myself as a fashion designer.

Actually, I don't even know what my title is.

I don't know anything about myself

That's right (laughs)

The truth is, I'm always a little bit bored, and I think that's a very important thing for a fashion designer.

I'm just a little bored with everything

Even if it's not, it's no good if you don't act like that

(Laughter) I'm really just a little bit bored with everything.

I always say to my partner, Marissa Gardini, that she's the one who makes all the bookings, she's dependable, she manages all the deals.

I often tell her that if I start killing time with the computer game Bridge.

I've been playing bridge all the time on my computer... anyway... 10 years ago, I thought, if I had to say the least boring place in the world, it would be a television station.

If you get bored, do something else... and we can talk about it, right?

So I got a TV show

This show has become very important to me.

Can you send me that video clip?

Here's my favorite Rosie clip

(Video) Back on set

hello hello ben

She's just wearing an all-back, but she's so cute, isn't she?

Where should I be?

I don't want to get in your way

Ashley, have you ever been anxious?

against what? haircut

haircut? I've never been nervous about a haircut at all

By the way, you're so cute, do you like it? I did it!

Don't you like to look cute? I want to look cute, of course I want to look cute

I just checked, sometimes- some people want to look ugly, so I'm not

I've read a lot about rich people

Rich kids, when they grow up, somehow, their lives get messed up, right?

There's gotta be a way to do something, Rosie.

For example, if you're ridiculously rich and famous for it, shouldn't you have children because it will ruin your life? Wouldn't it be better not to have children because it would ruin your life? I don't think so, but the happiness of children

It's no good if you don't think about it first

you decide what to do

My child is 7 years old, but when he turns 14

I was hospitalized in a rehabilitation facility

So watch this recording and oh I'm a terrible mother

What should I do? It's the first time I've made it so short!

Good, right?

Ashley: Your hair... okay! cut me off

Can you please let me come a little closer? No, I'm still on my way

still on the way

Are you in a hurry? It's so cute I like the new me

Very nice!

Full of Rosie Whoops!

By the way, what is the least boring thing in the world?

To make a pretty person so ugly, isn't it? That has nothing to do with boredom.

I actually found this wonderful quote the other day, "Fashion makes you feel good because it makes you forget you're going to die."

That's right? It's actually on my website

this is like i said

I think you said it in an interview, I forgot, but it's true.

I want you to watch the last video clip.

I cook a lot and I love to cook

I often compare things to food.

For example, do you serve rotten chicken to your customers?

You can't, you can't just give me a worn out old dress, can you?

You can't, you can't just give me a worn-out old dress, can you?

When you boil it down, that's what happens. Everything has to do with food.

When you boil it down, that's what happens. Everything has to do with food.

then take a look

I keep doing it because it's the most fun thing in the world

This website has many

It covers many fields

Each field is filmed separately, like a TV show.

I really like it

It just started at the beginning of February, so what will happen?

Whether the content is good or bad, it's not boring

now this is the last

I always make buttermilk pancakes and waffles.

Is that so?

Yeah, but I always can't find buttermilk

Oh, you can't find buttermilk anywhere even in high-end supermarkets.

Is that so? There is always low-fat buttermilk

That's the only way Was it?

didn't you know? I'll tell you then-

I'll tell you something funny Please don't laugh! It's not funny It's not low fat I didn't know there was no buttermilk-

I'm sorry so?

This is what it's like in the old days when you made butter - do you know how to make butter?

Do you want to stir? For making cream?

exactly that

First, take high-fat milk, or cream, and stir it until it separates into curds and water.

It's the same clear water that comes out when whipped cream is whipped too much.It's the same clear water that comes out when whipped cream is whipped too much.That's buttermilk.

People used to use it to make baked goods and stuff like that.

People used to use it to make baked goods and stuff like that.

That's why buttermilk is low-fat or fat-free milk.

I did not know

No wonder he thought so, because buttermilk is so rich and delicious.

I agree

No one thinks it's low fat, right?

thank you very much

nice ted it's great to be here i love it

thank you bye

Your parents' most precious gift to you is the two sets of three billion letters of DNA that make up your genome.

As with anything made up of 3 billion elements, it has a fragile side.

Sunlight, smoking, an unhealthy diet, and natural errors in cells all cause changes in the genome.

The most common change in DNA is the swapping of a single letter, or base, such as a C changing to another T, G, or A.

These single letter changes occur billions of times a day somewhere in the cells of the body and are called "point mutations."

point mutations are mostly harmless

Occasionally, such mutations disrupt important cell functions or cause cells to behave in a detrimental way.

If the mutation is inherited from a parent or occurs early in development, many or all cells will end up with the deleterious mutation.

You'll be one of the hundreds of millions of people with genetic diseases like sickle cell disease, progeria syndrome, muscular dystrophy, Tay-Sachs disease.

Severe genetic diseases caused by point mutations are particularly frustrating, because we often know which mutated letter causes the disease and, in theory, it can be cured.

Millions of people have sickle cell disease, which is caused by A to T point mutations in both hemoglobin genes.

Children with Progeria Syndrome are born with a T point mutation instead of a C, and the catastrophic result is that these wonderfully bright children age rapidly and die at about age 14.

Throughout the history of medicine, the most efficient means of in vivo correction of the mutation that causes this disease, reverting the T to a C

didn't until recently

In our lab, we have successfully developed a technique called "base editing" that makes this possible.

The story of the development of base-editing technology begins 3 billion years ago.

We see bacteria as what infects humans, but bacteria themselves can also infect viruses.

So about three billion years ago, bacteria evolved defenses against viral infections.

That defense mechanism is known as CRISPR.

CRISPR's weapon is this purple DNA-cutting protein that acts as molecular scissors, splitting the double helix in half.

If CRISPR couldn't distinguish between the DNA of bacteria and the DNA of viruses, it wouldn't be very useful as a defense system.

The great thing about CRISPR is that it can be programmed to look for, attach to, and cut only specific parts of a DNA sequence.

When a bacterium encounters a virus for the first time, it can store a small piece of the virus' DNA and program CRISPR to cut that DNA when it infects it in the future.

The truncation messes up the viral genome and disrupts the viral life cycle.

Six years ago, it was shown by eminent researchers Emmanuel Charpentier, George Church, Jennifer Doudna and Feng Zhang that CRISPR scissors could be programmed to cut arbitrary segments of the human gene sequence instead of viral DNA chosen by bacteria.

but the results will be similar

Cutting a sequence of DNA usually results in the disruption of the function of the cut gene, because a jumble of letters is inserted and deleted at the cut.

Inhibiting gene function can be useful for certain applications.

But for genetic diseases caused by point mutations, simply cutting the mutated gene does not benefit the patient, because the mutated gene needs to be repaired rather than further destroyed.

Cutting the mutated hemoglobin gene that causes sickle cell disease does not restore the ability to make healthy red blood cells.

We can also introduce new sequences to replace the sequences surrounding the cut, but unfortunately this doesn't work in many cell types, and the effect of the disrupted gene is greater.

Like many scientists, I dreamed of a future in which genetic diseases could be treated, even cured.

A major stumbling block has been the lack of means to repair the point mutations that cause many of the genetic diseases in humans.

As a chemist, I began working with my students to develop methods of directly chemically acting on individual DNA bases, with the goal of repairing, rather than destroying, the mutations that cause genetic disease.

The result is a molecular machine called a "base editor."

The base editor takes advantage of CRISPR's scissors programmable search mechanism, but instead of cutting the DNA, it converts one base to another and doesn't destroy the rest of the gene.

If natural CRISPR proteins are molecular scissors, then base editors can use molecular pencils to directly rewrite one letter of DNA to another, rearranging atoms to change one DNA base to another.

base editors don't exist in nature

In fact, we created the first base editor shown here from three proteins of different origins.

Using CRISPR's scissors as a starting point, we reduced the ability to cut DNA and retained the ability to programmatically seek out and extract target DNA sequences.

The force-reduced CRISPR scissors, shown in blue, attach to it a second protein, shown in red, that triggers a chemical reaction that replaces the C DNA base with a base that behaves like a T.

Third, we attach a protein, shown in purple, that prevents the edited base from being eliminated by the cell.

The result is a three-part protein that, for the first time, is capable of converting a C to a T at a specific site in the genome.

But this was only half the job

The two strands of the double helix must form base pairs in order to exist stably within the cell.

Since C can only pair with G and T can only pair with A, simply changing a C to a T in one strand of DNA creates a conflict between the two DNA strands, and the cell must decide which strand to exchange.

We realized that we could further modify this three-part protein to damage the non-edited strand so that it could be discarded.

This small wound tricks the cell into remaking the non-edited strand into one with the G replaced by an A, completing the conversion of the base pair C-G to the stable base pair T-A.

After several years of hard work led by Alexis Comore, a postdoctoral researcher in our lab, we succeeded in developing the first base editor to convert Cs to Ts and Gs to A's at specific locations.

Of the 35,000 or so point mutations known to be associated with disease, only two types are repairable by this first base editor, about 14% of the 5,000 mutations.

To deal with the largest group of disease-causing point mutations, you need a second base editor that converts A to G or T to C.

Nicole Gadelli, a postdoctoral researcher in our lab, set out to develop this second base editor, which could theoretically cover nearly half of the point mutations that cause disease, including progeria syndrome.

It turns out that a new base editor can also use the CRISPR machinery to bring it to the proper place in the genome.

But we soon ran into a big problem: there was no known protein that could change DNA's A to G or T to C.

When faced with such a serious obstacle, most students will look for another subject, unless they have a different supervisor --

(Laughter) Nicole agreed to continue with what seemed like a very ambitious plan.

In the absence of a natural protein that would perform the desired chemical reaction, we decided to evolve a protein in the lab that would turn A into a base that behaved like G, and started with a protein that would perform the relevant reaction in RNA.

We set up a Darwinian survival of the fittest system, searching tens of millions of protein variants and ensuring that only those variants that produced the necessary chemistry would survive.

And we got the protein shown here, the first protein that converts DNA's A to the equivalent of a G.

We attached the protein to the desensitized CRISPR scissors, shown in blue, and we had a second base editor, which changed the A to a G, and used the same strand-wounding technique we used in the first base editor to trick the cell into recreating the unedited strand of T into a strand of C, completing the conversion from base pair A-T to base pair G-C.

(Applause) Thank you.

(Applause) It's a rare experience for scientists working in America to be interrupted by applause.

(Laughter) We developed these two base editors only three years ago and one and a half years ago, respectively.

Despite such a short period of time, base-editing techniques have become widely used in the biomedical research community.

Base Editor has been offered over 6,000 times at the request of over 1,000 researchers worldwide.

There are already 100 published scientific papers using the base editor, ranging from bacteria to plants to mice to primates.

Base editors are new and have yet to reach clinical trials, but we've reached an important milestone towards that goal: we've repaired the same point mutations that cause genetic diseases in humans with base editors in animals.

For example, a team led by Luke Coblan and John Levy, which includes two of our students, recently used a second base editor to repair lesions at the DNA RNA protein level in mice with Progeria syndrome by reverting the disease-causing T to a C.

Other cases where base editors have been used to treat disease in animals include tyrosinemia, beta-thalassemia, muscular dystrophy, phenylketonuria, congenital deafness, and certain cardiovascular diseases, each of which repairs the disease-causing point mutation.

For plants, base editors are used to modify DNA to improve yields.

Biologists are using base editors to explore the role of individual letters in genes associated with diseases like cancer.

The two companies I co-founded, Beam Therapeutics and Pairwise Plants, use base editors to treat genetic diseases in humans and to improve agriculture.

All of these base-editing applications have happened within the last three years, and on the time scale of the history of science, that's a fraction of a second.

We still have a long way to go before base editing can really improve the lives of people with genetic diseases.

Many of these diseases are thought to be curable simply by correcting the underlying mutations in a percentage of cells in an organ, but it may not be easy to send molecular machines like base editors into human cells.

Using a natural virus to carry a base editor instead of a cold-causing molecule is one promising and successful delivery strategy.

It is very important to develop new types of molecular machines to cover all patterns of substitution of one base pair to another, and to minimize the possibility of unwanted edits at the wrong place in the cell.

Working with scientists in other fields, physicians, ethicists and governments to ensure that base editing is applied in a sensible, safe and ethical manner is an important responsibility.

That's the challenge. If someone had said, just five years ago, that researchers around the world were using molecular machines that had been evolved in the lab to convert one set of base pairs in the human genome to another in an efficient and minimal way, I'm sure I would have asked, "What kind of science fiction are you reading?"

Creative enough to create what you can design, challenging enough to evolve what you can't design, thanks to our tireless and dedicated students, base editing is changing from a science fiction dream to an exciting new reality, and the most precious gift we can give our children is not only three billion letters of DNA, but the tools to protect and repair it.

thank you

(Applause) Thank you.

Let's start with the founder of the Jet Propulsion Laboratory (JPL).

When they were young, they were very imaginative and adventurous, and at Caltech they mixed chemicals and competed in explosive power.

I wouldn't recommend trying the same.

Of course they blew up the shack, and the university banished them to the backwaters to continue their experiments.

Here's what I call the "first five employees" during their break.

As I said they are adventurous

One of them was like a cult, not far from here, in Orange Grove, where he was mixing up the best compound and had a tragic explosion.

You know what kind of people they are?

I'm careful not to cause another accident

see this

Who do you think is the JPL employee here?

I tried to imitate him this morning, but when I got out, it was too cold, so I decided to wear a shirt.

Rather than that, the reason I wanted to show you this picture is because I want you to pay attention to where the other person is looking and where he is looking.

No matter who else is looking, keep looking the other way and trying different things

that's what we're all about

I quote my colleague Ralph Emerson, who posted this in my office: "Don't walk down the road.

Let's leave our footprints on untrodden lands."

And this is what I would really recommend everyone to do: watch what people are doing and try something completely different.

You can't do much by looking at other people's work and making a few improvements.

In the beginning, I focused on rocket development, but I also did a lot of purdies.

It's like a party from a few years ago.

But after Sputnik was launched 50 years ago, a big change came, when we launched America's first satellite, which you can see on the left.

And then we made a 180-degree turn from rocket development to exploration agency.

The transformation was accomplished in a few years, and it is now one of the nation's leading space exploration agencies.

But all the while, I had to remember my past setbacks.

At the bottom is a rocket that should have ascended, but it somehow ended up on its side.

It's a missile that failed to guide, so to speak.

To commemorate this event, we launched the "Misguided Missile" contest.

Every year we had festivals and contests and parades to choose the winners.

It's no longer appropriate, certainly not classy given the current climate.

I got a little serious there.

This is what you saw the last time you attended the Rose Ball.

Just for fun, the rover on the right is about to go through final testing and be transported to Cape Canaveral for launch.

It is the real thing that soft-landed on Mars

You can see how we work hard while having fun at the same time.

I'm going to show you a short video, so you can see the talent that one of our employees has.

Viaware of Safety is the name of a rock band.

Exploring relatively experimental music

there was improvisational jazz

It also has a strong rock sound

We treat sound as an instrument, mixing electronics and acoustics for more abstract sounds and live performances.

Music is one side of me.

I work at the Jet Propulsion Laboratory, developing a Mars rover.

The best engineers I know are also talented in the arts.

people should do what they want

You don't need to listen to people who say you can't do it

They may be right, but I doubt it.

anyway do what you want

I'm Morgan Hendry I'm NASA

So let's move on from the entertainment to the real thing. People always ask me why I explore.

What is the reason for planning and exploring missions?

my idea is very simple

As you know, 13 billion years ago, the big bang, the origin of the universe, happened.

What's really interesting is what happened after the big bang, and the world we live in today is pretty amazing.

It's a beautiful landscape outside, full of life, and people like you are having intelligent conversations here.

It all started with the Big Bang So the question is, how did it happen? How did it evolve? How did the universe form?

How were galaxies formed? How were planets formed?

How did a planet that supports life form?

Is that normal?

Do all planets orbiting stars have life?

We are literally made of stardust

Our origin is a star We are stardust

So the next time you're feeling down, look in the mirror and say, "I'm looking at the stars."

You can omit "Kuzu"

literally we are made of stardust

So our search is like writing a book about how things that exist today came to be.

And the planet closest to us to explore is Mars.

One of the reasons Mars is particularly interesting is that it's not far.

Reach in just 6 months

6 to 9 months depending on the time Mars is longer than Earth

It's a little smaller, but it's very similar. Excluding the ocean, Mars' land area is about the same as Earth's.

It has polar caps, it has an atmosphere that is slightly thinner than Earth, it has a climate that is very similar to a certain extent.

It's like the Grand Canyon on Earth, but it's much, much bigger.

as big as the United States

There are volcanoes, and one of them, Mount Olympus, is a giant shield volcano.

If you look at its elevation, if you compare it to Mount Everest, you can see how huge Mount Olympus is.

Mount Everest is hidden

You can understand the scale of crustal deformation and volcanic activity on Mars You can understand the scale of crustal deformation and volcanic activity on Mars

Recently, satellites have observed landslides similar to those on Earth.

It's an active planet, and it's still active.

You want to know what Rover is up to right now? So let me show you what's going on

It's a huge crater, and geologists love craters because it's like a big hole in the ground that you can see below the surface without much effort.

It's called the Victoria Crater, and it's the size of several football fields.

You can see a small dark dot in the upper left

This picture was taken from an orbiting satellite

And when you zoom in, it's a rover on the ground.

If you shoot from orbit and zoom in on the ground, you can actually see the rover.

We used both satellite imagery and a rover to survey a wide area, and then we instructed the rover to move where we wanted it.

Specifically, we're dropping the rover into the crater.

geologists love craters

Many of you have been to the Grand Canyon, but you can see strata on the walls of the Grand Canyon.

A stratum is the part of the earth that was a million years, ten million years, one hundred million years ago, and there is sediment from that time.

Decoding geological strata is like reading a history book, because you can learn what happened in the past in that place.

This is the crater wall, and as the rover descends, it studies strata and analyzes rocks.

It's hard to go down a hill like this

you wouldn't normally do that

But we made sure everything worked perfectly before the rover began its descent.

The last time I was here, shortly after landing, I think it was about 100 days after landing, and I told you that it was amazing that the rover had been in operation for 100 days.

And it's been 4 years and it's still working

But no, we thought it would only last 90 to 100 days, powered by solar power, and we thought that on a dusty planet like Mars, the dust would accumulate on the surface and not provide enough power to run the rover.

Being smart is important, but sometimes luck is on your side

We got lucky, because sometimes on Mars you get these whirlwinds that blow dust off the rover.

It's like a new car and it's been working for a long time.

Of course, we've done some design work, and that's why whirlwinds have worked for so long and still provide scientific data.

Still, the two rovers are getting old.

One wheel is stuck. One of the front wheels. So I'm driving in reverse.

Another one has a broken joint, so the arm doesn't move well, so I'm tricking it into moving it.

still provides a large amount of scientific data

Over the years, many non-scientific people have been very excited about these rovers, so here's a video showing how the non-scientific community received the rovers.

please take a look

By the way, this video is a very accurate representation of what happened when we landed four years ago. By the way, this video is a very accurate representation of what happened when we landed four years ago.

All the parachutes opened

Airbag deployment Open

camera footage arrived

Hooray!

This is what the operations room looks like in Houston, exactly like this.

Let the Dutch find the Martians

what are you doing

What is this?

Not bad, right?

So let me tell you a little more about the beauty of Mars.

As I said, it's very Earth-like, and you can see the dunes.

You'd believe me if I said it was the Sahara Desert or something, but this is a picture of Mars.

One area of ​​particular interest is the northern part of Mars, near the North Pole, where there are polar ice caps, much like northern Canada, that expand and contract.

You can observe the characteristic topography of the glacier

In fact, we wanted to find out what the ice was made of and whether it contained organic matter.

A spacecraft called the Phoenix is ​​on its way to Mars and it's due to land exactly 17 days, 7 hours and 20 seconds from now, so please set your clocks.

We'll be landing on another planet on May 25th, roughly before 5:00 P.M. West Coast time.

This is an artist's rendering of the spacecraft landing on Mars, and for those of you who couldn't catch the landing show 17 days later, here's what it looks like.

Introducing "7 Minutes of Horror"

The plan is to dig a hole in the ground, take a sample, put it in an oven, heat it up, and measure the gas coming out.

Launched about 9 months ago

It's about 20,000 kilometers per hour, and seven minutes later, it soft-lands on the surface without damaging the lander.

Phoenix is ​​the first Mars reconnaissance program

We plan to land near the North Pole of Mars for the first time, and also for the first time to touch water on a planet other than Earth.

At least on Earth, where there's water, there tends to be life, so on Mars, it's possible that life once existed in water.

Atmospheric re-entry to soft landing requires a spacecraft flying at 20,000 kilometers per hour to decelerate and gently stop in a very short period of time.

enter the atmosphere of Mars

112 kilometers above the surface of Mars

The lander is housed inside what we call an aeroshell

Shaped like an ice cream cone

The part that looks like a plate on the front is heat-resistant and covered with a 1cm-thick heat-resistant cork Covered with a heat-resistant cork

This very special cork protects the spacecraft from the harsh impact of re-entry.

As the spacecraft passes through the atmosphere, it creates friction, which is used to slow it down.

From here, slow down from 20,000 km/h to 1,500 km/h.

The outside gets as hot as the surface of the sun

The temperature of the heat-resistant part is 1400℃.

Doesn't get hot inside

probably about room temperature

It's time to deploy your parachute It's time to deploy your parachute

Too early and the parachute will not work

The fabric and seams will tear

that's no good

Fifteen seconds after the parachute opens, it slows down from 1,500 to 400 kilometers per hour, which is relatively slow.

The heat shield that protected the spacecraft during re-entry is no longer needed, so it is removed.The heat shield that protected the spacecraft during re-entry is no longer needed.

Once the heat shield is disconnected and the legs are deployed, then the radar system begins measuring Phoenix's altitude above the ground, and then the radar system begins measuring Phoenix's altitude above the ground.

99% deceleration from atmospheric re-entry

99% of the process until landing has been completed.

But even in this case, the remaining 1% is very difficult.

Here the spacecraft decides when to release the parachute.

A spacecraft falling at 200 kilometers per hour will be released one kilometer above the surface of Mars.

It's like two Empire State Buildings on top of each other. It's like two Empire State Buildings on top of each other.

At that point, the aft shell separates and the spacecraft goes into free fall.

It's a moment of terror. So many things happen in an instant. It's a moment of terror. So many things happen in an instant.

As the spacecraft free-falls, it's in the proper attitude to land with all its equipment.It's in the proper attitude to land with all its equipment.

Then fire up the engine, straighten up, slow down slowly, and land safely.

Earth and Mars are so far apart that it takes more than 10 minutes for a signal to reach them.

This series of operations takes about 7 minutes

So when we get the signal to start re-entry, it's all over.So when we get the signal to start re-entry, it's all over.

Spacecraft must have a high degree of autonomy in order to land safely.

Mars soft landing is technically very difficult

We're going to take a spacecraft that's been in space and land it on the surface of Mars using every conceivable technology.

Exciting and challenging

I hope things go as you see

The moment a spacecraft lands on another planet can be very nerve-wracking.

Let me introduce you to our next plan.

We're currently designing the next rover we'll send to Mars.

Let me give you a little insight into the design phase.

It is also common to everyone's product planning.

As you can see, the Phoenix plan had to deal with the heat we were facing.

We studied all possible materials and shapes We studied all possible materials and shapes

We are not trying to please our customers

We want to make sure we build a practical, efficient device.

First, we tried to encourage employees to be as creative as possible.

Being close to the art center is a big plus. In fact, art center alumnus Eric Nyquist inspired us with his amazing work in our mission spaceship design room.

There's also a ton of Lego -- it's a real grown-up playground -- and we sit around and think of different shapes and designs.

And then it gets progressively more serious, with CAD/CAM engineers, engineers, scientists coming together, working on thermal properties, design, atmospheric properties, parachutes, and working in teams to go over the details and computer design a spacecraft that meets, to some degree, the specifications we need.

On the other hand, we also have to consider the environment of the planet we're aiming for.

If you go to Jupiter, it's a very radioactive environment, and the radiation levels near Jupiter are about the same as inside a nuclear reactor.

It's like throwing your computer into a nuclear reactor and it has to work.

We face all these problems big and small.

Parachute test in preparation for atmospheric re-entry

In the video, there was a scene in which the parachute was destroyed.

Deploy from ultra-high speed and decelerate So do all kinds of tests

If you compare the parachute to a person standing up, you can see how big it is.

Then we'll build a prototype and bring it to JPL's Mars yard, where we'll test it.

Kick it, hit it, drop it, and verify how it will break.

and fix your concerns

Then we actually build and fly the actual aircraft

The next rover to fly is the size of a passenger car

A large outer shield protects the rover from heat

It will be built over the next year and will be launched in June, a year from now.

It's a very big rover, so I couldn't use the airbags.

Last time, many people told me that the airbag was a very good idea.

Unfortunately, this rover is ten times the size and three times the weight of the previous rover.

So we can't use airbags, so we need some other clever landing method.

We wanted to send less material so that it wouldn't pollute the surface, and we wanted to land directly on the rover's legs.

So we decided to use the same idea that we're using in helicopters on Earth.

The lander actually stops about 30 meters above the surface and then uses a skycrane to lower the rover to the surface.

I hope it goes as planned

This time the rover is like a chemist

What the rover does is analyze the composition of rock chemistry.

The rover has an arm that picks up the sample, puts it in the oven and crushes it for analysis.

In order to collect samples that are too high to reach, we deploy a laser system, project it onto the rock, inhale the vaporized components, and analyze the composition of the rock.

It's like Star Wars, but it's real

is real

And to help us, we'll put ads on the rovers and train the rovers to serve cocktails on Mars.

I hope you can see the fun things I do on Mars I hope you can see the fun things I do on Mars

Now let's go to Saturn, and here are some things we know.

Saturn has two very interesting points.

First of all, it's a very attractive planet, and it has very beautiful rings.

And for scientists, this ring is also special, because they think it's a small-scale representation of how the solar system formed.

Some scientists believe that when the solar system formed and the sun condensed and formed, the dust formed a ring around it, and the particles in the ring piled up on each other, gradually forming rocks that eventually formed planets.

So by observing Saturn, we can get a real-time picture of the birth of a small solar system, a kind of test environment.

So let me give you a little introduction to the Saturn system.

I'll take you on the ring first

Of course these are live action

not animation etc.

It was taken from Cassini, a satellite that orbits Saturn.

You can see the details of the particles that make up the ring You can see the details of the particles that make up the ring

Particles collide with each other and get bigger.

As a result, tiny satellites form, creating grooves in them.

You would think that a ring is a very large object.

Yes, the diameter is very large, but the thickness is very, very thin.

This is where the rings cast shadows on Saturn

You can see one of the satellites that formed there You can see one of the satellites that formed there

It's a very thin giant ring spinning.

So many different types of satellites will form in the future, each one so unique, that scientists have spent decades studying them, and they're asking NASA to spend more money to understand the shape and origin of these objects.

There are two satellites of particular interest

One is Enceladus

They're all ice satellites, measured from their orbits.

And there's something very strange

When measured as it passes over what appears to be a tiger-stripe region, there is a sudden increase in temperature relative to the rest of the planet.

When I turned around after passing, I saw geysers blowing out

discovered

It's just Saturn's Yellowstone

Ice geysers erupting, we can infer that there is an ocean inside, and we can infer that there is an ocean inside.

Luckily, we were able to capture the moment when a large-moving geyser was released.

This little arrow is pointing about 50 kilometers, and a few months ago we decided to fly a spacecraft through the plume of a geyser to try to figure out what it was made of.

It was, of course, a risky endeavor, but it worked.

We passed the apex of the volcanic plume, but we could see organic matter erupting along with the ice.

And as we orbit Saturn in the next few years, we plan to make more precise observations as we get closer to the surface.

Titan is also getting a lot of attention, and Titan is interesting because it's bigger than the moon and has an atmosphere.

It's as dense as our atmosphere.

So on Titan, we feel the same atmospheric pressure as we do on Earth, but it's much colder and the atmosphere is made up of methane.

Methane got a lot of attention because it's organic, and that's why many thought that the presence of organic matter in abundance might have evolved into life.

Titan is now called a prebiotic planet because it's probably so cold that organic matter didn't develop into the building blocks of life needed for the birth and evolution of life.

Titan, therefore, appears to be a 3 billion-year-old Earth that was frozen before life arose.

It's an interesting topic, so I'm going to tell you what we did. We dropped a rover developed by our colleagues in Europe from Saturn's orbit. We dropped a rover from Saturn's orbit.

It plunged into Titan's atmosphere.

Here is a photo of the terrain taken during the descent

looks like the california coast to me

You can see the river along the coast. The white part looks like Catalina Island. That looks like the ocean.

And with our radar equipment, we've also found lakes that look like the Great Lakes, and they really do look like Earth.

There are rivers, seas, lakes, clouds and rain.

It's very similar to the water cycle on Earth, but it's not water, because it's so cold that water freezes.

These liquids are actually hydrocarbons, ethane, methane, similar to the fuel in our cars.

It has a liquid cycle similar to Earth, but it's an organic planet with ethane and methane.

So on Titan, you don't have to worry about gas prices.

All you have to do is go down to the nearest lake, put in a hose, fill up your car.

But if you strike a match and start a fire, the whole planet will explode.

Finally, here are some photos

This might give you a little idea of ​​the universe, and here's a picture taken from the far side of Saturn, looking toward the Sun.

Because the Sun is behind Saturn, we can observe "forward scattering." You can clearly see all of Saturn's rings. Let's zoom in.

You can't see it very clearly, but the little dot in the upper left, about 10 o'clock, is the Earth.

You can hardly see it there

Zoom up to see the Earth Zoom in until you see the Art Center

Thank you for your attention.

"New drug cures cancer"

"Aspirin reduces heart attack risk"

"Breakfast makes me lose weight"

The news is full of health headlines like this one, and they often contradict each other.

So how do we know what's a real health problem, or what's really promising, and what's unproven?

In medicine, there's often a disconnect between the news headlines and the underlying scientific research.

This is because headlines are designed to attract attention, and the bolder the statement, the more effective it is.

On the contrary, many scientific studies are more meaningful when they focus on specific problems.

The best way to fill this gap is to read the headline-making studies.

To test your skills, we thought of a simplified research scenario for each of these three headlines.

When you see the description of the first study, pause the video at the headline and find the problem.

Assuming you have all the information you need

Let's start with a hypothetical scenario: an experiment in mice to test a new drug for cancer.

In this experiment, you have two groups of mice, one receiving a drug and the other a placebo.

At the end of the experiment, the drug-treated mice had completely cured their cancers, and the placebo-treated mice had not.

So what's the problem with the next headline: "Study Shows New Drug Cure Cancer" Because the subjects in this study were mice, we can't draw conclusions about human disease based on this study.

In fact, early studies of new drugs and treatments aren't done in humans.

If early research shows promising results, we'll conduct clinical trials to see if it's applicable to humans.

Now let's look at a slightly more complicated example, a study of the effect of aspirin on heart attack risk.

In this study, a group of men were randomly divided into two groups.

One group takes aspirin daily and the other group takes placebo daily.

At the end of the experiment, the control group had far more heart attacks than the group taking aspirin.

So what's the problem with the next headline written in this context, "Aspirin reduces heart attack risk?" This study showed evidence that aspirin reduced heart attacks in men, because in this case, all of the subjects were men.

But the conclusion that aspirin reduces the risk of heart attacks is an overstatement, and we cannot assume that the results of men's studies can be applied to women.

Studies are often limited by a participant's geographic location, age, gender and many other factors.

Similar studies need to be done on groups with other conditions before these findings can be generalized.

If a headline claims a generalization, it must be substantiated by a variety of studies, not just one study.

Can the skill that solved the first two problems solve the more difficult problem?

As an example, let's try the effect of eating breakfast on weight loss.

The researchers asked people who skipped breakfast to eat breakfast every day.

Participants include men and women of all ages and backgrounds.

After one year, the participants had lost an average of 2.3 kilograms.

So what's the problem with the next headline, "Eating breakfast makes you lose weight?" The participants in this study lost weight when they started eating breakfast, but I don't know if they lost weight because they started eating breakfast.

To rule out the possibility that other factors influenced weight loss, it would be necessary to compare these participants to a group that had not eaten breakfast before the study and skipped breakfast during the study.

So we cannot claim that the headline can draw any general conclusions from the findings of this study.

Also, if the study itself made such a claim without a comparison group, we should question its credibility.

So far, we've trained your skills with three hypothetical studies and headlines, but now you can put these skills to the test in real-world reporting.

Even if you don't have to pay to see the full article, you can still find a summary of the experimental design and results in free abstracts and newspaper articles.

Individual research findings don't always align with eye-catching headlines.

Reaching important conclusions about human health issues requires accumulating evidence over time.

In the meantime, knowing what's behind the headlines can keep you abreast of the latest in science.

I recently got a clue

It means that you may be able to help solve one of the biggest problems facing humanity today, and that problem is climate change.

And I also realized that the reason I've been working for more than 30 years was to get to this point where I could actually contribute to big problems.

All the experiments that we've done in the lab over the last 30 years, and the people that we've worked with in the lab over the last 30 years, have led us to this grand experiment, the last big experiment.

who i am

I am a plant geneticist.

The world I live in has too much carbon dioxide in the atmosphere due to human activity.

But I've come to appreciate the true value of plants, and these wonderful machines that have been used to absorb carbon dioxide.

It's been going on for 500 million years, so it's a big deal.

I am very good at it

So...

I have an urgent message to tell you

As a mother, I want to leave my two children with a better world to live in than I inherited from my parents, and I want to keep moving forward in a better direction, not a worse one.

after that...

I've had Parkinson's disease for the last 15 years, so I have an urgent desire to take up this job now, and I want to contribute to the team while my health permits.

great team

[Souk's plant team] We want to do it because we work together and it's fun.

If you're going to save the world with a team of just five people, you can't do it unless you get along.

(Laughter) Well, my story ends here.

let's talk carbon dioxide

Carbon dioxide is the hero of this talk.

Many of you would think of carbon dioxide as a pollutant.

You may be looking at it from the perspective of the villain in a novel.

We only look at the dark side of carbon dioxide.

But as a plant biologist, I know another side of carbon dioxide.

The reason we plant biologists can look at carbon dioxide differently is because we remember one thing you forgot.

plants carry out photosynthesis

When photosynthesis takes place -- all of the carbon-based life on Earth -- it depends on the carbon dioxide that plants and photosynthetic bacteria extract from the carbon dioxide in the atmosphere.

Simply put, the carbon in your body comes from the air.

You're made of air, and that's thanks to photosynthesis, and plants use the energy of the sun to fix (produce) sugars from carbon dioxide.

that's great

The other important thing I want to share with you today is that plants and photosynthetic bacteria are extremely capable of photosynthesis, and can process more than 20 times the carbon dioxide produced by human activity.

So even if we humans don't do much to reduce our emissions or anything like that, plants, being photosynthetic organisms, have a lot to offer.

I hope it will

But it doesn't come true for free

We need to help plants, too, because they want to turn most of their carbon dioxide into sugar.

When the growing season comes to an end and the plant dies and decomposes, the carbon-based organic material created by taking carbon dioxide out of the atmosphere returns to the atmosphere as carbon dioxide.

So how can we transform the carbon dioxide that plants take out into something more stable?

And what we found was that plants make this substance, called suberin.

A substance found naturally in the roots of all plants.

The great thing about suberin, as you can see when you look at it, is that the black dots are carbon.

This molecule contains hundreds of carbon atoms.

The red dots you see here and there are oxygen.

Microbes are attracted to oxygen as they decompose plants.

Suberin is the perfect mechanism to keep the carbon from breaking down.

We can stabilize the carbon that plants have fixed in a way that's a little better for them.

So why now?

Why are we thinking about biological solutions to this problem now?

It's been in the last 30 years or so -- and that sounds like a long time for an answer to "Why now?" -- 30 years ago, we began to understand the function of every gene in a typical organism.

This includes humans, plants and other complex eukaryotes.

So what started in the 1980s?

We now know the function of many genes that promote plant growth.

And it's now possible to do genomic research in a faster and cheaper way than ever before.

What this tells us is that all life on Earth is related, but plants are even more related to each other than to other organisms.

And that if you introduce a trait (property) that is unique to one plant into another plant, you can expect the same thing to happen to the original plant.

this is also important

And then there's the recent development of a little bit of genetic engineering, and as you mentioned earlier this morning, you can use gene-editing techniques like CRISPR to make a little bit of a genetic mutation in a plant.

So biology is a powerful ally.

I'm a biologist, so I'm proposing a solution to the problem of climate change using plants, which are the most evolved forms of life on Earth.

So how do you do it?

help biology

yes next

By the way

Please remember three simple things

First, we need to get the plants to make more suberin than they normally would, which means we need to increase their capacity.

Next, we need to get the plant to produce more roots, and the more roots it has, the more suberin it can produce, because there are more cells that tend to accumulate suberin.

Third, we need to get the plants to have deeper roots.

And by doing this, you're asking the plants to say, "Please make more stable carbon and put it in the ground."

You can do this if you put your roots deep into the ground instead of putting them near the surface.

So those are the three traits that my team is trying to change: more suberin, more roots, more roots.

I'd like to collect these traits in one plant. It's easy to do, and I'm going to do it. I mean, I've already started with a model plant, Arabidopsis thaliana.

Once we have a plant that has all the traits we want, and we can make more suberin from this variety, we can apply it.

I'll talk later about why we chose to use crops.

This is the scientific background for this project.

I'm pretty confident that the scientific side works.

And that's because just last year, we identified genes that affect each of these three traits.

In some cases, for two of the three traits, there are multiple ways of doing it.

We may be able to further increase suberin by combining several within one trait category.

Here's one result. The plant on the right has more than twice as much root spread as the plant on the left. And that's because we made one of the genes native to this plant to be expressed in a slightly different way.

This is one example that I wanted to show you.

The next thing I want to talk about is that there are still many challenges left on this issue, because...

Because if you don't get farmers to buy seeds, or you have to get seed companies to buy seeds that farmers want to use, it doesn't start.

So you can't reduce the yield when you're doing an experiment, because if you were to start doing these experiments in 10 years, the world's population would be much larger than it is today.

It continues to grow rapidly

By the end of the century, we'll have 11 billion people, and by then our ecosystems will be exhausted by humans, and we'll be unable to support the burden of agriculture's consumption.

There is also competition for land.

I think we're going to need a lot of land to run a carbon sequestration experiment.

But we can't sacrifice land for food production because we have to feed the world's population while we solve this big problem.

In fact, climate change is reducing global yields.

Are farmers willing to buy seeds that affect their yields?

So we always have rigorous checks to decide whether to continue or stop the experiment to make sure it doesn't affect the yield.

Second, even though some plants are able to sequester more carbon and keep it in the soil, we are actually depleting almost all the soils on the planet of carbon because of the strain of agriculture that feeds the eight billion people on the planet today.

this is also a problem

When plants fix more carbon, the soil becomes richer in carbon.

In fact, carbon-rich soils can retain minerals such as nitrogen, sulfur, and phosphate that plants need to grow and increase yields.

It can also hold water in the soil

The suberin breaks down into tiny particles that change the texture of the soil.

As you can see, the more carbon in the soil, the darker the soil.

All of these factors can be measured, and I think they will help us solve the problem.

ok

Our team's challenge is that we need a lot of land, and we have to get farmers to buy our seeds, and the reason why we think this is a challenge for us is because no one is a sales person.

(Laughter) That's what most scientists do.

But now, no one can deny that climate change is happening, and we all know it.

The problem is real, the situation is bad and serious, and action must be taken.

But I'm optimistic, I think we'll get through it.

I'm here today to testify to the character of plants.

Plants are going to do it for us. We just need a little help, and they'll do something gold medal-worthy for humanity.

thank you

(Applause) (Cheers) Thank you.

(Applause) We're finally able to announce it.

(Chris Anderson) wow

It's a great achievement

Let me make sure that in the next 10 years, will you be able to offer the world wheat or corn or rice -- the seeds of major crops that will allow farmers to sequester three, four or more times more carbon than they do now without reducing yields?

More than that?

(Joan Collie) I don't know the numbers.

It means that it is more than now

CA: At the same time, it's a plant that fertilizes the soil in the farmland, right?

(Joan) Yes

(Chris) It's amazing.

We have the talent to make this happen, and we have solutions that are scalable, even though they are already on a grand scale.

(Joan) Thank you

(Chris) You're right.

It's a great story that makes me wonder if the story is too good

So your Audacious Project is about starting a lab study, scaling it up, and starting a pilot experiment to make this wonderful vision a reality.

(Joanne) That's right.

(Chris) Joanne Collie Thank you very much

I wish you success

(Applause) (Joan) Thank you.

I have a very enjoyable job of finding out what makes people happy.

It's so much fun that it seems a little frivolous, especially when you're seeing so much dark news.

But studying happiness could be the key to solving some of the most difficult problems we face.

It took me nearly 10 years to find out

Early in my career as a researcher, I and my collaborators published a paper in Science that said, "Spending money on others makes people happier."

I was confident in my findings, but the only problem was that they didn't apply to me.

(Laughter) I almost never donated, and when I did, it didn't give me the warm feeling of satisfaction I was hoping for.

So I began to suspect that something was wrong with my research, or with myself.

I was particularly puzzled by my lackluster emotional response to giving, because subsequent research showed that even young children show joy in giving to others.

In one experiment I did with my colleagues Kylie Hamlin and Lara Akunin, we had two-year-olds come into the lab.

As you can see, I had to use something that a toddler would really miss.

(Laughter) I gave the kid a load of these crackers, and then gave him the chance to share some with the stuffed monkey.

(Researcher) I have snacks, so I'll give you all of them.

(toddler) wow thank you

(Researcher) I don't have any more snacks.

Shall I give the monkey one too?

(Toddler) Yeah (Researcher) Okay?

(infant) yeah

yes

(Researcher) Yay Chomping

(Toddler) Everyone ate

We had a research assistant watch the video and record the infant's emotional response.

Of course, I didn't tell you the hypothesis of the experiment.

The data showed that the toddlers were very happy when they received the crackers, but they were even happier when they shared them.

This warm feeling of joy continues into adulthood

We analyzed the results of a survey of more than 200,000 adults around the world and found that nearly a third of them had made some donation in the past month.

What struck me was that in all the major regions of the world, those who donated were happier than those who didn't, even after taking into account their financial situation.

This correlation is not small

Donating seems to bring about as much happiness as getting double that in income.

As a researcher, if you're lucky enough to find a phenomenon that you see in children and adults all over the world, you'll start to wonder, isn't this part of human nature?

We know that pleasure reinforces adaptive behaviors. For example, eating and sex lead to species preservation. Giving seemed like one of those behaviors.

I liked the idea, and wrote an article about it in the New York Times.

One of the people who read that article was my tax accountant.

(Laughter) Yes

As I sat across from the tax accountant at tax time, I could see him blaming him as he slowly tapped his pen across the charitable donations section of his tax return.

(Laughter) Even though I've made a career out of showing how giving feels good, I've done very little of it myself.

decided to donate more

At that time, everywhere I heard the tragic stories of Syrian refugees.

I wanted to help, so I pulled out my credit card.

I knew that my donation could change someone's life, somewhere, but as I went to a good-looking charity's website and entered my card number, I felt something was missing.

That's when I learned about the Group of Five.

The Canadian government allows anyone with five Canadian citizens to personally support a refugee family.

If you raise enough money to support your family's first year in Canada, a refugee family will literally fly to your town.

The good thing about this program is that you can't do it alone.

We ended up with a group of 25 instead of five, working with community organizations.

I did the paperwork, waited almost two years, and got word that the family would be arriving in Vancouver in six weeks.

He said he had four boys and a girl, so we hurried to find a place to live.

Fortunately, we found a house, but we had to do a lot of work.

My friends would come in at night and on weekends to help me with painting, cleaning, and building furniture.

When the day finally came, we filled the family's refrigerator with milk and fruit and went to pick them up at the airport.

It was an overwhelming moment for everyone, especially a four-year-old.

The child's mother and her older sister, who had come to Canada through the same program,

We had a reunion for the first time in 15 years

When we hear that there are more than 5.6 million refugees who have fled Syria, our brains haven't evolved to make sense of the tragedy.

quite abstract

If you'd previously been asked if you could donate 15 hours a month to help with the refugee crisis, we probably would have said no.

But as soon as they welcomed their family into their new home in Vancouver, they realized that they would do anything to make them happy.

This experience made me think more deeply about my research.

We've seen in our experiments that when people feel connected to the person they're helping, and when they can easily envision the change they're making in their lives, the effectiveness of giving spikes.

For example, in one experiment, participants were given the opportunity to donate a small amount of money to either UNICEF or Spread the Net.

These two were deliberately chosen, both partners, with a common and important purpose of protecting the health of our children.

But UNICEF is a very large and broad endowment, so it's hard to imagine what difference your small contribution will make.

Spread the Net, on the other hand, promises something very specific: for every $10 donated, one bed net will be provided to protect a child from malaria.

In Spread the Net, the higher the amount donated, the higher the subsequent satisfaction.

On the other hand, giving to UNICEF had no emotional "return on investment" at all.

What this shows is that donating to a worthy charity is not always enough.

You need to have a clear picture of exactly what difference your money can make.

The Group of Five takes this idea to a whole new level.

In this project, we first discuss when the refugees will arrive.

we now call them "our family"

I recently took the kids out skating, and later my six-year-old son, Oliver, asked me, "Hey, who's the oldest kid in our family?"

I thought he was talking about his many cousins, but Oliver was asking about his cousins ​​and his family in Syria.

Since our family arrived, many people and organizations have offered to help, offering everything from dental fillings to summer camps for free.

This allowed me to see the goodwill in my community.

Thanks to these donations, the children were able to participate in a bike camp, and each day during the week someone from the group came to cheer them on.

I happened to go on a training-wheel-free day, and a four-year-old didn't think it was a good idea.

So I preached the long-term benefits of riding without training wheels.

(Laughter) And then I remembered that he was four years old and still barely spoke English.

I decided to sum it up in one word that she could definitely understand: ice cream.

If you do your best without training wheels, I'll buy you ice cream

this is the result

(Elizabeth) Here you go

(child) try

(Elizabeth) Great

I can ride I'm riding alone!

(Laughs) Great!

(Applause) (Laughter) (Applause) This is the kind of help that humans have evolved to find joy in, but for 40 years, Canada was the only country that allowed its citizens to personally sponsor refugees.

Yay Canada!

(Applause) That's great.

Now Australia and the United Kingdom are starting similar programs.

Imagine how different the refugee crisis would have been if more countries had made this possible.

By creating these deep connections between individuals, we have the opportunity to deal with even the most overwhelming challenges.

One of those conundrums is just a few blocks from here on the downtown East Side of Vancouver.

According to one index, it's the poorest urban area in Canada.

We actually debated whether we should bring in refugee families, because there are already people in need here.

My friend Evan says that when he was a kid, he used to hide in the back seat of his car as he drove through the area.

What Evan's parents never would have guessed was that he would grow up and invite people from the area to a local restaurant for a multi-course meal.

Evan was instrumental in founding a foundation called Plenty of Plates, whose purpose is not just to provide free meals, but to give people the opportunity to connect with people they otherwise might not have met.

Every night, a local company serves dinner and sends out volunteers to cook and serve.

Any surplus food will be distributed to people on the street, and the extra money will be used to provide 1,000 free lunches to locals the following day.

Food isn't the only benefit of this program.

Volunteers have the opportunity to engage with people, to sit down and listen.

After this experience, one volunteer changed her commute and avoided the area, but she went through it and smiled and made eye contact with familiar faces.

We can all find joy in giving

You shouldn't expect it to happen unconditionally.

Using money to help others doesn't always make you happier.

it's important how you do it

If we want more donations, we need to completely change the way we think about giving.

We need to create opportunities to experience the wonders of our shared humanity.

If you work for a charity, don't try to reward donors with pens and calendars.

(Applause) Reward them with opportunities to see the tangible impact of their generosity and to connect with the people and communities they're helping.

We have thought of giving as a "should"

that's right

But that way of thinking misses the best part of being human: humans have evolved to find joy in helping others.

Think of giving as a source of joy, not just a moral responsibility.

thank you

(applause)

I want to tell NASA, ``If this continues, we will be in trouble.''

In the field of manned spaceflight, humanity is not making any progress, it's actually going backwards.

We are losing our ability to inspire children to dream and to do the important things that we humans have always done.

Until now, humans have followed their instincts to face harsher environments, overcome them, and ultimately survive.

I strongly believe that our kids shouldn't just be expecting new mobile phones.

Children need to explore unknown worlds, move to other planets, and expect breakthroughs that have never been achieved before.

We need to inspire children to dream for their future development and survival.

What I find particularly problematic is what NASA is doing under the Bush administration... over the next 15 years --- oh my god...

We are strongly told not to talk about politics here.

(Laughter) What I'm trying to say is... (Applause) What I'm trying to say is... it's not just about giving kids dreams, but it's about the government's current plan to deprive some of the country's most creative spacecraft engineers from taking risks and trying new things.

We are going to the moon in 50 years

And knowing that I can't learn anything new

I really take that as an issue, and what I want to share with you today is how we inspire the children who will be our leaders in the future.

that's what i'm talking about today

I think that dreams start at a young age, between the ages of 3 and 12 or 14.

What the child sees at that time is important

A look back at the history of human flight

There were four of the most important years in the history of aviation, with many breakthroughs.

When the Wright brothers first flew in France in 1908, everyone said, "I can do that!" At that time, there were very few pilots in the world.Four years later, there were hundreds of planes and thousands of pilots in 39 countries.

You look at a modern airplane and you think it's great, but there weren't any planes like that in the early 20th century.

At that time, tens of thousands of test flights were conducted, and if the plane crashed and the pilot died, another pilot would fly.

In those days, there were no pilots with flight training, so the ones who successfully flew and landed were considered the so-called "good pilots."

Thousands of attempts like this led to the shape of modern airplanes, and it's only through trial and error that they're as safe as they are today.

Nothing like that has happened in spaceflight.

Because only two countries, the United States and Russia, have challenged

Who were your influences during those early four years?

Aviation Week asked me who was the most accomplished person in 100 years of aviation history.

After writing their names, I realized that all of them had spent their childhoods in the early four years of aviation.

A lot happened when I was a child

There was also a jet and missile development race, Von Braun's Mars plan Sputnik launch

Mars was a lot more interesting back then than it is today, because it was thought to have animals, and it was thought to have color-changing plants.

But nobody believes that anymore because NASA only landed satellites in deserts.

(Laughter) The black line is the fastest human flight speed, the red line is the flight speed of the military's best pilot, and the blue line is the flight speed of commercial aircraft.

When I was a kid, I could see that there was a leap forward in technology, and it was that moment that sparked my dreams, and gave me the courage to try things that other people gave up on.

What was I doing as a child?

No modified cars, no women, no dancing, and no drugs back then. Instead, I was playing with model airplanes.

During the Vietnam War, he was involved in the production of prototype airplanes for the United States Air Force for about seven years.

After joining the Air Force, he also built an airplane that was easy to assemble.

About 3,000 of these planes took off, one of which was the Voyager. And in 1982, I started my current company.

Since 1982, we have built at least one new aircraft every year

In addition to the planes here, there are many more

The plane that left the biggest impression on me was the one that appeared only ten years after the development of the jet plane.

then used to its useful life and retired

An airplane built in 1956 retired in 1998, can you believe it?

The spacecraft that left the biggest impression on me was... the Guruman lunar lander. You can land on the moon and take off. It's all automated.

and retired in 1972.

This lander was built three years after Gagarin flew in 1961.

Only three years later. How are you now?

Let's talk a little bit about innovation cycles. When new things come out, they supersede old ones.

This happens every 25 years

This is true of any other technology, and the interesting thing is that this innovation cycle is completely absent in the history of high-speed flight.

These two new planes fly at the same speed as the plane that debuted in 1958.

So there's no innovation cycle, because the country develops it and the country uses it.

A good example is the DARPA network

Computers were originally used for military purposes

However, since we in the private sector started using it, it has come to be used effectively.

Don't forget that I looked for innovation cycles in spaceflight and got zero.

In the first year that Gagarin made the first manned space flight, Alan Shepard took off just a few weeks later, and that year there were a total of five manned spaceflights.

In 2003, all US astronauts died in accidents.

In 2003, there were only three or four space flights.

In 2004, there were only two Russian Soyuz launches to the International Space Station. I did three launches from the Mojave Spaceport, with a small team, five total, which is the same number as in 1961.

nothing really grows

Here's a picture taken from SpaceShipOne

Here's a picture from orbit

Our goal is to make everyone see this view

Right now, it's safe to do suborbital flight, or at least as safe as early aircraft.

I would like to talk a little bit about why such a small company decided to do such a big thing.

First, what is going to happen next?

More companies will enter the space travel business

Just last week, there was a company that announced its entry into the market.

This is also ballistic flight. The reason it's not orbital is because there are safety issues with orbital flight, and three governments have been working on it for 45 years, and four percent of those who go out into the atmosphere die in accidents.

It's hard to do business with this safety record.

100,000 people will be in space by 2020

I can't say when this will start because competitors will know.

Technological innovation will come soon, and resort hotels will soon appear in orbit.

You'll be able to easily circle the moon and see amazing vistas.

Since the moon has no atmosphere, it is possible to fly in an elliptical orbit over the surface of the moon at an altitude of 3 meters.

It's fun and addictive!

(Laughter) But some people say, "We're just using billionaire money for billionaire fun."

"It's not practical, it's just for fun"

I used to worry about this, but think about it. I bought an Apple computer in 1978 because I wanted to show it off to others.

it was for playing games

(Laughter) Unlike computers in banks and businesses, computers in homes were for playing games.

For 10 years, computers were for "play"

But what happened then? The personal computer has become a huge industry and has achieved great growth.

You happen to be here today -

With Al Gore's vision of the information superhighway, what we've been using for 10 years for play now underpins all of our business, our research, our communications. If you ask any of the Google employees, they'll tell you more examples of successful ideas born out of play.

That's why it's okay to "play"

Look at this slightly complicated graph, what's going to happen next?

And there's an important point

I don't know all the names, but there are people who were inspired by the news of the moon landing as kids and are now taking action. They were kids between the ages of three and 15.

Paul Allen, Elon Musk, Richard Branson, Jeff Bezos, The Ansari family helping Russia suborbital flights, Bob Bigelow of the private space station, John Carmack,

They're investing in areas that matter to us, not things like the new mobile phone, but the areas that matter to us as human beings, and they're about human progress. They allow us to explore the unknown, and I believe that in the far future, we'll be able to prevent the extinction of humanity by colonizing the stars.

Investors like them dream of great progress.

so what's really going on

One of the military's finest jets, there was the SR-71, it was retired after it's full lifespan, and the Concorde doubled the speed of commercial planes.

It was also used to the end of its life and retired without a rival, leaving us with the same level of technology as the planes that came out in the late 1950s.

But now I can give my children dreams

Especially relevant if you have a baby or a 10-year-old.

Something really interesting is about to happen

Soon you will be able to buy tickets for planes that fly faster and higher than the military's most advanced planes. this has never happened before

The reason the military is stuck in old technology is because we no longer need to build fast planes when wars can be won at the touch of a button.

But before space travel becomes commonplace, the military will first have pilots with suborbital flight skills.

Developing as a business progresses faster

Let's call this the "capitalist space race." Conversely···

The space race of the '60s was a matter of national prestige, although the United States suffered two losses in the race.

Neither was a technical defeat, because the satellites were loaded with American-made equipment.Similarly, the Sputnik launch.

It wasn't a technical defeat, it was a national prestige defeat for America.

In that moment, America was no longer a high-tech country, and it was a shock.

Then, just weeks after Gagarin's flight, the United States launched Alan Shepard to show off its technical prowess.

But America lost. That's why we made a big leap

Again, in the beginning of the race, America lost to Russia.

Now you can't buy space tickets in the US, but you can in Russia.

We can fly with Russian-made equipment, because the Russian space program is underfunded, and we want to sell millionaires space tickets for $20 million each.

You could say it's a space travel business, and tours that go around the moon, like Apollo 8, are now on sale.

It's a multi-billion yen trip to the moon

Imagine, in the space race of the 1960s, when an American was launched to the moon, and when he got on the rocket, what if it was loaded with Russian-made equipment?

What if the astronaut who boarded the rocket for the first manned moon landing project with Russia's prestige at stake wasn't Russian? If you're a millionaire Japanese or an American, it's very strange.

Anyway, the development race is coming again

There's going to be a very, very big space tourism business, and it won't matter who builds it first, the way it used to be the competition.

For example, Russia developed a supersonic airliner before the Concorde.

It was only used for freight transportation.

When you develop as a business, you make a difference like this.

Consider the evolution of human spaceflight in business

By 2020, if technology advances as a space travel business, it's expected to be five times more advanced than NASA's plan. Private sector investment alone has already raised $1.5 billion to $1.07 billion from all over the world.

The space tourism business is going to be a lucrative business, because if you sell a $200,000 travel tour, it costs a tenth or less of that, and it's going to be very profitable.

We also estimate that the money invested in this business will cost half the money American taxpayers spend on NASA's space program.

What's more, the money invested will be spent 10 to 15 times more efficiently than at NASA, which means that progress in human spaceflight will be five times more advanced than NASA's current space program without taxes.

We can do that because we are a private company.

We can't let the government continue to do things like this. For a long time, we have relied on NASA and other government agencies.

But NASA has long been in charge of building spacecraft and running the only space route, and we've been blind to that fact until now.

Thank you for your attention

(applause)

Nature is a source of poetry and an object of passion.

As a National Geographic photographer, I've been photographing nature.

But five years ago, I went on a personal trip

I wanted to film the story of life.

This is the first time I've ever done such a difficult effort, and I wanted to give up many times.I've never had such a difficult effort, and I wanted to give up many times.

But I've also made some amazing discoveries, and today I want to show you one of them.

But I've also made some amazing discoveries, and today I want to show you one of them.

I visited a remote cove in Australia I wanted to see the Earth three billion years ago I visited a remote cove in Australia I wanted to see the Earth three billion years ago What the Earth looked like when the sky was not yet blue

It has stromatolites, the first organisms to perform photosynthesis. It has stromatolites, the first organisms to perform photosynthesis. It's the only place where stromatolites exist today.

It was like being pulled into a time capsule.It was like going back in time and being reborn.

We breathe the oxygen released by stromatolites today.

The hero of the story is the stromatolite

I think this story still appeals to modern times.

You and me, a story of nature and science

So let me take you on a journey of life through time.

Over time, matter condensed into a sphere.

The flames shaped the solidified surface of the earth

The flames disappear and the earth appears, but this is a strange planet.

The moon was near and everything was different

The heat from within erupted geysers, the birth of the ocean.

The waters of the polar regions froze, forming the ends of the earth.

Water is the source of life, but frozen water is dormant.

Without water, the earth will become Mars.

But this planet was different. It's a fireball inside.

When that energy touched water, life was born.

Life awakened along the cracks in the earth

Dirt and minerals are the basis of life. Bacteria were created.

begin to proliferate and increase in density

Under a strange sky life was shaped

Stromatolite released oxygen

the atmosphere has changed

Breath has become a fossil of iron oxide and has reached the present

Meteorites brought material, probably membranes as well.

Life needs a membrane to wrap itself around, and with that membrane life begins to replicate and mutate.

This is a single-celled plankton with a skeleton of diatomaceous silicon.

The circuit board of the future

Shallow waters thrived early on, and diatoms transformed into more complex tissues in those waters.

Repeated growth as light and oxygen increased

life became stronger and more protective

I learned to move, I got sight, and the trilobites were the first to have eyes.

Horseshoe crabs with advanced vision were among the first creatures to emerge from the sea.

Horseshoe crabs continue to do the same thing even now.The enemy was defeated long ago.

The scorpion chased its prey out of the sea, and the slug became a snail.

Fish tried and tested amphibians, frogs adapted to the desert.

Fungi teamed up with algae to create lichen communities.

The lichen clings to the rock and eats into it, the barren land has changed.

Terrestrial plants were born without leaves

Learning to stand upright, plants developed size and shape.

The basic form of the fern followed, producing spores that became the prototype of the seed.

Wetlands abound with life

On land life developed further, jaws followed by teeth.

Leatherback turtles and tuatara are remnants of that era.

Life moved away from water over time, and water still attracts life.

Life got the strength to embark inland

Awakened dragons still live with us today

Jurassic Park is still alive in parts of Madagascar and in the depths of Brazil, and cycads are still stubbornly alive.

Forests were born, feeding winged creatures

Archeopteryx left traces like it died yesterday

Birds fly in the sky, like afterimages of the past

Birds have a new means of locomotion

The continent was flooded with flamingos, and the migration of birds began.

Birds have seen flowering plants

The water lily is the most ancient flower

Plants diversified into large trees

In Australia, lilies turned into pampas grass, and in Hawaii, daisies turned into ginseng.

The land of Gondwana in Africa grew proteas.

As the ancient continents split apart, life became more abundant.

A rainforest was born, creating a new symbiotic relationship.

Fungi multiplied, orchids appeared, genitalia lured worms.

It was a strategy that also employed the largest flower on earth.

Coevolution permanently linked insects, birds, and plants.

A bird that cannot fly is powerless

Like kiwis and hawks that live only near Antarctica

Some extinctions are slow, some are instant.

An asteroid collided and the world was set on fire.

But there were survivors of the darkness who witnessed it.

The sky cleared and a new world was born

It's a world fit for mammals. From tiny shrews, Tenrecs were born and adapted to the darkness.

Bats appeared and civet cats

A new predator, the hyena, is going faster and faster.

Prairie brought possibilities

My sense of keeping the herd safe has sharpened.

Upsizing is one way, but size comes at a price.

some mammals have returned to the water

The walrus has put on a layer of fat, and the sea lion has taken on a streamlined shape.

Cetaceans have moved to a world without borders

Mammals come in many shapes: kangaroos leap in Australia, horses gallop in Asia, and wolves evolve long legs in Brazil.

Primates emerge from the jungle, first tarsiers and soon evolved into lemurs.

Empowered monkeys set out into open land

The forest dried up again, and the monkeys began to live upright.

who are we? A ferocious chimpanzee brother? Gentle bonobo sisters? we are all monkeys and more

we were born with the power of life

The veins in your hands are like water streams on the earth.

Our brain, this wonderful brain is like the tides in the swamp.

life is power it's the new ingredient

Life has changed the Earth, covering it like a skin.

Lifeless winter Greenland is like Mars.

But when the ice melts again, the difference is stark.

Liquid water becomes the womb, the womb of cells that turn green with chlorophyll. This amazing molecule, chlorophyll, made the difference. It's the source of power.

Today, the entire animal kingdom lives off the oxygen that plants and algae have accumulated.

The earth is alive, and we have created a membrane that surrounds the earth.

We call it the atmosphere, which is the symbol of our journey.

You can imagine your next trip

(Thank you for applause

I'm Ursus Weeri, and today I'm going to talk to you about tidying up art.

First… Do you have any questions so far?

I'm not actually from here.

I come from a completely different culture. Did you notice?

I'm wearing a tie, and I'm a little nervous. English is a foreign language, so I might say something strange by mistake.

I hope it doesn't sound like my native Swiss German, but this is what happens when a Swiss tries to speak like an American.

But it's okay I don't mind

The problem is your language

(Laughter) I don't mind -- you can go back to Switzerland after the TED show, so you guys have to keep saying these words.

(Laughter) Today I was asked to read a book I wrote.

It's called "Organizing Art," but it's more like a picture book.

As soon as I read it, it's over

Since I've come all the way to the TED stage, I'd like to introduce it in a more modern way.

I thought I'd pass it around and show it to you (laughs).

"Art order" is a relatively new term.

not very well known

Actually, it's been a hobby of mine for the last few years, and it all started with this American painter, Donald Battler's paintings. I had this painting in my house, and every day I looked at it, and I couldn't stand it, just like this mess.

I feel sorry for him

He himself seemed sick of looking at the messy blocks day after day.

So to help him out, I arranged the blocks neatly and stacked them in a row.

(Laughter) I think he's not as pathetic as he used to be.

I thought this was good, so I decided to observe contemporary art works carefully. Contemporary art is a lot of messed up stuff.

this is a very good example

Very simple, but a good introduction

A painting by Paul Klee

At a glance, this is color chaos.

(Laughter) This artist doesn't seem to have any idea where to put which color.

Various colors gather to create various patterns, but there is no structure at all.

Maybe Mr. Klee was in a hurry. (Laughter) Maybe he was about to miss his flight.

We're starting to use orange here, we've run out of orange here, and it looks like we're taking a bit of a break.

Let me show you this cleaned up version

(Laughter) You can see at a glance what the original picture didn't show. There are 17 red and orange squares, and next to them are two green squares.

much better

Don't be surprised by this, this one is for beginners

Let me show you something a little more difficult

(Laughter) It's a mess.

Scattering so many things

If my room looked like this, my mother would get mad at me and I'd be banned from going out for three days.

So let's bring some solid composition to this painting.

This is pretty high level tidy

(Applause) Usually there's applause here, but in Switzerland it would be a big round of applause.

(Laughter) Switzerland is famous not only for its chocolate and cheese, but also for the accuracy of its trains.

Swiss people like to keep things neat.

The next great example is

This is the work of Joan Miró

I prepared lines and figures bit by bit and placed them randomly on a yellow background.

It's kind of like the doodling you do on the phone.

(Laughter) And here's -- (Laughter) I think you can see it's pretty refreshing.

Very economical and efficient

This way Milo can save one canvas.

Some people still think it's a joke

Just to let you know how serious I am, I've brought the patent details for this project, and I've patented this method, of course, at the patent office in Bern, Switzerland.

(Laughter) I'll just read the bill.

(German) I haven't read it yet

(German) (German) (German) (German) (German)

I could have translated it into English, but I don't think I understand either way.

I don't know for sure, but it doesn't seem like anything bad is written.

But when you introduce a new idea to someone, there's a way to do it, and sometimes you need these documents.

I would like to do a little test

Everyone is lined up neatly

Could you please raise your right hand a little higher?

The right hand is usually used for writing letters.

I'll count to three from now on, so everyone is still lined up neatly.

I will count to three from now, so please shake hands with the person behind you when you count to three. May I?

One two three

(Laughter) You see, even this kind of orderly behavior can easily become chaotic at times.

Let's prove this with the following picture

This is a painting by Niki de Saint Phalle.

I have no idea what the intertwining patterns represent in the original painting.

When you organize it, you can see that a tanned woman is playing volleyball.

(Laughter) Is this a better example?

Keith Haring's painting

(laughs) There's nothing up and down.

This picture doesn't even have a proper title

It's titled 'Untitled'.

If you try to sort it out, you will have a "replacement parts store" of Keith Haring's painting

(Laughter) Here's a statistical analysis of Keith Haring.

You can clearly see that there are 25 green pieces, one of which is circular.

If you look here, there are 27 pink squares, one of which is bent.

It's an interesting discovery, because this way we can do a statistical analysis of all of Haring's various works: when did he use more light green circles, and when did he use more pink squares?

Artists themselves can also use this analysis to predict how many colors of paint they'll need in the future.

(Laughter) You can combine them.

For example, Keith Haring's circle and Kandensky's dot

You can also add to Paul Klee's squares

The end result is a list that you can arrange however you like.

You can divide it into categories, put it in a file, put it on the shelf, put it in the office, and then you can eat it.

(Laughter) Well, I'm speaking from my own experience.

This is a painting by Jasper Johns.

(Laughter) I think this should also be a little more formal.

I think it's a good idea to sum them up like this

(Laughter) And I like this one.

Tidying up Rene Magritte - It's funny

It goes something like this. (Laughter) People often ask me why I started doing this.

When I often stayed at a hotel, I had this chance

I had the chance to stay at a five-star luxury hotel.

Then you'll find a sign on the door that reads, "Please clean your room."

Anyway, at the hotel I stayed at, they clean my room three times a day.

That's where I got a little bit of a mischief, and I purposely threw things out every day before I left.

Books, clothes, toothbrushes, anything

By the time I got back to my room, everything was tidied up where it should be.

Then one day, I hung a tag on this painting by Van Gogh saying, "Please clean it up."

(Laughter) This room hasn't been cleaned since 1888.

When I got back to my hotel room, it was this

(Laughter) Now you can vacuum.

(Laughter) But there are people who say, "Some of the pictures aren't organized 'right'." I would like to try it there

This is a Rene Magritte painting, so I want you to imagine how you organize this painting in your mind.

(Laughter) What do you think? Shall I do this

Does anyone make apple pie

Anyway, I hope you now understand that organizing art is a very time-consuming process of manually cutting and pasting elements.

Of course, with a computer, it would look like this

(Laughter) I started trying to do paintings that I had wanted to clean up for years.

This Jackson Pollock painting is a very good example.

this is a very difficult picture

After thinking about it for a while, I took the plunge and put the paint back in the can and put it away.

(Applause) You can even apply it to 3D works.

"Fur Cup" by Merett Oppenheim

I have restored this to its original state.

(Laughter) That's great, we're still going a long way. Let's deal with a technique called pointillism.

A picture drawn in pointillism is made up entirely of tiny dots.

Pictures like this are great for organizing

(Laughter) I organized the work of Georges Seurat, the pioneer of pointillism, by taking apart the dots and collecting them.

this is what i collected

(Laughter) If you want to count, go ahead and check back later.

The great thing about the idea of ​​organizing art is that it's still a new method, so without tradition

I don't have a textbook.No, I don't have "yet"

"The future we create" (\*The theme of this conference)

(Laughter) As a summary, let me introduce one last thing.

Bruegel's "Carnival and the Quarrel of Lent"

This is what happens when everyone gets home

(Laughter) I know some of you are wondering where they all went.

Of course it's not gone. It's here.

(Laughter) I tried stacking

(Laughter) That's the end of my story for now.

If you want to enjoy more, please purchase the book at the bookstore below

I'll sign it for you in the name of your favorite artist.

(Laughter) But there's one last thing I want to show you. I'm working on something like this right now.

I think so, and I'm working on tidying up the national flag

er, this is the new shape of the british flag

(Laughter) And then finally-

If you show me this, you should go home quickly

(Laughter) It's hard, and I had a hard time figuring out what to do with it, so I decided to keep it simpler.

(laughs) Thank you very much.

(applause)

On April 26, 1937, Fascist forces bombed the Basque village of Guernica in northern Spain.

It had the worst civilian casualties of the Spanish Civil War, a battle between the government of the Republic and the fascist camp led by General Franco.

Struck by this tragedy, Pablo Picasso became obsessed with his creation and painted a giant anti-war painting he called "Guernica."

This powerful work is both historical documentation and political protest.

Picasso's artistic motives are clear, but the symbolism in the painting is as confused and chaotic as war.

How should we interpret this overwhelming image? What makes this painting a masterpiece of anti-war art?

The painting's gigantic canvas is confusing from the start, filled with the Cubist style pioneered by Picasso.

Cubism intentionally emphasizes the flatness of the canvas and flattens the object to be drawn.

It gives the viewer multiple, sometimes impossible, perspectives on the same object, and this technique was shocking even to those around Picasso.

But in the present context, this style presents a scene of violence, destruction, and victimization with overwhelming force.

Multiple perspectives reinforce the fears that exist, and cause the eyes to wander in vain in search of reassurance.

On the far left, a woman is holding a dead child and screaming. Her eyes are tear-dropping and her head is unnaturally tilted and echoing with the child's head.

Beneath that is a statue of a soldier, but he can't protect women and children.

A mutilated body lays there, and a broken sword in its hand indicates utter defeat.

At the tip of the sword is the leg of a woman trying to escape from the ruins.

The other leg appears to be rooted in place and does not move out of the corner of the canvas as it stretches to move.

Behind the hunched figure is another victim.

This woman, who collapses helplessly while surrounded by flames, is also trapped in a hopeless situation.

All the figures placed around the painting are caught in a terrible situation, giving the work a sharp sense of stagnation.

If the size of the canvas obscures this feeling, it only emphasizes the life-size atrocities being shown.

A lamp of some relief is held in the hand of a ghostly woman who stretches through the window.

Is this ray of hope really illuminating the scene?

Or is it a jagged lightbulb that seems to represent the art of modern warfare, illuminating the chaotic landscape below the woman?

The woman's arm, which emerges from the border of the coffin-like window, draws the viewer's eye back to the scene of the conflict, with its most controversial symbol: two ghostly animals trapped in destruction.

Does the whining horse represent the threat of Franco's militarism and nationalism, or do the stakes driven into its body mark the victims?

Does the white bull represent Spain, the land of the bullfighters, a common theme in Picasso's work, or the ferocity of war?

These animals on the battlefield only raise more questions than answers.

Hidden elements throughout the screen present even more secrets to the careful observer.

Above the canvas, we catch a glimpse of a bird desperately trying to escape the carnage.

And the many animals allude to the day of the bombing, which was market day, and the streets were full of villagers, animals, and other victims.

Like the bombing of Guernica, Picasso's paintings are full of destruction.

But beneath that seeming chaos hides carefully crafted scenes and symbols that attack fascism from multiple angles.

Decades after it was painted, "Guernica" continues to have the power to shock and controversy, and is often featured in anti-war rallies around the world.

Many viewers are captivated by its powerful language, striking symbolism, and complex political messages.

Even if you don't quite understand the complex implications behind it, Picasso's work is a powerful reminder of who the real victims of violence are.

I'm Hannah

It's a palindrome

Whether you write from the front or from the back, the spelling is the same If you write it properly

It's funny -- (Laughter) -- my family all have palindrome names.

it's my tradition

Mother (haha), father (chichi) (laughs) Baba and Gigi

(laughs) My younger brother is Kayak.

(laughs) See.

just a little joke

(Laughter) I like to start with jokes because I'm a comedian.

You already know two things about me.My name is Hannah.I'm a comedian.

not wasting a moment

Third piece of information about me: I don't think I'm qualified to speak my mind.

It's bold to start a talk, isn't it, but it's true.

I always struggle to put my thoughts into words

It's a bit of a contradiction, isn't it? I'm not good at talking, so I'm going to be a stand-up comedian.

However, however

I have become

My first stand-up comedy... See here

See, see

(Laughter) I first tried stand-up comedy in my late 20s. I was pathologically shy, literally taciturn, had low self-esteem, and had never held a mic before.

But I had no idea what it was

Why are you so good at doing things you're so bad at?

(Laughter) I have no idea.

I eventually understood

Now, before I explain why I'm so good at something I'm so bad at, let me throw in another paradox first, that as soon as I figured out why, I decided to retire from comedy.

Before I get to the riddle about the nasty question I gave you in your thoughts, let me tell you what happened: I should have retired, but I became a popular comedian.

(Laughter) After I quit comedy, I really took off and became the most talked about comedian on the planet.

Now, in all that I've said so far, aside from a little self-introduction, I've indirectly conveyed three ideas that I want to share with you today.

You presented three contradictions.

Three ideas and three contradictions

I'm sure you're wondering why there are only two instead of three -- (Laughter) that's literally a contradiction.

please follow me

(Laughter) The people at TED told me that for a talk of this length, it's best to stick to one idea.

declined

(Laughter) What makes you say that?

It's obviously good advice, but let me explain why I didn't follow it.

This joke uses one of my favorite comedy rules: the rule of three.

"My family all have palindrome names." "Mother Father Baba Jiji."

The first two produce patterns, and the patterns produce predictions.

And then the third punch line Kayak? What?

this is the rule of 3

1, 2, Surprise! Hahaha

Now -- (Laughter) The rule of three is not only the cornerstone of my comedy, but it's also the cornerstone of my communication.

So no matter what they say, I won't change it even for TED's sake, isn't TED three?

(Laughs) This rule is universal, isn't it?

But as a professional comedian, jokes aren't enough.

The perfect balance of charm and relaxation is important

To make up for my non-soft personality, I needed to increase my attractiveness, and I found that the most effective way to do that was through episodes, not jokes.

So my stories are often anecdotal, stories about my childhood, stories about coming out, stories about the abuse I've received because I'm a big woman, and I'm a masculine center of masculinity.

If you look at my comedy comments online, you'll see what kind of slander.

(Laughter) I'm going to shift the talk gear to second, and I'm going to talk about what I've been saying in this episode.

In the days before she died, she was surrounded by people, lots of people.

For those of you who haven't noticed yet, I am part of that family.

I was lucky enough to say goodbye to my grandmother the day she died.

But it was a one-sided farewell, because her consciousness was already fading away.

So I thought about a lot of things that I hadn't thought about in a long time, and I wrote a lot of funny stories that I hadn't thought about in a long time.

I remember failing to articulate the anxiety and fear that pervaded me as I tried to make my way through a world too big for my hands.

But writing the letter also gave me some comfort, because I was thinking of my grandmother when I wrote it.

Eventually, when the world around me became more and more overwhelming and I couldn't cope, I stopped writing letters.

Because I didn't think my grandmother lived the way she wanted to know in her letter.

My grandmother didn't know I was gay. About six months before she died, she suddenly asked me if I had a boyfriend.

I remember making a clear decision at that moment that I wasn't going to come out to my grandmother.

Because my grandmother's life was coming to an end, and I didn't want to talk about the differences between myself and my grandmother in the limited time we had.

I wanted to talk about something that made me feel connected to my grandmother.

so i changed the subject

It seemed like the right decision at the time

But as I sat there watching my grandmother's life fade away, I felt like I was wrong for not telling her something so important in my life.

And then I realized that I had missed the opportunity.

It's too late to take out the onions."

(Laughter) I thought about those words and how many "onions" I had to deal with growing up, because homosexuality was illegal in the state I grew up in.

Along with that, I realized how tightly I was entwined with the vines of internalized shame.

I thought about all the traumas I had: violence, abuse, rape.

In the midst of all this mingling of thoughts, an idea, an unanswered question, came to my mind: Why do I exist as a human being?

My grandmother was the closest person in my family.

had so many things in common

Not so these days

People change when they die

But -- (Laughter) this is also my grandmother's humor.

The person I felt closest to in this world was my mother, my grandmother, my great-grandmother, my great-great-grandmother.

Speaking of me, I'm the first branch on the family tree.

I wondered if there was even a connection with the trunk.

Why do I exist?

The year after my grandmother died was one of the most creative years of my life.

I think it's because, by that time, my thoughts were more organized than scattered.

my thought process is not linear

Because we think visually, thoughts come to our eyes.

I don't have a photographic memory, and my thoughts don't sit neatly on a shelf in my head.

Rather, I have a hieroglyphic language that I invent and that evolves day by day, and that allows me to understand things better and think more deeply.

But translating is a very difficult task.

I'm not very good at drawing, sculpting, or even doing handicrafts.

Like I said, I'm not very good at speaking my mind.

I used to think that speaking was like a still image, a poorly captured life inside of me.

What I'm trying to say is that I've always understood more than I could ever convey.

The year before my grandmother died, I was officially diagnosed with autism.

For me this was generally good news

All this time, I thought that the reason I couldn't live like a normal person was because I was depressed and had anxiety.

But actually, I was depressed and anxious because I couldn't live like a normal person, because I wasn't normal and I didn't know it.

It's not that I don't struggle anymore

I'll be honest with you, every day is hard.

But at least I know what it's like to struggle, and it's not about trying to be a normal person.

Instead of trying to escape the storm

Find the eye of the storm as best you can.

There are repetitive behaviors, routines, obsessive-compulsive thoughts that are ways people on the autism spectrum find peace, but I have a surprise door that leads to the storm's eye: stand-up comedy.

There's also evidence that I'm not neurotypical: the things that most people fear calm me down.

On stage, he's as calm as the dead

(Laughter) My diagnosis gave me a framework to think about aspects that I didn't understand.

I was a misfit, but suddenly I found my place, and for a while I felt confident and excited about my way of thinking.

But after my grandmother died, that confidence faded, because I mourn death by thinking.

In that sadness, I suddenly had a clear vision of how deeply isolated I had been.

Why do I exist?

I've come to believe that autism and PTSD have a lot in common.

And I started to worry, because I have both.

Is it possible to untangle the two?

All my life I've been told that overcoming trauma requires a coherent narrative.

We had a coherent story, but we weren't spared the trauma.

Even though it's dissolved in the soup, the onion still stings my eyes.

That's when I realized that I was telling my story to make you laugh.

I've stripped down the dark spots, cut out the pain, and clung to my trauma to please audiences.

While I brought other people together with their laughter, I was deeply disconnected from myself.

Why do I exist?

I didn't know the answer, but I had an idea.

I wondered if I could tell my truth, instead of laughing at everything about me, telling my trauma -- literally my heartfelt pain.

I thought a comedy show would be perfect for that.

I ran it there

I wrote a comedy that doesn't care about the punchline, and comedians are expected to make you laugh with a good punchline.

I won't let it end with a punchline

He threw a piercing blow into the stomach of the viewer.

I didn't mean to make you laugh

If I give it a breathtaking impact, my audience will listen to me and feel the pain as individuals.

That's what happened, and it's titled "Nanette."

Now a lot of -- (Applause) Now a lot of people said "Nanette" wasn't a comedy.

I'll admit that Nanette isn't a comedy show, but they're all wrong.

comedy didn't slip

I used everything I knew about comedy, techniques, methods, know-how, everything, and then I destroyed comedy.

If comedy is slipping, you can't break comedy with comedy

Piko Piko Hammer is useless

(Laughter) (Applause) Destruction isn't the goal.

I didn't just want to destroy comedy.

The goal was to destroy comedy and rebuild it, to make it better and to do all the things it wanted to say, and that's why I said, "I'm retiring from comedy."

Well, it's about time you thought, "Hmm, okay, but what are those three ideas anyway?

I do not know it"

let me ask

(Laughter) I'm sure there are a lot of people out there who know the three ideas.

It's a bunch of smart people by any measure, so it's no surprise.

But you might be surprised to hear that there aren't three ideas.

I lied when I said I had three ideas.

It's all made up I'm a weirdo

What I'm trying to do now is seed various ideas and seed them all over the talk.

why did you do that?

If it's not for the sake of making you laugh, it boils down to one thing my grandmother used to say.

"It's not the garden that matters, it's the garden work"

"Nanette" told me that it was true.

I knew very well that by breaking the rules of comedy and telling my own story with truth and pain intact, I would marginalize myself in life and in art.

Knowing that, I was prepared to sacrifice myself to tell the truth.

but it didn't

The world didn't push me away, it pulled me closer

I found connection by disconnecting myself

It took me a long time to understand that, and the core of that paradox is also the core of another paradox: why are you so good at something you're so bad at?

In real life, I'm not very good at talking to people, and in the diversity of my brain, I'm the type of person who finds it difficult to think, listen, speak, and process new information all at the same time.

But on stage you don't have to think

you can think ahead

You don't even have to listen, it's your job

(Laughter) And actually, you don't even have to speak, because you're technically reciting it.

So what's left is to make an effort to truly connect with your audience.

If there's one thing I've learned from Nanette, it's that I'm not the only one who makes connections.

you all participate

Even if "Nanette" came from within me, that character lives in the heads of people around the world, not mine, but others.

i think you are connected to me

So Nanette is much bigger than I am, just as her purpose as a human being is much bigger than any of us.

interpret as you like

thank you and hello

(applause)

Welcome to the world at an altitude of 3000 meters

Let me tell you the purpose of this talk and why there are pine cones all around you.

A long time ago I wrote a book called "Buildings Learn"

Today's story is, so to speak, "Mountains teach."

A little background: For the last decade, I've been thinking about how to manipulate civilization so that it becomes habitual to look at things in the long run, instead of being difficult and impossible.

It would be good if human beings did not think of the time frame of "now" as short as next week or the next term, but instead began to be conscious of the length of the history of civilization, 10,000 years ahead, 10,000 years ago.

The Long Now Society in San Francisco

An organization that fosters more than a dozen projects related to long-term sustainability.

At the heart of it all is a big billboard project, a dreamlike 10,000-year clock, a big undertaking, a plan to build a clock that will keep time accurately for that long.

It's really fun to think about the design challenges of projects like this.

First of all, the clock, which I have here, is the same one that I showed you here three years ago.

This is the first prototype that is actually working.

less than 3 meters tall

Designed by Danny Hillis and Alexander Rhodes, it's now ticking right at the Science Museum in London.

The design challenge I'm going to talk to you about today is how and where to install this clock, which could become a ruin in the future, so that it can continue to keep time for the next 100 centuries without error.

The first thing that came to my mind was

A tower with a slope on the outside, designed by Alexander Rhodes.

It's only when you think, "This is good," that it's going to affect a building over a very long period of time.

Let's look at an example of very long time effects

This is the Parthenon, it's only 2,450 years old, and since then.

This wonderful project was meant to last forever, because it was built out of giant stones.

In its present dire state, it's hard to tell even the original purpose of the building.

It's the fate of buildings. Buildings are weak.

The Pyramids of Giza, which are supposed to be strong and indestructible, look terrible when you see them up close.

Looted inside and out

It was built to protect things, but it protects nothing.

If we couldn't build a building, we thought about where we should install it to make it safer, and we decided that it should be in the basement.

Under the ground but with a view

Is there a place with solid ground?

The obvious answer is mountains

Not every mountain is good

We need a mountain that fits the conditions, because we're going to protect the clock for 10,000 years.

If you look at the place you are looking for from a distance, it will look like this

For a variety of reasons, mountains in the desert became a good thing, and we started looking for arid areas in the southwestern United States.

hills of new mexico

An extinct volcano in Arizona was also a candidate.

Around that time, Roger Kennedy from the National Park Service introduced me to the United States' newest and oldest national park in eastern Nevada, the Great Basin National Park.

Over 3,000 meters above sea level on the eastern border of Nevada

Located in the highest mountain range in Nevada

The left side, the west side, is steep, and the right side is gentle.

Nothing around, no city within 300 km

Far from highways and railroads

The only road nearby is Route 50, the loneliest road in America.

The national park is inside the yellow line on the right.

National forest is inside the green line

To the left of that is the Bureau of Land Management and private land.

It just so happened that this three-kilometre-long strip of land was available on private land.

Thanks to Jay Walker and Mitch Kapor here, Long Now was able to purchase this three kilometer strip of land.

Let's see the majestic truth that unfolds here

This is the view of the west side from Pole Canyon, 3535 meters above sea level, and you can see the steep slopes of Mount Washington.

The white cliffs are dense Cambrian limestone

The rock formation is 600 meters thick and might be a great place to hide a clock.

It's a pilgrimage to get to the clock, and it's a pretty serious mountain climb.

Last June, Long Now executives, staff, supporters and professionals went on a two-week expedition to this mountain to explore, to investigate, if it was an eligible mountain, and if so, how to proceed with the plan going forward.

Danny Hillis framed the assignment

He defined what the watch-visiting experience should be

I named it "Seven Steps of a Fantastic Adventure"

The first step is the imagery.

In this case the image might be this watch

The next step is departure, moving from ordinary life to a pilgrimage in search of something.

Next is a maze like the one in this image

A maze is just a concept, a place like the Twilight Zone, a place that's difficult and confusing to think about.

The next step is to have traction that's always in sight, something like a lighthouse that guides you through the maze and helps you along the way to your destination.

Brian Eno, who has been very involved with Long Now, spent two years making a CD called "January 7003," subtitled "A Study of Long Now Clock Bells."

Based in part on an algorithm developed by Danny Hillis, 10 bells will ring differently every day for 10,000 years.

Hillis's algorithm, the factorial of 10 gives us that number.

let's hear this sound

January 7003, listen

back to danny's list

The fifth of the seven is the reward, the climax of the journey, the goal.

We all work hard to get this.

According to Danny, a good trip comes with a secret bonus.

Something I never thought would come along that exceeded my expectations

and return

The return to the world must be slow, so that what is learned sinks into one's mind.

What do you remember? is the seventh

At the end there will be something like a reward that you can touch with your hands At the end there will be something like a reward that you can touch with your hands

Rocks from excavating mountains would be fine.

It's a special item that you can take home as a "souvenir".

How do we survey mountains for a project like this?

It's not like building a normal building

what are you looking for

What factors influence our thoughts and decisions the most?

Let's look at the boundaries. On the left side of the cliff is the national park.

There are possibilities here. It's important to see the boundaries.

Other factors include mines, weather, roads, elevation, etc.

And especially the tree, look at that tree on top of it.

Mount Washington is covered with bristlecone pines.

The oldest living organism in the world

You might think that this tree is little more than a shrub, but that's not necessarily the case.

Some trees are over 5000 years old

The wood is strong and hard as stone and can last for years after it dies.

If you look at the rings on the trunks left on this mountain, you'll find that some of them have been around for 10,000 years.

This "stone" itself is so beautiful, it's been honed by millennia of harsh winters.

We had an expert in dendrochronology from the University of Arizona with us.

If you have a pinecone nearby, take it in your hand and touch it, especially the tip.

it's funny

You can see why it's called bristlecone pine.

This is Danny Hillis in a forest of bristlecone pine trees, which is on the Long Now property.

In the 1950s, Edmund Shulman studied stressed trees at the forest limit and published his findings in Science magazine under the title "Conifer Longevity Under Adversity."

And with that in mind, I started looking for different trees at the forest line, and I found a bristlecone pine tree in the White Mountains that turned out to be over 4,000 years old.

Longevity in the face of adversity is itself an intriguing design mechanism.

Now let's turn to the mines. In 1998, the sale price for the land was 70 hectares and two mine shafts for $100 million.

The landowner said that the mountain should have more than $100 million worth of beryllium buried in it.

"That's great, but how about it's not free?

(Laughter) We're a non-profit organization, so donating land is a huge tax deduction.

(Laughter) If only I could prove the country was worth $100 million."

Well, after a few years of negotiations, with the help of Mitch and Jay, I was able to get the land for $140,000.

This is one of the tunnels, there was no beryllium.

It was called Paul Addit, and it had tungsten, and it was a mine with a little leftover tungsten.

But the mine shaft continues straight into the mountains to the east, over two kilometers into a very interesting area.

Shale is a type of claystone and cannot be said to be hard rock.

Hard bedrock won't collapse without pillars

Shale needs support, and some parts are crumbling.

This is Ben Roberts, a national park bat expert.

There are a lot of great things inside, like this mold growing on fallen wood.

This is another tunnel, at the top of the land, dug in 1870.

This land was developed by a group of miners at the time and was once a good silver mine.

In fact, it was the highest mine in Nevada, operating year-round.

You can imagine what winter is like at 3000m altitude

I'm sure some of you know these two miners.

Jeff Bezos on the right, Paul Seville on the left, looking for a mixture of lead and silver, Galena.

We're both back to work. This is the last tunnel.

It's called Bonanza Adit, and it's at the bottom of the valley.

Alexander Rhodes, on the left, surveyed a mine with people from the National Park, and it's just under two kilometers deep.

4 types of bats discovered

Under the mountain these tunnels are almost connected

Not quite, but worth considering.

just a little bit far

Let's turn to the weather. Mountain weather is an interesting thing.

Much more interesting than Monterey weather even today

It was a Tuesday in June last year

When I woke up in the morning, the mountains were completely covered with snow.

Thanks to Mitch Kapor, it was the perfect day to visit the weather station under construction.

this is kind of funny

This guy with a smile on his left is Pat Irwin, the regional manager of the National Forest, who gave me a temporary license to build an observatory.

Eventually, you'll have to ask for another temporary permit for your watch.

A temporary permit valid for 10,000 years.

Kurt Bollaker and Alexander Rhodes designed an innovative radio station.

Solar-powered signals are sent out of that antenna, reflected off space dust trails in the atmosphere, and we get the data in Bozeman, Montana.

You can see the weather for a week on Mount Washington, 2800 meters above sea level, on the internet.

Then the way to watch

There are no trails on Mt. Washington, just a few old mining trails, so you have to work your way through them.

Luckily, there are no bears, sumacs, and basically no humans.

No matter how many days I walk, I see no one

Well, this is one of the candidates for the climb

Coming up from Lincoln Canyon

It's surrounded by cliffs, and it's a beautiful place in itself.

Do not climb from Lincoln Canyon

Another option is to climb the western side of the mountain.

You can see why it is also called Long Mountain.

From the valley below 1800 meters, the pine and juniper forest can be easily climbed through the hill at 2300 meters ahead.

It navigates effortlessly through meadows, through increasingly steep forests, to the bottom of cliffs at 3,200 meters, and from there it's a problem.

When Jeff Bezos finished his expedition, he said, "Let's make the clock as inaccessible as possible.

Because the harder it is to reach, the more worth going.”

It's perfect - this is a 180-meter towering wall.

Alexander Rhodes decided to explore this trail, starting at the track on the left and heading up at 2,700 meters.

As you go up in altitude, your IQ goes down (Laughter), but the emotional effect goes up, so if you want to have a fantastical experience, it's a great environment, whether you want it or not.

According to Danny Hillis, you can tell how high you are by your mental arithmetic slowing down.

(Laughter) When Alexander arrived at the base of the cliff, he was just listening to the radio and he said, "There's a hidden niche here, and I think we can climb up there."

He's used to climbing cliffs, but he's an executive of our association.

He loves climbing cliffs

While I'm saying "Be careful, be careful"

I started climbing, and then the radio said, "Half climbed. It's like climbing stairs. It's climbing at an incline of 60 degrees.

It's a secret passage, like something out of Tolkien's story," I heard.

"Be careful, be careful, please."

After a while, I heard him say, "I've reached the top, and I can see everything from here."

I saw you running on top of a mountain

Look, this is Alexander Rose.

The first ascent of Mount Washington from the west, and it was also a solo ascent.

This discovery changed everything I knew about cliffs, even my plans.

It's time to name the route that Alexander discovered.

Because it's funny in Zander's crevasses

(Laughter) I decided to call it Alexander's Sikh.

The reason for this is that some people may have visited the ruins of Petra, but since the majestic gorge that leads to Petra is called Sikh, we did the same.

It's hidden so well that even I can't find it, and you can't see it either.

It's only when new snow falls that it becomes visible along this edge, and it really stands out.

When Danny and I were around here, Danny found something on the right side of the cliff, which was sort of like a verandah or cliff ledge with bristle cones growing on it, and people who saw the clock in the mountains thought they could come out on that ledge and look out over the landscape.

People coming up behind will see a little figure in the middle of the cliff and they'll rub their eyes and think,

I wonder how I climbed

This will be the traction that is part of the maze

Danny's porch from another angle Turn south and look north to see the whole terrain

For Danny's clock to work accurately, it needs sunlight at noon on a sunny day, which triggers heat conduction from the sun to reset the clock to the correct time.

Even if the rotation of the earth slows down, the clock will continue to keep accurate time.

Looking north from the south side

This is all national forest, and if you go up this cliff, the land of Long Now is in the forest.

If you climb up and look down, you can imagine the view from the top of the mountain.

You can see the scenery far away, 130 kilometers to the horizon.

That's the forest line, and the bristlecones here are shrubs.

It's a completely different world.A world at an altitude of 3,470 meters is so wonderful that words cannot describe it.

If you look at the edge of the cliff from the right of this picture, about a meter to the left of where Kurt Bollaker is standing, there's a 180-meter vertical wall, and he's leisurely making his way to Xander's Sikh.

A view looking down from the edge

It will be dangerous if you don't use the handrail

The east side is gentle as far as the eye can see

It's not snow, it's white limestone that looks like this.

here's a bighorn sheep

The herd was reintroduced from Wyoming

Things are going well, but there are problems

This is under review by Danny Hillis Design Issues

I'm thinking about how the land of Long Now where he's standing looks like a peak from the valley below.

The true summit is hidden on the other side

This was formerly called the summit of the military guise

His question is correct, in fact, from the valley you can see the summit, which may be important.

I realized that there are three important elements to this project.

One is the experience of seeing mountains

The second is the experience in the mountains.

The third is the experience of looking around from the mountains, which is determined by the view of the valley that surrounds it, the view behind Danny, all the way to the right, over 20 kilometers into the Shell Creek Mountains.

In the foreground there are 10 farms along the foot of the mountain.The water source is the mountain water.

In fact, there is also a well with water spouting out.

One of the ranches is called Kirkby Ranch.

very nice ranch

Alfalfa and cows, run by Paul and Ronnie Brenham, laid back but hard work.

Most of the ranches around here are out of business.

This is the view on the west side of Shell Creek

If you walk up to the trees, you can see what this valley used to look like.

This is a Rocky Mountain cedar here that's thousands of years old.

This is where a new plan was born: Long Now is exploring the possibility of buying the entire valley, because there are 10 ranches totaling over 7,000 hectares, but grazing land is ruining the entire 1,200 square kilometer valley. We could buy it all for $5 million and, little by little, restore it to its natural state. I can do it, it would be amazing if I could

Let's take another look at the mountain itself

Your encounter with a watch should be special, but it shouldn't be visible from the outside.

There is a natural cave at the foot of the cliff

It's only four meters deep, but what if it went deeper?

It comes up from somewhere inside and cuts it.

Keep the entryway rough and narrow, so that it becomes more sophisticated and beautiful as you go inside.

This stone gives off a special shine when polished.

Go through several polished paths and rooms until you finally reach the 10,000 Year Clock.

It's not a mine, it's a place that evokes the basic structure of a mountain, so that you can experience the wonders of the outside as well as the inside.

This isn't a build-on-building structure, it's a carefully-removed structure.

That's what the mountain taught me

Most of the beauty of watches can be borrowed from the beauty of mountains.

It's just a matter of merging the watch around it, while highlighting the great features of the mountain.

It's not a clock in the mountains, it's a clock that's integrated with the mountains.

When the Tewa Indians of the American Southwest say what to do to think long-term, they say,

“Ping Peya Ove”—Look to the Mountains

thank you

(applause)

black holes are the most destructive objects in the universe

Anything that gets too close to the singularity at the center of a black hole, whether it's an asteroid, planet, or star, risks being torn apart by its extremely high gravitational field.

When an oncoming object crosses the black hole's event horizon, it disappears and never reappears, only adding to the black hole's mass and increasing its radius in the process.

Nothing you throw into a black hole will do any damage.

It can't be destroyed by another black hole, the two black holes just merge into a larger black hole, releasing a little energy as gravitational waves.

There are theories, but someday in the distant future, the universe may become nothing but black holes.

Still, it's possible that the black hole could be destroyed or evaporate.

If the hypothesis is correct, all we have to do is wait.

In 1974, Stephen Hawking put forward the theory that black holes are gradually losing mass.

This theory, known as Hawking radiation, is based on the well-established phenomenon of vacuum quantum fluctuations.

According to quantum mechanics, a point in spacetime oscillates between multiple possible energy states.

These fluctuations are caused by the continuous creation and destruction of virtual particle pairs, which consist of a particle and an antiparticle with the opposite charge.

Usually when two particles appear, they collide with each other and annihilate, conserving all their energy.

What if it appears very close to the black hole's event horizon?

If two particles are well-placed, one can escape the gravitational pull of the black hole, and the antiparticle will fall into the black hole.

The antiparticle annihilates with another particle of opposite charge inside the event horizon, and the black hole's mass decreases.

On the other hand, to an outside observer, it appears as if the black hole emitted the escaped particles.

So unless the black hole continues to absorb new matter and energy, it will evaporate at a very slow pace, particle by particle.

How late are you?

A branch of physics called black hole thermodynamics provides the answer.

We capture the energy that everyday objects and celestial bodies give off into our surroundings as heat, and we use that emitted energy to measure temperature.

Black hole thermodynamics proposes to similarly define the "temperature" of a black hole.

The theory is that as the mass of a black hole increases, its temperature decreases.

The largest black hole in the universe emits a temperature of the order of 10 to the minus 17th power K (Kelvin), which is infinitely close to absolute zero.

On the other hand, the black hole, which has the mass of the asteroid Vesta, can reach a temperature of nearly 200 degrees Celsius and radiate a large amount of energy into the cold outer space through Hawking radiation.

The smaller the black hole, the hotter it burns, and the faster it burns out.

How short?

It's almost breathtaking

First, most black holes merge and absorb matter and energy faster than Hawking radiation.

But when a black hole stops merging, even one with the same mass as the Sun, it takes 10 67 years to completely evaporate, much longer than the current age of the universe.

When a black hole shrinks to about 230 tons, it can only exist for another second.

In the last second, the event horizon shrinks and shrinks until it releases all of its energy into space.

Hawking radiation has never been observed directly, but some scientists believe that certain gamma rays detected in the sky for short bursts are the last vestiges of tiny primordial black holes that formed at the dawn of the universe.

Ultimately, we may be left with a cold, dark universe in the almost unimaginably distant future.

But if Hawking is right, before that happens, the usually terrifying and otherwise indestructible black hole will finally glorify itself and disappear.

I have a story to tell you

I'm talking about Africa

It's a compelling story of hope and vitality.

First there was "Ha" Rewood

Then came "Bo" Liwood

And now we have the world's third-largest film industry, "no" wood.

In 2006 alone, about 2,000 films were made in Nigeria.

Imagine 40 to 50 movies sold every week in Lagos, Nigeria or on the roadside in West Africa.

The Nollywood market is said to be worth more than 30 billion yen.

It created so many, if not countless, jobs.

and is still growing

But it originally spread as a grassroots movement.

It didn't come with foreign investment or government aid, it started with almost nothing in a still difficult environment for the Nigerian economy.

15th anniversary of the film industry

Now, you might be thinking, "Why in the world would an Italian filmmaker based in Boston be interested in this story?"

I'd like to share a little bit of my personal story here: I have connections with Africa.

My grandfather spent most of his life in Zambia and still sleeps there.

My father lived in East Africa for a long time, even as an adult.

i was born in zambia

Even though I left Zambia when I was only three years old, I still felt that Africa meant a lot to me.

The first time I learned how to walk

It was in Africa that I spoke my first language and that my family bought their first house.

When I came back to Italy, one of the things I still remember very well was not being able to share my experiences in Africa with the people around me.

To those around me and to my friends, Africa was either an imaginary exotic place or a place of terror and famine.

I couldn't escape these stereotypes.

So I remember very well how I wanted to tell the story of Africa, where I used to live, as a place where people lived the same way and lived with dreams.

So when I read about Nollywood in the business section of the newspaper, I felt that this was the opportunity to talk about Africa without being prejudiced.

I was able to tell a story about an African who, like me, is making films, and that story inspired me.

I'm privileged to be a film director, teaching at the Digital Imaging Arts Center at Boston University.

We're seeing how digital technology is changing and how young independent filmmakers are making budget-friendly productions.

So when I approached them, they had all the support they needed to make a film.

And I was able to find two collaborators, not just support, and I was able to find two collaborators, not just support.

Amy Corrigan, a talented young photographer, and her friend and mentor Robert Caputo, a longtime National Geographic employee, said, "Franco, I've been writing about Africa for 25 years, and I've never encountered a story so hopeful and joyful."

We visited Lagos in October 2005

I went to Lagos to meet a wonderful and talented filmmaker named Bond Imelwa, who is here today.

Our plan was to take a look at this amazing film industry, Nollywood, by following the making of Mr. Imerwa's action movie called "Checkpoint," which focused on the issue of corruption.

The problem of police corruption

The filming period was 9 days.

i thought it was a great subject

At the same time, I talked to a lot of filmmakers to show them what Nollywood looked like.

Because it is said that a picture is worth a thousand words

I will show you a 6 minute video.

Here's a six-minute video specially edited for you at TED.

The documentary has several themes, but this time I've re-edited it for you.

Isn't this the world's first screening?

(Video) Men: Action

Wokedi: In Nigeria, you can shoot a movie for about 1.25 million yen a week.

Wokedi: In Nigeria, you can shoot a movie for about 1.25 million yen a week.

Piberecima: Making movies for the masses

We are not dealing with elites and bonbons We are not dealing with elites and bonbons

They can watch 'RoboCop' or whatever.

Balogan: In Nigeria, filmmaking is a way of life, we shoot for a living.

It's not cool filmmaking like Hollywood, trying to make it extravagant. We don't have much money.

If you make a movie here, sell it and jump to the next scene and shoot the next movie.

Imelwa: Entertainment also needs to have a message.

I believe that sight and hearing have great power.

90% of the population watch Nollywood

I think it's the most reliable way to convey information now.

I think that if you make a movie, regardless of the theme, you should weave the message you want to convey.

Woman: I have to report

requiring proper medical treatment

Piberesima: What I always try to tell people is that now is not the time to talk about quality.

Of course, there are people who are trying to make good quality stuff, but what you have to remember about this society is that there are still people in Africa who live on a dollar a day, and it's those people who watch Nollywood movies.

McDonald W: Nollywood was born here - it's a great industry.

No one believed that Nollywood would be born in Africa.

Imasen: The films made here tell stories that the locals can relate to.

It's about the locals, it's a movie for them.

Whenever a story is understood, people are glued to the screen.

Narrator: suspense, fun, curiosity

blockbuster comedy

Big laugh no doubt

Abaoshi: Until now, I prefer foreign movies.

It was all about foreign movies

But even we can do something

We can make something that people around the world will look at and think, wow, this is Nigeria.

Man: Sgt. Please handcuff yourself.

please stop blaming shame

Don't run away, come back, come back

McDonald W.: Now when I walk down the street, I see people who are my role models.

different from what you see in the picture

you get to meet real people

By seeing how you talk and how you live

very good influence

Don't just look at the pictures

It's not what you hear in western media.

Man: see you later

action

Obi: I used to admire cowboy movies.

But when I found out about the situation in my country, corruption was pretty rampant at the time.

Here young people have to do bad things or commit crimes to get things done.

I didn't want to do that

And I realized that I could have a great life as an actor, without committing crimes, cheating, or lying.

All I need is myself and the talent God gave me

Man: ok let's do it

let's start

keep this

Remove

Animadu: When you make a movie in a big country, everything is in order.

But here even gunshots have to be improvised

For example, you can see the pistol right now, but I'm using a knockout so it doesn't show up.

Ikeduba: I'm afraid the explosion won't reach my face.

Woman: That's why you're wearing protective tape.

Because the protective tape keeps it down

Wait a minute, can you bring me here?

Kevin: I'm begging you to make sure that the explosion doesn't affect your face.

But she's a pro too, she knows how to do it

I have to protect my face

I hope this isn't the last movie I'm in.

This is the Nollywood of the magical world

Roboger: With or without help from anyone, you can see how we make movies.

Male: action

cut

(Applause) Franco Sutch: So much to say and so little time.

It is filled with many themes.

I just want to tell you one thing

I spent several weeks working with producers and actors, and the problems they faced were unimaginable for a filmmaker working in America or Europe.

And yet, they always have a smile on their face and a passion for it, which is amazing.

German filmmaker Werner Herzog once said, "I need to make films like you need oxygen."

they are breathing too

Nigerian filmmakers are doing what they really love

This is very important for them and for the audience.

A woman once told me, "Watching Nollywood movies really relaxes me. I breathe easier."

There is one more important thing.

It's technology, and it's an area that I'm very interested in, and non-linear editing in particular, has become a very cheap technology, and the price has dropped to a fraction of what it used to be.

You can buy a high-quality camera for under 400,000 yen

This trend is driving people's enthusiasm.

What do you think then?

I had nothing to teach them

They understood themselves, they embraced technology, they used technology, they were successful.

I want the Nollywood phenomenon to develop in both directions.

I want to encourage other African countries to embrace technology, to follow Nigeria's example in making films, to create jobs, to create relatable stories for their own people, positive, reassuring and part of their culture.

But I think we can be more inspired by this phenomenon.

I think it's a phenomenon that works on both sides.

My filmmaker friends look at Nollywood and say, "Wow, these guys are doing what they really want to do for a living."

That's the lesson I think I'm learning from them.

And one thing I'd like to challenge you to do is think about the importance of storytelling.

This can also be called the theme of this lecture.

Imagine, just for food, clothing and shelter

A world without stories Around a campfire A world without stories

No legends, no fairy tales

A world without stories

no novel

Difficult, right? it's an empty world

So I sincerely think

The key to a healthy society is a large number of storytellers, and Nigerian filmmakers are proof of this.

listen to them

it's just short

This is the voice of Nollywood, not a movie.

(Video) Arousa: Nollywood is the best thing in life

If there's an industry that makes people smile, it's Nollywood.

McDonald W: In the near future, not only will we make better films, but we will have films that can only be made in Nigeria.

Imelwa: The theme is basic

love and action

But I tell stories in a Nigerian, African way.

There are so many different cultures in Africa, there are so many that it would take me a lifetime to tell you all about them.

Franco: That's all I have to do. Let's leave the rest to the director of Nollywood.

I hope that there will be many collaborations and that we can teach each other.

I sincerely hope that

thank you

(Applause) Chris Anderson: Hold on, I have two questions.

Franco, this means it's the third largest in the world.

How many movies would that be?

Franco: Yeah, I mentioned it briefly, about 2,000.

Some data show that

Chris: 2,000 bottles a year?

Franco: 2,000 films per year. In 2005 or 2006 alone, censorship agencies censored 1,600 films.

I know there are more than this

So 2,000 would not be wrong.

About 45 per week.

there are many difficulties

There's an oversupply, and we have to improve the quality and move on to the next stage, and I'm optimistic.

Chris: Are these movies mostly seen in theaters?

Franco: Yes, it's important.

Well, as you can imagine, these films are being distributed directly to the market.

purchased at a video shop

very cheap to rent

Chris: What format?

Franco: Format - good question. It's a VCD.

It's a CD, but it's a little more compressed.

Originally VHS

I didn't have to wait for the latest technology.

It started around '92 or '94

Nigeria has 57 million VCRs that can play VHS and VCD.

It's basically the same as a CD.

Chris: Then a movie on the side of the road...?

Franco: So if you're stuck in traffic in Lagos, you can buy a movie, a banana, a bottle of water, yes.

(Laughter) What I'm trying to say is that storytelling is really a necessity and a staple food.

There is no life without stories

Chris: Thank you very much Franco.

I want to shift your perception of the world a little bit and show you design in nature.

I'm going to use slides to talk about the dawn of the universe, what I call cosmic exploration, where by observing the remnants of creation, we can deduce what happened in the beginning, and then continue to make sense of it.

Look around What do you see?

It's a space that designers and people have worked into, but what you're actually seeing is material that was already there, processed into a certain state.

Where did that substance come from?

How did it get to its pre-processed state?

This is a question of what is continuity.

If you ask me, it leads to the question of how the universe began and was shaped.

How did these substances come about during the creation of the universe and its subsequent evolution?

So let me show you a picture of the Hubble Deep Space Exploration.

This picture shows some glowing objects in the dark.

Four of the glowing objects are stars, here in the shape of small pluses.

This and this are stars, everything else is a galaxy.

If you put your eye in here, you can easily see thousands of galaxies.

Especially when I see this galaxy, which looks so much like our own galaxy, it makes me wonder if there's an art college design conference going on there, and there's intelligent life thinking about design, and there's some cosmologists out there wondering where the universe came from, and some of them looking at our galaxy and wanting to know what's going on here.

But there are many other galaxies, and the ones that are closer are the color of the sun, and the ones that are farther away have a bluish tint.

But I think the question is, why are there so many galaxies?

This is a clean representation of a small part of the universe.

there are only a thousand galaxies

It's estimated that the Hubble Space Telescope could see about 100 billion galaxies, given the time to study it.

very large number

Our galaxy has roughly the same number of stars.

But when you look at pictures like this, there are more galaxies than stars, and I don't know why.

So the question is, what design or creative process made the world the way it is?

I'm going to show you that it's a very complicated thing.

Proceed through trial and error

What helps us look at this is the fact that the universe is so big that it's kind of a time machine.

Here's a cross-section of a multi-layered sphere.

Since we are observing from Earth, we put the Earth at the center of the sphere.

The moon is 2 seconds away at the speed of light, so when you take a picture of the moon, you will see the moon 2 seconds before.

2 seconds is like now

Eight minutes before the sun, not a big deal except when escaping an incoming flare.

I'd like to receive some advance warning if it attacks.

But when it comes to Jupiter, it takes 40 minutes at the speed of light, and that's a problem.

Communicating with Mars is also difficult because it takes time for the light to travel back and forth.

It takes about 10 years to get to the nearest 40 to 50 stars.

What you see when you take a picture is what it looked like 10 years ago

At the center of the galaxy, it's what it looked like thousands of years ago.

Our nearest galaxy, Andromeda, is what it looked like two million years ago.

Two million years ago on Earth, there would be no trace of humans, because that would have been before humans appeared.

Now you can see the scale

With the Hubble Space Telescope, we're looking at time from hundreds of millions to billions of years.

If you can figure out a way to see farther - and I've done a lot of research on it - you can look back in time, before the stars and galaxies were born, when the universe was hotter and denser than it is today.

They are lined up in that order.

There's a galaxy in the middle, the Milky Way galaxy, and it's surrounded by galaxies that look like Hubble, and the spheres represent different time scales.

Behind it is a newer galaxy

Got the big picture?

Oddly enough, the beginning of time is outside.

And there's a part of the universe that we can't see, that's too dense and too hot for light to come out.

Just like we can't see the center of the sun, we need other ways to know what's going on inside the sun.

But you can see the outer edge of the sun, and you can see the universe that way.

At the very edge of the exterior is the model domain, the radiation born from the Big Bang, which is incredibly uniform.

The universe is almost perfectly spherical, with very little variation, and this picture is extremely enlarged.

Over time, these small differences lead to irregular galaxies, the first stars, more advanced galaxies, and finally the solar system.

It's an epic design. Let's see how it's been done.

These measurements were made on several satellites.

They discovered this difference using the COBE satellite, launched in 1989.

In 2000, the WMAP satellite was launched, which allowed us to take clearer pictures.

Later this year -- it's a cool, quiet satellite -- it's got a beautiful design -- the Planck satellite is going to launch and make very high definition maps.

And that's how we advance our understanding towards the beginning of the universe.

Differences in the universe can tell us secrets about the structure of space-time, what the universe is made of, and how the universe began.

I've prepared this magnificent picture for you. Let's go back to the beginning of the universe.

After a period of expansion, the universe cools and becomes transparent, and after the Dark Ages, the first stars give off light, from which galaxies and eventually clusters of galaxies form.

Somewhere during this time the solar system formed

has grown into what it is today

It was amazing

The part that looks like the bottom of this trash can shows changes in the structure of space-time itself during the expansion period.

that's a really weird model

What evidence do you have?

Let me show you some patterns in nature that resulted from this.

I believe that space-time is the essence of the universe, and that galaxies and stars are like sea foam.

It's an indication of where the interesting waves are and what happened.

This is one million galaxies from the Sloan Digital Sky Survey.

Each dot indicates the position of a galaxy

In the survey, we point the telescope at the sky, take pictures, and since we focus on the galaxies, we exclude the stars, and estimate the distances and plot them.

You can radially do something like this

You can see the Great Wall, a large-scale structure of the universe, but there are also hollow areas and dark areas, depending on the performance of the telescope.

See it in 3D

What it does is it shoots the universe in a sector that matches the rotation of the earth.

There are places you can't see because of our galaxy's obstructions, and places you can't see because of telescope limitations.

In the next video, I'll show you the 3D version spinning around

Can you see that the universe is projected in the shape of a fan?

Each dot represents a galaxy, relatively close to our own galaxy.

You can see the Great Wall, some complex structures, some hollow.

Some places have no galaxies, while others are densely packed with thousands of galaxies.

There seems to be an interesting pattern, but we don't have enough data to explore it.

We have data for only one million galaxies.

It's like looking at a million balls in the sky So what do we do?

There's a study that's very similar to this, the 2-degree-field galaxy redshift observations.

Observing far away in 2 degrees of field of view

Every time we find a galaxy, we observe things like redshifts and record the type and color of the galaxy, which is a representation of the actual observations.

When you're in the middle of the galaxy, it's hard to see patterns, like in the middle of life.

It's hard to see the pattern when you're in the middle of the audience.

let's go out and see

First, you can see the structure of the survey, and then you start to see the structure of the galaxy, because you're outside, so you can see it.

I see the Great Wall towering

You can see that there are cavities. It's a complex structure. How did that happen?

Think of yourself as the designer of the universe

How do you make a galaxy look like this?

It wasn't just a random toss

there is a more complicated process

How do you build it?

It's time for "serious play", which is also the title of this conference.

We have to take God's role seriously, not only in changing people's lives, but in creating the universe.

How would you handle that responsibility?

What method do you use?

What do you do?

I'm going to show you the results of a large-scale simulation, using the principles of play and design that humans have worked so hard to learn about how we think the universe should be, but that nature has known all along.

We start with very simple ingredients and rules, but we need enough ingredients to make it more complicated.

Add some randomness and fluctuation to it, and you'll see different shapes.

What I'm going to show you is the distribution of matter that depends on the scale.

let's zoom in

We have to add another kind of material to make the universe just right.

is dark matter

It's a matter that doesn't interact with light like normal matter like me or this stage.

Dark matter, which is transparent to light, is represented here as white.

The white part in the figure is dark matter.

We should call it invisible matter, but we made it visible.

The yellow part is the normal stuff that makes up stars and galaxies.

Watch the video

zoom in

Please pay attention to this pattern

Zoom in more

You can see filaments (thread-like structures) and cavities.

Superclusters are formed when many filaments are knotted together.

What you're zooming in on right now is between 100,000 and 1,000,000 galaxies in a small area.

we are in the countryside

We're not at the center of the solar system, we're not at the center of the galaxy, and our galaxy isn't at the center of a cluster of galaxies.

keep zooming in

It's a place with over 100,000 galaxies, and there's about a million galaxies in that area.

let's zoom in more

i forgot to mention the scale

1 parsec is 3.26 light years

1 gigaparsec is about 3 billion light years

It means that it takes light three billion years to travel that distance.

Consider the distance between these two points

This is the distance between us and Andromeda

The little speck you see here is the galaxy

If you zoom back in, you can see the structure, which looks regular from a distance, but is made up of many irregular shades.

the components are simple

First is a very simple fluid

We have normal matter, we have dark matter, we have photons, we have neutrinos, but they don't really play a role except in the early days.

A simple fluid evolves over time into this complex structure.

When you first saw this diagram, it probably didn't mean much.

We're only seeing about 1% of the visible universe here, but we're still seeing billions of galaxies, or nodes, but they're not the main structures.

Invisible dark matter acts like a framework that holds everything together.

You know how difficult it is to get the big picture while you're inside something.

will give the same result

There's a filament, the bright part is invisible material, and the yellow part is emerging galaxies or stars.

If you go all the way down, you'll find occasional intersections of filaments, and even giant clusters of galaxies.

Let's go to a place where there's a very large cluster of galaxies, and you'll see what it looks like.

Doesn't look too complicated from the inside, does it?

It's only when you zoom in that you realize it's a very complex design.

Somehow it has evolved to this point

What I want to know is, how hard is it to put this together?

How big of a construction team would you need to build this universe?

that's what matters

here we come

You can see how some filaments come together to form a supercluster.

But it doesn't really look like this. First, you can't move that fast. Everything will be destroyed.

If we can see invisible matter when we travel billions of years

should look like this

It's this: how do we simplify the universe?

We know that the entire visible universe, seen by the Hubble Space Telescope and by other instruments, was once contained in a space smaller than a single atom.

It started out as a small quantum fluctuation, but it expanded at an incredible rate.

Those fluctuations spread to an enormous size and eventually became the cosmic background radiation.

It is necessary to reach the irregular structure of galaxies and galaxy clusters from fluctuations in background radiation.

Let me show you a small simulation

In the current simulation, after a month of calculations on 1,000 CPUs, we were finally able to visualize things like now.

Here's what you can do on your computer in two days.

We start when there was a small fluctuation in the universe, this time a quarter size.

And we see connections coming together and forming the structure of the universe.

This is a simple model. There is no normal matter, only dark matter.

Dark matter clumps together, and normal matter follows.

That is right

was uniform at first

Fluctuation is about 1/100,000

Fluctuations of about 1/10,000 occur here and there, and after billions of years, gravity is added.

Dense areas attract matter

I will draw you in steadily

But the universe is so vast and the scale of time is so large that it takes a long time to form.

In terms of expansion, it will continue to form until the universe is about half its current size.

At this stage, the universe mysteriously accelerates its expansion and stops forming larger structures.

The size of the structures you see here is the upper limit, and only those that have already begun to form will continue to form.

This simulation takes two days on my computer.

It takes 30 days on 1000 CPUs to run a simulation like the one shown earlier

We know how to play seriously with the creation of the universe. We start with something smaller than a tear full of matter. It's almost nothing. It's tiny, it's almost perfect.

We have a model, we can do the math, and we can use it to design what we think the universe should look like.

The design goes far beyond what we originally envisioned.

I started doing this 15 years ago, using the COBE spacecraft to map it, and I found that there was massive fluctuation, and it was divided into phases.

Then came the WMAP (Wilkinson Microwave Anisotropy Probe) survey, which gave us the ability to resolve higher angles.

Now you can see the same large-scale structures, as well as small-scale structures.

On the bottom right is an image of what would happen if the satellites were reversed and depicted the Earth.

you will be able to find the major continents

What we hope to see from the upcoming Planck satellites is to observe the universe at the same high resolution that we can see complex patterns on Earth.

Sharp boundaries and snug-fitting fragments reveal the existence of nonlinear processes.

For example, in geology, there are non-linear effects of plate movement.

You can see this just from the map

We'd like to get to that level with maps of the early universe, and the presence or absence of non-linear effects that make things move and change can give clues to how space-time itself originated.

we're here now i just wanted to tell you

I wanted to convey a different perspective on design and how to look at all things.

thank you

(applause)

What shape are your cells?

Shaped like a squishy cylinder? Or a jagged shape?

We probably don't think much about the structure of these basic building blocks, but at the microscopic level, small changes can have a very big impact.

Some changes in cell shape are adaptations that make them better evolved, while others lead to a chain of debilitating complications.

This is a story about sickle cell disease.

Sickle cell disease affects red blood cells, which are responsible for carrying oxygen from the lungs to tissues throughout the body.

To do this essential job, red blood cells are filled with a protein called hemoglobin that carries oxygen molecules.

These proteins float individually inside the donut-shaped, plastic red blood cells, keeping them flexible and able to fit into even the tiniest blood vessels.

But in sickle cell disease, a single mutated gene alters the structure of hemoglobin.

After delivering oxygen to the tissues, the mutated proteins cluster together in rigid rows and become immobilized.

This rod-shaped hemoglobin transforms the red blood cell into a sickle shape with a long, pointed tip.

These red blood cells are so hard and sticky that they can't move freely through the blood vessels.

Sickle cells can get stuck and clump together, completely blocking the blood vessel.

This prevents oxygen from reaching various cells, causing many of the symptoms that people with sickle cell disease experience.

The disease develops before the age of one year, and patients experience a sharp pain that radiates from tissues that have been deprived of oxygen.

Specific symptoms appear depending on the location of the clogged blood vessel.

When blood clots form in the spleen, which is part of the immune system, it increases the patient's risk of contracting dangerous infections.

Blood clots in the lungs cause fever and difficulty breathing.

Clogged blood vessels near the eye can cause visual impairment and retinal detachment.

And if a blood vessel in the brain becomes clogged, it can cause a stroke.

To make matters worse, sickle cells have a short lifespan, lasting only 10 to 20 days, compared to four months for normal cells.

A shorter lifespan means that patients are constantly exposed to a shortage of red blood cells, a condition called sickle cell anemia.

Perhaps the most surprising thing about this deleterious mutation is that it originally evolved as a beneficial adaptation.

Researchers have traced the origin of this mutation to a region where the tropical disease of malaria has wreaked havoc throughout history.

Malaria is spread by parasites that are carried in local mosquitoes, use red blood cells as a "growth site" for themselves, and travel through the bloodstream to quickly and fatally spread throughout the body.

But this change, which turns red blood cells into obstructions in blood vessels, also makes them resistant to malaria.

If a child inherits a copy of the mutated gene from exactly one parent, the abnormal hemoglobin levels are sufficiently lethal to the malaria parasite, but most red blood cells continue to retain their normal shape and function.

In regions where this parasite is abundant, the mutation that gave rise to sickle cells had a huge evolutionary advantage.

But as this adaptation became more widespread, it became clear that inheriting the mutated gene from both parents caused sickle cell anemia.

Today, most people with sickle cell disease can trace their ancestry back to countries where malaria is endemic.

This mutation still plays an important role in Africa, which accounts for more than 90% of malaria infections worldwide.

Luckily, while this "adaptation" works, treatments for sickle cell disease continue to advance.

For many years, hydroxyurea was the only drug that could reduce sickle cell count, numbness, and extend lifespan.

Bone marrow transplantation is also an option, but these treatments are complex and not easily accessible.

But promising new drugs are emerging in breakthrough ways, such as keeping oxygen bound to hemoglobin, preventing sickling, and reducing the viscosity of sickle cells.

And the availability of genome editing has increased the likelihood that stem cells will produce normal hemoglobin.

If these methods become available in areas most affected by malaria and sickle cell disease, they will be able to improve the quality of life of many more affected people who suffer from this harmful adaptation.

What kind of technology could end global poverty?

I found it really amazing

The first thing we looked at was mortality in the 20th century, etc. Why did things improve? the conclusion is simple

You might think that antibiotics improved the numbers more than clean water, but the reality is that they didn't.

Something very simple - off-the-shelf technology that was easy to find on the early web - made a huge difference to this problem.

But also, as we look at increasingly powerful technologies, we're concerned about the dangers of nanotechnology, genetic engineering, and other emerging digital technologies being misused.

Come to think of it, once upon a time in the distant past, it was the question of individuals oppressing other individuals that had to be dealt with.

And we found the answer - Ten Commandments: Thou shalt not kill

This is about a one-on-one problem

We've come to live in cities Cities have many people

He created the concept of individual freedom so that the majority would not oppress the individual.

And to deal with large groups, say, on the scale of nation-states, they ended up signing non-aggression pacts.

But now the situation has changed.In other words, it's an era called asymmetry, and technology has become a powerful force.Technology has become more powerful than the nation-state.

Instead of nation-states bringing about mass destruction, individuals have become the dangers of it.

This is also the result of new technology being digitized.

we found the gene sequence

You can download gene sequences.You can download gene sequences of pathogens on the Internet.I read someone in a scientific journal saying it was dangerous to FedEx the 1918 flu virus.

If you want to experiment in your own lab, all you have to do is regenerate the virus yourself, because FedEx might destroy it.

We cannot deny that there is no such possibility.

A small group of individuals with technologies like self-replicating technology, or even biologics, can become so powerful that it is clear that this group is dangerous to the world.

could trigger a global epidemic

And we haven't had much of a pandemic, and we as a society can't handle events that we can't manage or that are illogical.

Preparing in advance is difficult

In this case, the stack of technologies just gives more power to those people who can't solve their problems.

The possible solution is to imagine, like Russell and Einstein, At the beginning of the twentieth century, dialogue was more powerful than it is today.

Social order and public morality improved

The negotiations that have brought about civilization are those without the use of force

Individual rights are established by society protecting us from others by acting as the law allows us to do, rather than doing what we want.

In other words, restrictions are necessary to mitigate the dangers posed by the novelty. Ultimately, individuals must be essentially restricted from accessing the source of the epidemic.

You also have to have good defenses in place, because limits alone won't stop crazy people from doing things.

As you know, the trouble is that it's easy to do bad things, but it's hard to deal with all possible bad things because attackers can take advantage of asymmetry.

In 1999-2000, I thought about these things and my friends told me that I looked really depressed, and they were seriously worried about me.

And then I signed a contract to write a darker book on the subject I moved to a hotel in New York My room was full of books about the plague

And then came September 11th I was in town with other people

I never thought that I would be there

The next morning I decided to go out into town Sweeping trucks were gathered on Houston Street Ready to hit the rubble road

Headed downtown and walked to the train station There weren't any stores open south of 14th Street

It was a shocking experience, but I don't think it came as a surprise to someone who lives in a room full of books.

It was a surprise that it happened at that time and in that place, but it wasn't a surprise that it happened.

And everyone started writing about this

Thousands of people started writing about it

I gave up on writing a book Then Chris asked me to speak at this conference I don't want to talk about this anymore Because it's been boring

But I'm here to say a few words about this matter.

We must continue to believe in the rule of law to combat asymmetrical threats, but I suspect that the current situation and the influence of those in power have discouraged us from believing in it.

We can't face this threat the ridiculous way we do it now, because million dollar actions cause hundreds of millions of dollars in damage, and trillions of dollars in counterattack.

You can't get a million times more happiness out of fighting threats at a million times less cost.

I gave up writing a book, and then I had the great honor of joining Crayner Perkins, Inc. A year ago, I got a job at a venture capital firm on innovation.

Because the difference of one digit becomes the difference of many digits in the end

I had a lot of fun last year, and some very high-quality, exciting innovations have landed on my desk.

Sometimes I was overwhelmed, but thanks to Google and Wikipedia, I was able to understand a little bit of what people were talking about.

I'm going to talk about three of those areas that are very interesting, and related to the issues we were talking about in the Wired article.

First of all, the field of education has a lot to do with what Nicholas said about the $100 computer.

Moore's law is still valid

The latest transistors are 65 nanometers, and in this area I thought I would invest in a company that could extend Moore's Law even further, down to the scale of 10 nanometers.

For example, 6 improvements in dimensionality reduction result in 100 improvements in raw materials, increasing the chip's capabilities. Specifically, what costs $1,000 today.

Now let's say $100 computers become available in 2020 as educational tools.

The challenge that we have to face, and I'm pretty sure that this is going to happen, is that we can develop the tools for education, and make it network-enabled, and make the most of this device.

Could it be that we have incredibly powerful computers, but not enough software?

In retrospect, when good software came along and I ran it on a ten-year-old computer, I would say, Oh, how fast was this machine?

I remember when I put Apple's Mac interface on the Apple II.

The Apple II had plenty of power to run that interface, but at the time I didn't know how to do it.

So, from what we understand, Moore's Law has consistently improved in performance as predicted by that law, for more than 40 years.

I can imagine what computers will be like in 2020

It's great to be able to say this Let's create education and educate the people of the world Education is a great force for peace

You can distribute a $100 computer to people all over the world, and you can have a $10 computer in 15 years.

The second area I focus on is environmental issues, which are clearly having a greater impact around the world.

We'll hear more from Al Gore soon.

Similar to Moore's Law considerations, there are things that improve our ability to cope with environmental problems, it's new materials.

On this issue, we must respond to urban population growth. Within this century, urban population will grow from 2 billion to 6 billion. People will move to cities in the blink of an eye.

We all need fresh water, energy, and transportation.We want to develop in an environmentally friendly way.

Efficiency has improved to some extent on the production side.

There have been improvements on the energy and resource efficiency side, but on the consumption side, especially in the US, it remains very inefficient.

But new materials will bring significant innovation.We are confident that these new materials will benefit the market.

Now let's talk specifically about the new material, which was discovered 15 years ago.

Carbon nanotubes, as you know, were discovered by Iijima in 1991, and have extremely excellent properties.

These properties were what we were looking for, so we started working on the nanoscale.

Strength: Nearly the strongest material known for its tensile strength

It is very stiff and hardly stretches when force is applied.

For two-dimensional applications, this material can be used to create cloth, and is 30 times stronger than Kepler.

When you make a three-dimensional structure like a buckyball, it has various excellent properties.

Even if you hit a particle and make a hole, self-healing is possible. It hardens and repairs the hole.

(Laughter) When you hit it with light, it generates electricity.

Flash the camera and it'll burn

Emit light when electricity is applied

If you pass an electric current, you can pass a thousand times the current compared to a piece of metal.

Since we can make both p-type and n-type semiconductors, we can make transistors.

Heat passes in the direction of the fiber, but not in the direction perpendicular to it There is no thickness, and heat does not transfer in the direction other than the direction of the fiber When stacked, the characteristics of carbon fiber appear

When you hit a particle, it shoots out fragments, like a miniature linear accelerator or an electron gun.

The inside of a nanotube is extremely narrow, with only 0.7 nanometers at its smallest part, which is the quantum world.

There is a strange world inside the nanotube

It's in this area that Lisa Randall, who got the material and made a business plan, talked about it.

I had a business plan, and in connection with that, I was trying to understand Witten's superstring theory, and I was trying to understand what was going on in this nanomaterial.

So much for the inside of the nanotube

These new materials allow us to take advantage of their different properties - lighter and stronger - and we can use these new materials for environmental issues.

New materials can be used to make water New materials can be used to improve the efficiency of fuel cells There are also new materials that can act as catalysts for chemical reactions, which can also reduce pollution

Ethanol - a new purification method for ethanol

All-new, electric transportation

A dream solution to these environmental problems - profitable

So we decided to launch a new fund and set aside $100 million to invest in this field.

Companies like Genentech, Compaq, Lotus, Sun (Microsystems), Netscape, Amazon, and Google have yet to find a place in these areas, and this materials revolution will allow these issues to move forward.

The third thing we're working on was just announced last week - we were all in New York.

Raised $200 million to invest in this area, invested in research into pandemics caused by bioterrorism weapons

Considering the previous funding Kleiner raised was $400 million, this funding means a lot to us.

In the past few months, no, a few months ago, Raymond Kurzweil and I wrote an op-ed for the New York Times about how dangerous it was to publish a book about the 1918 flu gene.

John Doerr, Brook and others took notice and started paying attention to what the world was doing How the world was preparing for the pandemic And I realized there were gaps

So could something innovative fill this gap? Brooke once told me I can't sleep with all these worries because there's so much good technology out there We're addicted to technology, but we can't get by without it

There's an antiviral drug that might cause a hoarding Well, it still works, it's 'Tamiflu'

However, the virus is now resistant to Tamiflu. Tamiflu no longer works

For AIDS, it turns out that a cocktail treatment is necessary: ​​multiple antivirals are needed for viral resistance.

need to do more research

To understand the current situation, we need to create a network

If we could get a quick diagnosis, we'd be able to tell if we have a new strain of influenza that we've just learned to recognize.

Rapid diagnosis must be made possible as soon as possible

We need new antivirals and cocktails, we need new vaccines

Broad-spectrum vaccine

A vaccine that can be produced quickly

cocktail therapy, multivalent vaccine

In general, use a trivalent vaccine that covers all three types

I need this vaccine I don't know what the future holds

If we could close these 10 gaps, we could dramatically reduce the risk of a pandemic.

The difference between a normal seasonal flu and a pandemic is whether or not the number of deaths will be in the thousands.

We are very much looking forward to funding 10 projects and seeing 10 projects accelerate and see them enter the market, which should be within the next few years.

If we can use technology to help us address education, if we can help address environmental issues, if we can help address pandemics, will we be able to solve some of the bigger problems I've talked about, the ones I wrote about on Wired? Unfortunately, the answer is no, because the problem of managing technology cannot be solved with more technology.

If you unleash unlimited power, very few people will abuse it.

become a one-million-to-one unfavorable battle

So we have to come up with better policies.

For example, what we can do is solve the problem with policies that are not in the current political system.

Market power is huge

For example, if you try to regulate a problem, it won't work. But if you put a price on the cost to the business, on the cost of catastrophe, the people whose business has a higher cost of catastrophe will insure against that risk.

Let's say you want to sell a certain drug.

But if you don't have to get approval: but then you have to get your insurance administrator to agree that the drug is safe.

By applying the insurance concept more broadly, we can harness an even stronger force, the market force, and harness the reaction from the market.

How can the law be obeyed?

I think the law deserves to be obeyed

In other words, everyone must be held accountable

Law imposes accountability

Today, scientists, engineers, businessmen, and engineers have no personal responsibility for the consequences of their actions.

In other words, it must be stipulated by law

Finally, we have to take action, and that - which is an unwelcome statement - means we have to start designing the future.

We cannot choose the future, though. can decide the direction

We are making investments to prevent influenza pandemics, and these investments are paying off.

It may not be possible to completely prevent it, but perhaps if you focus on this problem, you can reduce the damage.

We can design the future By choosing what we want to happen in the future and what we don't want to happen, we can reduce the risks.

Vice President Gore will talk about how we can guide the trajectory of climate change to reduce the risk of catastrophes.

But most importantly, what we need to do is help the good guys. Help those on the defensive get an edge over those who think they're going to take advantage of things.

All you have to do is restrict access to certain information

But we have placed so high a value on free speech that it is not easy for any of us to accept this.

It will be especially difficult for scientists to accept because Galileo's house arrest has not been forgotten and is still at odds with the Church.

But the price for maintaining civilization is

The price of maintaining the rule of law is restricting access to great and unbridled power

thank you

(applause)

A few months ago, I went to Spain and had the best foie gras I've ever had.

I have never eaten such delicious food

Because I saw something that convinced me it was the future of cooking.

It's funny, isn't it?

The future of foie gras and cooking…

There is no food more sinful than foie gras.

It's cruel

Banned for a while in Chicago

There's a lawsuit going on in California and most recently in New York.

If you're a chef and you put foie gras on your menu, you could be attacked.

A famous chef was actually attacked in San Francisco

I'm not saying that the arguments against eating foie gras are without rationale.

The issue is forced feeding.

They catch geese and ducks and force them to swallow large amounts of fodder.

Feed in a few weeks more than you will eat in a lifetime

Liver swells 8 times

Suffice it to say, it's not the ideal of sustainable farming.

But the problem for us chefs is that it tastes so damn good.

(audience: laughter) I love foie gras.

Full of fat, sweet and smooth texture

Eating anything together makes it taste incredible

Can you make a delicious menu without foie gras?

of course!

Even the Tour de France can run without relying on steroids

(Audience: laughter) Not many people try it.

there's a reason for that

(Audience: laughter) A few months ago, a friend sent me a link to Eduardo Souza.

A man doing what he calls "natural foie gras"

natural foie gras

What part of foie gras is natural?

It takes advantage of the abundance of geese and ducks to eat when the temperature drops in autumn and before the harsh winter comes.

Outside of the season, he roams around the land he owns and eats whatever he wants.

No force feeding, no factory conditions, no cruelty.

surprisingly this is not a new idea

It was started in 1812 by his great-grandfather Pateria de Souza.

Ever since then they've kept quiet

And it came to prominence last year when Eduardo won the coveted French gastronomic contest called coud coeur.

It's like the grocery Olympics

he won first place in foie gras

big problem

He said the French were cancans

(audience: laughter) He said happily

filled the newspapers

I read in Le Monde

The French condemned him

"Spanish Chef Cheating"

He said he bribed the jury.

And surprisingly, the Spanish government was involved.

Isn't that amazing?

We talked about it for weeks

no evidence was found

hello

You don't look like someone who would bribe a French judge for foie gras.

So gradually the topic died down, and another controversy soon followed.

That's not Folagra, so he shouldn't have won.

It's not force feeding.

not foie gras

By definition, he lied and should be disqualified.

It's funny to think about it now, but if this story had been brought up before this controversy happened, I would have objected.

The definition of foie gras is force-fed, and if you want to eat foie gras, you're going to eat foie gras that's been force-fed.

But I changed my mind when I went to Eduardo's farm in Extremadura, a city on the border with Portugal.

The system that I saw firsthand was very complex, but also very simple, like all the beauty of nature.

As soon as he met me, he said his calling was to give geese what they wanted to eat.

In the two days I spent with him, he repeated it about 50 times.

I'm here to feed the geese what they want.

When I visited him, he was laying with geese and taking pictures with his cell phone like his own child.

Surprise

I love geese from the bottom of my heart - I'm a goose keeper

(audience: laughter) I was talking to him like I'm talking to him right now, but as he slowly began to get to know who he and his sister were, everything became more interesting, and he got excited and asked a lot of questions.

he moves his hands like this

A Jew From New York Gets Excited

I regretted that I spoke a little too aggressively, and calmed myself down.

At the end of the day, I was talking to "Mr. Eduardo" like this

he still does this

I noticed there

my voice was too loud

So whisper

I spoke to him through an interpreter, half whispered.

Then he won't move his hand

The geese on the other side of the farm would have thought, ``Get away from the annoying guy,'' but to our surprise, when we lowered our voices, they all came back to us.

so close

right next to the fence

A surprise was hidden in the fence

His idea of ​​fences is the complete opposite of ours.

Fiberglass fences only have electricity on the outside.

he remade it himself

That's the first time I've seen that. Have you ever seen it?

Usually, you enclose the animal and apply electricity to the inside.

in his case

It only applies electricity to the outside.

The reason is

He's proven that geese feel trapped and manipulated on this little farm.

It's the Garden of Eden with figs and whatever.

Guess I'm feeling like a goose being manipulated

He removed the electricity, he removed the electrical current from the inside and put it on the outside to protect the geese from coyotes and other predators.

so what happened

He showed me a graph, and he started eating 20% ​​more liver-enhancing foods than he used to.

his farm

with a great view

Garden of Eden itself

There are figs and everything

The irony of the land Extremadura

means very solid ground

super difficult

But over the course of four generations, he and his family literally transformed this very hardened land into delicious cuisine.

improved the life of this goose

Geese can eat whatever they want

What's even more ironic is that if Eduardo sells figs and olives, he can make more money than foie gras.

he doesn't care

He lets the geese eat whatever they want, and he says, "It's okay because it only eats half of it."

sell the other half and earn income

the income you get from it

make up most of his income

but he never controlled

He lets the goose eat whatever he wants and he sells the rest.

His biggest problem was the current market demand for bright yellow foie gras.

i learned that too

Good foie gras must be bright yellow

That's the sign of the best foie gras

But he doesn't force feed him, he doesn't force him to eat a lot of corn, so his foie gras was gray.

at that time

But he found a wild plant called lupine

Found everywhere in Extremadura

He collected the seeds and planted them across a 36,000 pyeong farm.

Then the goose

I ate lupine seeds with pleasure.

Foie gras turned yellow by eating seeds

radioactive yellow

bright yellow

Best yellow foie gras I have ever seen

(Audience: Laughter) When I heard this, I thought, Is there such a thing? I thought

Because he had the answer to everything and always found the answer in nature.

never himself

People who try to keep things away from themselves don't really like bugs.

because I'm trying to get your attention

But he didn't talk about himself, he just talked about building a farm.

So I was kind of ambivalent about him, but gradually I just accepted what he said.

We were sitting and we heard this sound in the distance, so we looked into the distance.

He grabbed me and the interpreter's arm and pulled us into the bushes and said, "Look at me."

as has been said many times

I said, "Shhh! Look at me."

The geese flew in a V formation

(clap of hands) And then the geese got louder and louder and they were right above us.

As if we were the airfield control tower, geese flew over us and called back again and again.

and come back

his geese were communicating with wild geese

(clapping hands) Wild geese are calling.

(clap hands) The sound got louder and louder, and the goose landed in a circle.

I thought you were lying

(audience: laughter) It's an impossible sight.

I said to Eduardo, who was horrified by this spectacle, "Are you saying that your goose is asking the wild geese to come and visit?"

he said "no no

I came here to stay.”

“Are you here for the night?”

(audience laughter) Geese have DNA that migrates south in the winter, so I said,

"When it's cold, go south

Their mission is to return to the north when it gets warmer, right? ”

“No No

They have the DNA to seek out environments in which they can live.

for happiness they

find here

I don't need anything more"

A goose stops here and mates with his goose so his goose doesn't die out.

just think about it

Isn't it great?

It's like a wild pig coming into a pig farm in South Carolina and trying to settle down.

(Audience: Laughter) How does foie gras taste?

I finally got to taste it before heading home

He took me to a nearby restaurant and served me his foie gras confit.

I couldn't stand it

After much talking, there's a good chance I'll be exaggerating in my comments.

Even if I want to compare it to something, I can't compare it

I was drinking the powdered juice that he made, and even if he gave me goose feathers, I would have thought he was amazing.

i fell in love with him

I ate such delicious foie gras for the first time in my life

I thought I had never eaten foie gras until that moment.

I have eaten something called foie gras

Exceeded expectations

I may change my mind, but I don't think I'll put foie gras on the menu from now on, because the taste that Eduardo gave me.

sweet and smooth

It has all the attributes of foie gras, but the fat tastes real and unadulterated.

and smelled of herbs and spices

No kidding, I smelled an octagon.

It's true

I'm not an iron man of taste

Flavor is scented

100% I could smell the octagon

he says no

I put all kinds of spices together, and then I said salt and pepper, and I thought that was the seasoning.

the answer is no

When he harvests the foie gras, he bottles the liver into confit.

No salt, pepper, oil or spices

I couldn't believe it

We went on our last farm tour, and he showed me wild pepper, which he purposely planted to give salt to geese.

He doesn't need to add salt and pepper,

You don't even need spices because of the flavor. At the end of the meal.

I tried to ask him a few questions, but he didn't give me a direct answer, but I asked him, "In Spain, a chef like Ferran Adrià, who is called the best chef in the world, is relatively close to us. Why don't you serve him foie gras?

why are you anonymous ”

the wine you were drinking

Perhaps it was my excitement that affected him. He immediately said, "The chef doesn't want my foie gras." (audience: laughter)

it was exactly

When the chefs get the foie gras, they cook it their own way.

the chef cooks

Everything about the food is directed at the chef. Mr. Eduardo represents nature.

it's a gift from god

I thought it apt when he expressed that God was saying good job On the flight back home

I wrote many pages of notes

I was really moved, and in one of those notes, I wrote:

I asked him what he thought of conventional foie gras.

When I asked him what he thought of the 99.99999 percent of foie gras consumed in the world.

"I think it's an insult to history," he replied, so I wrote it as an insult to history.

On the plane, while I was tearing my hair out

why

more meaning

I felt like I didn't pursue

After going home and doing some research,

I found this information

The history of foie gras. Jews invented foie gras.

It's true

True story

I was able to do it by chance.

Jews were looking for a substitute for schmaltz

Tired of chicken fat

was looking for something else

It's autumn and it's natural

I found a very delicious sweet goose fat

So they slaughtered the goose and used the fat in their cooking during the winter, and the Pharaoh sniffed out about this.

it's true what i found on the net

(audience: laughter) It's true

(audience: laughter) Pharaoh sniffs out what it tastes like and wants to eat it

I liked it very much when I ate it, he was pestering me

I wanted to eat it all year round, not just in autumn

Pharaoh ordered the Jews to prepare a portion for everyone

Jews want to save their lives

came up with a clever idea

At least they were trying to fulfill the Pharaoh's wish, and they came up with the idea of ​​force feeding.

The foie gras thus made was served to Pharaoh.

We saved the delicious part for ourselves. This is a guess, but I think it's true. This is the history of foie gras.

if you think about it

The history of low-cost mass production agriculture

A modern history of food, most of the things we eat.

Megafarm Feedlot Chemical improver

Long-distance transportation Food processing

Everything is a food system, and it's an affront to history.

against the fundamental laws of nature and life

is also an insult

Beef or chicken

Whether it's broccoli or brussels sprouts, it was in the New York Times this morning about the catfish wholesaler going bankrupt, or whatever, the mindset reminds me of General Motors: the idea of ​​one-use.

Buy more, sell more, waste more

Then there will be no future supply

Jonas Salk said great things

“If all insects disappeared

Life on Earth as we know it will be extinct in less than 50 years

If there were no humans, there would be no life on earth as we know it." He's right.

Now is the time to embrace new ideas for agriculture

Take a method that will wipe out the earth—

I plan to quit the business

and the quality of resources under the pretext of providing cheap food.

A plan to stop dropping You can start by following the example of a farmer like Eduardo

These are farmers who find solutions and answers to their problems from nature.

It's not about letting nature take over the solution

Jenin Benias, my favorite writer and thinker, says on this topic, "Listen to nature's operating instructions."

That's Eduardo's way of doing it, and he's really good at it. I think what he's shown us is very good for the chef, and I'm grateful for that.

And for those who care about food and cooking

I think it's the greenest choice, it's the most moral choice, whether it's Brussels sprouts or foie gras.

that is happiness

The power of discovery. Thank you. (Applause)

i am a tired father

I'm under the rule of two mini dictators who reign ruthlessly in my life and wear disposable diapers.

(Laughter) Maybe because I'm so obsessed with little people, I've started paying attention to certain types of news.

Developed countries around the world are having fewer children.

Birth rates continue to fall in North America, Europe, China, and Japan.

In the last 50 years, the world birth rate has halved.

What the hell is going on?

My childless friends say the climate crisis is the reason they don't have children.

You might be thinking, "We also have overpopulation. Many countries in Africa and the Middle East still have high birth rates. There are orphans who need parents.

I understand that

But despite all those issues, I think we should have children.

I think we can and should fight for both the planet and humanity.

Speaking a little more personally, I can understand why some people have doubts about having children.

This is a picture of my wife and me before we had kids.

young happy and alive

(Laughter) This is a picture of me since I had kids.

It's a shell that's been beaten down and beaten down

(Laughter) This is the car I wanted to drive when I grew up --

It's a Porsche

This is the actual car —

Honda Odyssey minivan

(Laughter) (Applause) Minivans are the best.

I used to dream of looking good, but now I need ample space and good fuel economy.

We are fully aware that global warming and climate change are serious threats.

I want to take having children as a deep and fundamental personal choice.

Some people can't have it even if they want to

Let's take a look at it the other way around today.

How big a problem is it that not enough people are born again?

According to the WHO, we need 2.1 children per woman to have enough to replace the previous generation.

It was thought that overpopulation would become a big problem in 100 years, but it could be underpopulation.

So what happens when this number is less than 2.1?

A domino effect will occur

As we all get older, live longer, and the younger generation dwindles, there will be labor shortages in the world's great economies.

Countries such as the United States, China, Japan, and Germany

Fewer young workers means less tax revenue

Less tax revenue means less money and less resources for the safety net that we all depend on.

such as pensions and medical

all generations are connected

How did this happen in the first place?

It may have been caused intentionally

Get in the DeLorean and go back to the simpler days

take a look at china

Between the decline of disco and The Empire Strikes Back, 1980.

In 1980, China implemented its one-child policy, limiting many parents to having only one child to combat overpopulation.

Look at the old Chinese propaganda, it's nice, isn't it?

Fast forward to 2019

China's birth rate continues to fall even after the one-child policy was abolished in 2015.

A shrinking population is robbing us of one of the greatest drivers of growth—

Humans. If this trend continues, China's population will peak in 2029, after which it will begin an "unstoppable decline."

The Chinese government, in a state of panic, launched a new propaganda campaign: "Let's have children for our country."

Next, let's head to Japan in the DeLorean, home to the Honda Odyssey that I love so much.

(Laughter) Japan now produces more diapers for adults than for children.

The number of children has been declining for 37 consecutive years.

Unlike other countries, it couldn't supplement its population with migrant workers.

There will be a labor shortage, and there will be a shortage of funding for safety nets.

Japan took two measures.

one is the economic incentive

Some local governments give money to people who have children, and the more children you have, the more money you get per child.

This actually worked in Ama Town in 2014.

fertility rate rose from 1.66 to 1.8 per woman

However, it has not spread to the whole of Japan.

In 2018, ruling party officials tried a new tactic.

I told young people, "He who doesn't have children is selfish."

Surprisingly, appealing to shame had no aphrodisiac effect.

I'm surprised

who would have guessed?

(Laughter) Now it's time to take the DeLorean to Europe, the land of cheese that I love so much, but I can't pronounce.

Britain and most of the countries in Western Europe have fertility rates of around 1.7, which is still a lot better than Hungary, which has a fertility rate of 1.45.

Hungarian Prime Minister Orban Viktor has proposed a new incentive to have children.

Families with four or more children are exempt from income tax

it's really nice

At least it's better than the 2007 Russian proposal, where having a child in one region won the refrigerator.

(Laughter) Of course it didn't work.

but wait

Prime Minister Orban made this proposal primarily because he wanted to keep the Muslim and people of color populations in check.

He said that Hungarian traditions, culture and colors should not be "mixed with other things."

It's a really subtle phrase

Orban and many of the EU countries, unfortunately, don't have high fertility rates to get by without immigration.

Populations are declining in EU countries

Europe seems to be headed for browns and Muslims

(Laughter) (Applause) I don't know.

The question remains: Why don't people have children?

Why are birth rates declining in these countries?

In part, this means that women have access to higher knowledge and education.

due to increased financial options

That is wonderful

(Applause) Especially in India, where the fertility rate has fallen, but it's still holding the magic number of 2.1.

It's also great because of the widespread availability of contraception, which gives women more control over their births and pregnancies.

But especially in the United States, many young people cite economic insecurity as the reason they don't have children.

So let's take the DeLorean to my home country, the United States, where the birth rate hit a record low in 2017.

America is the most expensive country in the world to raise a child.

Without insurance, even if all goes well, giving birth will cost you $32,000.

That's enough money to buy a brand new Honda Odyssey.

It's great to have children, but the economic productivity of babies is zero.

The United States is the only industrialized country in the world that does not require employers to provide paid maternity leave.

"Mother, you have a baby, congratulations, it's a wonderful thing.

Hey girl, if you don't go back to work, you're fired! ”

My wife and I both have jobs and pay $3,500 a month for childcare.

$40,000 a year

You can buy a new Honda Odyssey with complete options

I have one, so I don't need 10

here's a bold suggestion

Make it easier for people to have children

To invest in the future, we need to invest now and help those who want to become parents.

Provide affordable medical and childcare Paid parental leave

France had the highest fertility rate in the EU in 2017

I wonder why?

It's because of childbirth incentives that keep women in the workplace.

Paid childcare leave to help pay for daycare

China and Japan have also wisely come to offer such policies.

that's great

That being said, some of you, after listening to me, may still think that having children is not the best investment you can make in your future.

it respects

I know where it's coming from

I'm sure there are many people in this venue who want children but are worried about the future.

As a parent I know how you feel

I am worried about the future

I wrote these closing remarks a month ago,

It really hit me three days ago after I got here at TED.

Three days ago my wife called me crying

I got a call in my hotel room

say you're calling from the hospital

My daughter Nooseiba, named after a warrior princess, had a bulging stomach and had to be taken to the hospital.

A lump was found in the liver

I just found out this morning that I have stage IV liver cancer.

(groaning) It's been a tough week

I want to thank all the people at TED for their time here, the people behind the scenes, the people in the backstage, the other speakers.

On behalf of my family, my wife and my parents, my Pakistani parents told me I had to say this.Thank you for your kindness this week.

thank you

(Applause) These are my beloved children, Ibrahim and Nooseiba.

I spoke with my wife and she confirmed that despite this terrible news and the battles that await us, we have nothing to regret.

Having a baby was the best decision we ever made.

Children have brought us so much joy into the world. Having children is a risk, but life is a risk in the first place.

If you've been listening to me, you know that in the developed world, to protect our economy and our pensions, we need to invest in our children.

But that's no reason to have children

not the main reason

Children have always represented humanity's greatest, most powerful, most beautiful, limitless potential.

What's the point if we, as developed nations as a whole, don't invest for present and future generations?

What's the point of sharing this ridiculous journey?

So for those of you who can and choose to have children, please pass on the beauty of this life with kindness, tolerance, compassion and love.

thank you

(applause)

computers are getting really awesome

We all carry supercomputers in our pockets.

Amazing, don't you think?

It's a shame, then, that the way we use computers hasn't changed much since 50 years ago.

I still use my mouse and keyboard to click buttons on the screen.

It's the same with smartphones

It's just a matter of using your finger instead of the mouse.

Is that the only way?

Is this what the future will look like?

Being trapped in the world inside the screen without looking around?

The future I'm attracted to and dream of isn't like that

I've always been fascinated by the tangible objects around me, like the ones on this table, which this family doesn't pay attention to.

things are about who we are

really says a lot

let me show you an example

Here's a picture of what a person touched in a 24 hour period.

What do you know about this person?

I'm a motorcycle lover

occupy most of the picture

What about this woman?

spend a lot of time on the beach

I have a surfboard

i live near the sea

what about this man?

I'm a chef

There are many different ingredients that he touched while cooking, and computers are a very small part of his life.

If we use things all the time, and they're such a big part of our lives, why not turn them into interfaces with the digital world?

Is it possible to make the world itself an interface?

that's my idea

I've been working on it for the last 20 years

You don't need a separate screen, keyboard or mouse to interact with the digital world

I just want to be able to interact with the digital world through everyday objects.

To do that, we need to solve three big problems.

let's talk about it

The first question is, is it possible to do that in the first place?

How can we turn everyday objects into computer interfaces?

I was inspired by the book "Hackers."

I read it when I was a teenager, and the basic idea in this book is that you can invent new technology, hack things, change things, and you can change the way things are used.

So I've been wondering what kind of technology would we need to invent to hack the things we use every day so that we can interact with them.

When I was working on this piece, I invented a sensor that could create a structural electric field in an object, turning it into a gestural interface.

You can turn a doorknob into a gesture sensor without having to touch the doorknob itself.

I know how you touch me

making a circle or holding

not touched

It's just a normal doorknob

Anything can be made interactive

For example, plants

What's interesting about this plant is that it knows where you're touching it.

You'll see a horizontal line going up and down on your screen.

Now you can turn a potted plant into an instrument interface.

(The sound changes depending on where you touch it.) You can also use it in a more practical way.

(Laughter) You can also give things a personality.

(Varying sounds) In this example, an orchid -- in this example, an orchid -- can interact with people through sound and visuals.

It hates being touched and is intimidating with sharp electronic images.

This tiger is much tougher and likes to be played with, it responds to touch.

Everything has a personality and can express how you feel.

Everything can be hacked, and the human body is no exception.

In this example, we've hacked the human body so that you can see how you put your hands together, and you can use hand gestures to control things.

Everything can be hacked, and research is important, but the second problem is how do we go from R&D and prototypes to real products?

How can we make real, everyday objects also interfaces?

you might wonder who's going to do it

Is it Silicon Valley?

Is it Shenzhen?

The problem is that the world of things is huge.

The clothing industry produces 150 billion items of clothing each year.

By contrast, the tech industry makes about 1.4 billion smartphones.

The world of things is much bigger than the world of technology.

The world of technology cannot change the world of things.

Instead, we need to create technologies that enable manufacturers of things like chairs and clothes to build smart products.

To try this out, I came up with a simple question: Can a tailor make a wearable device?

I don't want the tailor to be an electronics engineer here I don't want the tailor to be an electronics engineer here

I want you to be a tailor

What we want to do is create high-tech components that look and feel like the materials that tailors use to make clothes.

For example, if you're going to make a touch panel for a tailor, it should be made of fabric like the one on the right, and it should be able to be cut and sewn.

It should still be functional

Making fabric touch panels requires a different approach than making electronics.

In our case, we went to a small factory in the mountains of Tokyo that has been making thread for kimonos for generations.

The people I worked with weren't engineers.

A craftsman who knows how to make things, an artist who knows how to make things beautiful.

Together with them, we've created some of the best yarns, thin metal alloys wrapped in polyester and cotton fibres.

This thread was made using the same machine that makes thread for kimonos.

The resulting yarn was then taken to a fabric factory, and using ordinary machines, smart fabrics were woven, and fabrics of different colors and textures were produced and taken to a tailor on Savile Row in London.

Tailors honor tradition, especially on Savile Row

i don't use a computer

don't use machines

cut by hand

Determine dimensions against a human body, not a 3D avatar Determine dimensions against a human body, not a 3D avatar

They're modern, even if they don't think of things in terms of technology.

I know how to use technology

So if you put technology in a form that they can use, like buttons or fabric, they can make wearable devices -- like clothes that can make phone calls.

(Ring) I was able to confirm that a tailor can make a wearable device, not an electronics company.

We worked with our partner Levi's.

It's on sale and everyone can buy it

It's made in the same factory that makes the rest of our products.

Swipe down to go forward, swipe up to go back.

Of course, not only slide manipulation

you can do more

I can control the navigation system and the music I'm listening to, but the most important thing is that it's still the jacket and it makes me look good.

(Laughter) (Applause) That's the point.

(Laughter) Being able to turn things into interfaces.

We were able to show non-technology companies that make things that they could make something like this.

I'm cool Is that the end?

(laughs) Not yet.

The third problem is how can we spread this?

From one product to many products

that's what we're working on now

let me tell you what i'm doing

First of all, let me be clear, this is not about the Internet of Things.

I'm not trying to create a new gadget that you can just throw in the closet and forget when you get tired of it. I'm not trying to create a new gadget.

The basic and important principle that guides my work is that technology should make what already exists be better.

It's about connecting things to the digital world, adding new uses and new functions, but keeping their original uses the same.

This jacket I'm wearing can control my phone and slide, but it's still a jacket.

As everything starts to become interactive and electronically connected, each thing will have its own actuators, displays, sensors.

Jogging shoes don't need touch sensors

I will not use

It has sensors that measure how fast you run and how much pressure you put in your knees, and it has sensors that measure how fast you run and how much pressure you put in your knees, and it has sensors that measure how fast you run and how much pressure your knees have, and it's still a great shoe.

Manufacturers of things need to start thinking about what digital capabilities they can add.

Manufacturers may not survive unless they become service providers

We're going to have to create an ecosystem of services, just like a cell phone, with a lot of apps and services, and the occasional phone call.

To enable such an ecosystem, we need to avoid fragmentation.

It's inconvenient for the interface to change when companies and things change.

We need to create a unified user interface, and that means having a single platform for everything to use.

What kind of platform is it?

The answer is pretty self-evident: cloud computing.

We can't connect things directly to the cloud.

We should build tiny devices that can be embedded into things and use them to connect to the cloud and unlock new capabilities and possibilities.

I'd like to show you here the actual device that we built.

First time public

It looks like this. We use it when we want something to be connected, smart and interactive on a small device. We use it when we want something to be connected, smart and interactive.

As for how it works

There is a small electrode on the back

As you can see, it can be embedded in many things.

We want to offer this device to manufacturers who make things like clothes and furniture, so they can use it in the same way that they would use buttons and zippers.

It's up to the manufacturer what they do with it.

I don't want to limit usage

I want the people who make these things -- the artists, the designers, the brands, the craftsmen -- to imagine and create a new world, a world where things are interconnected and with exciting new digital capabilities.

You don't need a keyboard or a screen or a mouse to use a computer

I've been working on this idea for 20 years, and it's starting to take shape now. Along the way, I've realized something.

What I and my team are building is a new kind of computer, the ambient computer.

thank you

(applause)

great creativity. When it comes down to it, we need a lot of creativity

When it comes down to it, we need a lot of creativity

Creativity can spread tolerance among people, it can defend freedom, it can make education look like something great.

(Laughter) Great creativity can put poverty in the spotlight, or it can make it look like it's not necessarily poverty.

Great creativity can also make politicians and parties worthy or worthless.

It can also make war look like a tragedy or a farce.

Creativity is what creates the slogans on T-shirts and the expressions we speak.

Creativity also shows us a simple path, a way out of an impenetrable moral maze.

Science is clever, but the great creativity is something more difficult to acquire as knowledge, more magical. And now we need that magic.

Now is the time.

Our earth's climate is changing rapidly. too quickly.

And we need great creativity to make us think differently through dramatic and creative language.

To make us think differently through fun and creative clips of a movement I'm involved in using creativity to raise people's environmental awareness.

I would like to introduce such a clip.

Video: Man: I'm going to walk instead of drive today.

Narration: And he started walking. While walking, he saw many things.

It's a new and wonderful thing that I would never have seen if I hadn't walked there.

A deer with itchy feet. A motorcycle that flies in the sky.

A father and daughter separated from their bicycles by a mysterious wall.

and he stopped. It was she who was walking in front of him.

She used to skip meadows with him when she was a kid, but ended up throwing him away.

Yes, she has aged a little.

No, I was really old.

But he felt his old passion for her return.

"Ford," he called out softly. that was her name. "

"No more words needed, Gusty," she said. that was his name.

"There's a tent next to the trailer, exactly 300 yards from here.

Let's go out there and do something good. in a tent. ”

Ford undressed and opened one leg, then the other.

Gusty boldly entered her and had sex rhythmically. All the while she was videotaping him. Because she was an avid amateur porn director.

The earth moved for them.

The two lived happily ever after.

Most of all, it was because he decided to walk instead of drive that day.

(Applause) Andy Hobsbawm: We've got the science, and we've had enough discussions.

There are only moral imperatives in front of us.

It takes great creativity to take it all and make it simple and sharp.

to get it right. Make it something that people want to try.

So this is a call and a plea to the incredibly talented people at TED.

Let's unleash our creativity against climate change.

And start doing it now. Thank you for your attention.

(applause)

Xu Xian had just received the second invitation to the opening ceremony of Jinshan Temple.

My wife, Shiroko, advised me not to attend.

In fact, Shiro Musume was a gentle white snake spirit in human form, but her marriage had put an end to the accusations of meddling Zen masters.

However, Xu Xian, who had devoted himself to the Buddhist sect, felt that he had to show up at the ceremony.

However, I had no idea that the sender of the invitation was none other than Master Fakai.

Fakai confronted Xu Xian and told him to stay in the temple and purify his soul because he was possessed by a monster.

Xu Xian didn't like it, so I made Xu Xian unable to escape.

At home, the white girl was worried

My husband left so quickly that I couldn't tell him I was pregnant.

My husband didn't come back no matter how long I waited, and I realized something bad had happened.

White Musume encountered Hokai on the way to Jinshan Temple. When Hokai threw a prayer rug at Shirou Musume, fire and smoke spewed out.

Shiro Musume, who was weakened by pregnancy, frantically summoned an army of General Crab and Shrimp Soldiers, and raised waves to overthrow Hokai and put out the fire.

The wave flooded a nearby village and drowned many innocent villagers.

For the first time, the white girl has harmed a human being.

When he could no longer receive the blessings of the gods, Hokai tried to catch him with a pot bowl (a bowl that received alms) that had magical powers.

At the moment when all hope seemed to have been extinguished, the white girl's belly glowed brightly, escaping the magic of the mad Zen master.

Saved by mystical powers, the couple fled home, and Bai Zi Zi soon gave birth to a son, Xu Shilin.

Despite this happy event, Xu Xian was uneasy.

Even if unintentionally, I was horrified by my wife's destructive behavior and feared that disaster would befall my family.

In less than a month, Hokai came to visit my house.

I gave Xu Xian a bowl of good luck as a baby gift.

While being wary of the Zen master, Xu Xian received the bowl because he was caught in the destructive behavior of the white girl.

But as soon as the bowl entered the house, it flew to the white girl's head and put it in it.

With his family's wishes in vain, Fakai buried a bowl under Leifeng Pagoda.

Xu Xian begged to let his wife go free, but the Zen master said sternly, "If the iron tree blooms, the white girl will be free."

Both were ignorant

The son was sent for the pious Xu Xian, the reincarnation of the god of wisdom, Wenqu Star.

By this dharma power, the white girl was protected at the temple, and Xu Shilin himself grew wiser as he grew older.

When I turned 19, I went to the capital to take the government official recruitment exam, and passed with the top score.

The emperor himself rewarded Xu Shilin with a gorgeous hat studded with precious stones.

He put up a brocade flag in his hometown, but when he thought of his parents, Xu Shilin's heart sank.

Inviting his wandering father to pay his respects to his mother, he went to Leifeng Pagoda.

Kneeling in front of the Leifeng Pagoda, Xu Shilin offered a jewel flower to the iron tree.

Then suddenly the earth opened and a white girl appeared.

Through tribute to God, the mother's sins were forgiven, the iron tree blossomed, and she was set free. Humans and divine souls were reunited as families.

Late at night, in the dark, a self-driving car wriggles along a narrow country road.

Suddenly three hazards appear simultaneously

what happens next?

Before the car can navigate through the onslaught of obstacles, it must sense them. By gathering enough information about its size, shape, and position, the control algorithm can determine the safest course.

Cars without a human in the driver's seat need SmartEye, a sensor that analyzes these details in seconds in any environment, weather or darkness.

It seems like an unreasonable request, but it can be solved by combining the following two things: a miniature version of a special detector that uses a laser called a lidar and a communication technology called integrated photonics, which is used for Internet communication.

To understand lidar, a good place to start is with a related technology, radar.

In aeronautics, a radar antenna shoots out a pulse of radio waves or microwaves at an aircraft, and the time it takes for the beam to bounce back determines the location.

It has a limited viewing angle, but a thick beam can't discern the finer details of an object.

Self-driving cars' lidar systems, on the other hand, which lidar means "light detection and ranging," use narrow, invisible infrared rays.

It can detect things as small as a pedestrian's shirt button from across the street.

But how do we detect the shape and depth of objects?

The lidar emits a series of ultrashort pulse lasers for depth analysis

If a moose were on a country road

As the car drives past, the rider's pulse wave scatters at the horn's hairline, and the next pulse reaches the tip of the horn before returning to its original position.

By measuring the extra time it takes for the second pulse to return, we can get data about the shape of the horn.

By emitting many short pulses, the lidar quickly conveys shape details.

The most obvious way to emit a pulse of light is to turn a laser on and off.

But this makes the laser unstable, which affects the precise timing of the pulses, and limits the depth resolution.

It is better to leave it in the ON state and use a reliable and fast method to periodically block the light.

This is where integrated photonics comes into play.

Digital data on the Internet is transmitted by highly precise time-controlled optical pulses with intervals of only about 100 picoseconds.

One way to create such pulses is with a Mach-Zehnder modulator.

This device uses the property of waves called interference This device uses the property of waves called interference

Imagine what happens when you drop a pebble into a pond, and the waves spread and overlap each other to create a pattern.

In some places the crests of the waves overlap and become very large, and in some places they cancel each other out completely.

A Mach-Zehnder modulator works in a similar way.

Dividing light waves along two parallel arms and finally rejoining them

If light is slowed down and delayed in one arm, the two waves will join together out of sync and cancel each other out, blocking the light.

By switching this delay with one arm, the modulator acts like an on/off switch that emits a pulse of light.

A pulse of light lasting 100 picoseconds provides a depth resolution of a few centimeters, but the cars of the near future will need much more.

Combining the modulator with an ultra-high-sensitivity, high-speed photodetector improves the resolution down to the millimeter level.

That's more than 100 times better than normal human vision when seeing things across the street.

Early automotive lidars relied on a complex set of rotating parts mounted on the roof or hood to scan.

Integrated photonics is shrinking modulators and detectors down to 0.1 millimeters or less, and they'll be on chips small enough to fit in car lights.

Additionally, the chip contains a cleverly modified modulator that eliminates moving parts and allows for faster scanning.

By slightly slowing the speed of light in the arms of the modulator, this additional device would act as a dimming device rather than an on-off switch.

By arranging a series of arms in parallel that create very controlled, minute delays, you can do something amazing: a steerable laser beam.

This new feature will allow the SmartEye to probe and see more than natural creatures can catch, and to pass through any number of obstacles.

No problem - although a disorienting moose can be difficult.

What drives a man to cold-blooded murder?

What on earth is the killer thinking?

What kind of society produces such people?

Some 150 years ago, Fyodor Mikhailovich Dostoevsky took up this question, which gave rise to one of the most famous works in Russian literature, Crime and Punishment.

Published as a literary serial in 1866, this novel tells the story of Rodion Romanovich Raskolnikov, a young St. Petersburg law student.

Raskolnikov lives in abject poverty and, early in the story, runs out of money and is unable to continue his studies.

A letter from my parents' house in the countryside tells me how much my mother and sister have sacrificed for my success.

His anguish deepens. After selling his last piece of gold to an old pawnbroker, he becomes helpless and decides to kill the old woman and take her money.

But the shock of carrying out that unthinkable act was so excruciating.

It's sometimes referred to as a precursor to psychological thrillers, but the story extends far beyond Raskolnikov's inner struggles.

From dark taverns to dilapidated apartments to the suffocating police station, the dark side of 19th-century Petersburg is depicted with Dostoevsky's powerful brushstrokes.

Along the way, you'll meet a variety of characters: Marmeladov, a retired government official who ruins his family's life by drinking money; Svidrigailov, an unstable and lustful nobleman.

When the Raskolnikov family arrives in town, their goodness contrasts sharply with the corrupt people around them, and their destinies become entangled as well.

This bleak portrayal of Russian society reflects the author's own complex experiences and nurturing ideas.

As a young writer left behind a promising military career, Dostoevsky was drawn to the ideas of socialism and reform, and began to hang out in intellectual circles discussing extremist ideas banned by the Reich government.

When the incident came to light, members of the group, including Dostoevsky, were arrested.

Many were sentenced to death, but only subjected to mock executions before being pardoned by the emperor at the last minute.

Dostoevsky spent the next four years in a Siberian labor camp before being released in 1854.

This experience led me to take a more pessimistic view of social reform and focus more on soul matters.

In his 1864 novella "Notes in the Underground," he believed that utopian Western ideas would never satisfy the contradictory desires of the human soul.

Crime and Punishment, conceived and written the following year, contains many descriptions along those lines.

The novel follows the familiar plot of a young and promising young man's temptation and fall into the dangerous city life.

That social critique goes much deeper.

Raskolnikov justifies that society as a whole benefits from his own promotion at the cost of the death of an exploitative moneylender.

This reflects the selfishness and utilitarianism held by many of our contemporary intellectuals.

Believing his high intelligence transcends moral taboos, Raskolnikov cuts himself off from humanity.

"Crime and Punishment" presents deep concerns about ethical issues, but it's never just a moral tale, each character has a unique and compelling ideology.

One of the amazing things about "Crime and Punishment" is that even though the details of the central murder are revealed in the first part, it's still a thrill.

Raskolnikov's guilt is clear

It is only through Dostoevsky's gripping and persistent depiction of the social and psychological conflicts that follow that the reader becomes aware of the nature of his punishment and the possibility of redemption.

Hello

I'm going to tell you about an animal that inspires you: the sloth.

(Laughter) For the past ten years, I've been documenting the bizarre lives of some of the dumbest mammals in the world.

I still remember the first time I saw you

I fell in love with its strange ecology

How can you not fall in love? I was born to always have a smile on my face—

(Laughter) A creature that needs a hug?

(cute!)

But sloths are so misunderstood.

It's been given a name that means sin, and it's been criticized for its lazy life, as if it had no place in the fast-paced world of survival of the fittest.

I'm here to tell you that everyone's got this animal wrong, and understanding the truth about sloths could save us and the planet.

My search for the origins of the sloth slander led me to Valdes, the Spanish conquistador, who was the first to write about the sloth in an encyclopedia of the New World.

He wrote of the sloth, "The dumbest animal in the world...

I've never seen an animal so ugly or useless."

(laughs) Oh, what do you think, Mr. Valdes?

(Laughter) I have something to say about Valdez's drawing ability.

(laughs) I mean, what is this?

(Laughter) I've never seen a more useless drawing of a sloth.

(Laughter) But the nice thing about this one is that it puts a human face on the sloth, and the sloth actually has a human face.

This sloth I took in Costa Rica looks a bit like Ringo Starr.

(Laughter) And then, strangely enough, we found a sloth that looked like The Beatles.

(Laughter) I especially like the bottom right pole.

In fact, sloths are just as successful as the Beatles.

It diverged from an ancient lineage of mammals, and at one point there were dozens of species, including giant terrestrial ones, about the size of small elephants, and they were pretty much the only animals that could drink whole avocado seeds and scatter them around.

Tsu・ma・ri (laughs) It seems that some people have noticed

(Laughter) If it weren't for the sloth, we might not have seen the toast with avocado.

(Laughter) (Applause) There are six extant species, divided into two groups.

Three-toed sloth with Beatles hairstyle and Mona Lisa smile

Then the two-toed sloth

This one's like a Wookie and a pig hybrid.

They live in the jungles of Central and South America, and there are a lot of them.

In the 1970s, studies in the Panama rainforest found sloths to be the most numerous of all large animals.

It accounted for a quarter of the mammalian biomass.

The fact that there are so many of them shows that the sloths are doing something very, very well.

Maybe we should learn from sloths instead of calling them weird.

Humans are obsessed with speed

Being busy is seen as great, and in a rush, convenience takes precedence over quality.

Our express life is suffocating humans and the planet.

Cheetah-like animals are worshipped "Ferrari of the animal world" 0-100km/h Just 3 seconds!

Then what?

(Laughter) (Applause) So what do you say?

Sloths, on the other hand, can easily reach five meters per minute—when there's a tailwind.

(Laughter) But speed comes at a price.

Cheetahs are fast, but they come at the cost of strength.

Because they can't take the risk of fighting, one in nine of their prey is taken by tougher creatures like hyenas.

No wonder hyenas laugh

(Laughter) Sloths, on the other hand, take a more discreet approach to eating.

Sloths eat — immobile leaves.

(Laughter) Leaves, like antelopes, don't want to be eaten because they're poisonous and hard to digest.

In order to consume the leaves, sloths also had to become athletes, "digestive athletes."

(Laughter) Sloth's secret weapon is a four-chambered stomach and lots of time.

It has the slowest digestion rate among mammals.

It takes up to a month to digest one leaf, enough time for the liver to process the leaf's poison.

Sloths are not lazy

I'm rather busy-

to digest

(Laughter) I've been very busy.

(laughs) Oh, I'm busy. I'm really busy.

Leaves have almost no calories, so sloths have evolved to use as little energy as possible.

They can live on 100 calories a day, consuming about 10 times less than mammals of their size, thanks to their clever adaptations.

Three-toed sloths have more cervical vertebrae than any other mammal, including giraffes.

Because of this, it can turn its head 270 degrees and eat all the leaves around it without having to move its body.

(Laughter) He's also an amazing swimmer.

You can move three times faster in water than you can on land, and you're floating on stored gas.

(Laughter) Actually -- (Laughter) sloths are the only mammals known to not fart.

When I need to release gas, I get it into my bloodstream and then push it out of my mouth.

(Laughter) Living upside down also saves energy.

It has about half as much skeletal muscle as any other land mammal.

You don't have a lot of extensors. They're weight-bearing muscles.

It has long claws, is durable and can hang for long periods of time, like a happy, hairy hammock.

Sloths can do pretty much anything in this inverted position.

I sleep, eat, and even give birth

Their throats and blood vessels have unique adaptations that allow them to pump blood against gravity and swallow it.

There's something that sticks to your ribs to keep your big stomach from crushing your lungs.

The fur grows upside down and dries without ironing even when drenched in tropical rain.

The only problem is that when sloths are turned upside down, gravity takes away their dignity.

(cute!)

Because I can't stand with my weight

It's like you're dragging your body and climbing a mountain on a flat surface.

Early explorers like Valdez may have viewed sloths as miserable creatures because they viewed them in the wrong orientation and situation.

I spent hours of happiness admiring the movements of the sloth.

Lack of muscle does not hinder its strength or speed.

The natural Zen master's relaxed movements are like watching "Swan Lake" in slow motion.

This kid fell asleep on the move, but that's not uncommon.

(Laughter) You might be wondering, how can this hanging leaf digestive sac stay uneaten?

good question

This is one of sloth's main predators.

Harpy eagle

It can fly at speeds of 80 kilometers per hour, has grizzly bear-like claws and exceptionally good eyes, and its ringed wings collect sound, allowing it to hear even the faintest rustling of leaves.

Sloths, on the other hand, are deaf and blind, and escaping danger is clearly out of the question.

The sloth survives thanks to the invisibility cloak that makes Harry Potter so blue.

It has grooves that trap moisture in its fur, which acts like a hydroponic garden of algae, and also attracts a variety of invertebrates.

In a mini-ecosystem where the sloth itself moves slowly

become one with the tree

It moves so slowly that even a fearsome harpy eagle flying over the canopy looking for something moving would miss it.

Sloths are ninjas. They rarely leave the safe canopy of trees. Except when they defecate, they defecate at the base of trees about once a week.

This high-risk, energy-intensive behavior has long been a mystery, and there are many theories as to why it does it.

I think it's to leave a secret scented message for the potential mate.

Sloths are generally quiet, solitary creatures, with the exception of females in heat.

Females climb to the top of trees and scream for sex.

with a sharp

(Laughter) Don't you believe it?

(crying sloth) Les sharp

This is the only sound that gets the male's attention.

imitating the call of the great kibara flycatcher

You can keep yourself hidden while screaming for sex and raising your voice.

This secret sex invitation travels miles through the woods, and the male slowly moves towards it.

(Laughter) I guess the scent message in the feces is to not let Romeo climb the wrong tree and waste precious energy.

By the way, sex is the only thing sloths do quickly.

I've seen it done, and it's done in seconds.

There's no reason to waste precious energy, especially after a big expedition.

(Laughter) Unlike other mammals, sloths don't waste energy trying to maintain a constant body temperature.

The sun's energy is free, so they bask in the sun like lizards and retain their heat with their thick, untropical fur.

Sloths have an unusually low metabolism.

This may be why sloths are able to recover from injuries that would kill other animals.

This sloth has recovered from amputation of both arms, and I know a sloth who survived being electrocuted by a power line.

We believe that a low metabolism may be the key to survival from extinction.

A study of mollusks by researchers at the University of Kansas found that high metabolic rates could predict extinct species.

Sloths have lived on earth for 40 million years, morphing.

The secret of its success lies in its lazy nature.

The sloth is a symbol of energy conservation.

To protect and promote the slow, steady and sustainable way of life for sloths, I founded the Society for Taking Care of Sloths.

i'm pretty impatient

you might see

The sloth taught me a lot about taking it easy.

If we all followed the sloth's style of slowly digesting leaves, it would be a boon to the planet.

Why not take care of our inner sloth, slow down and focus on the present moment, reduce waste behind convenience, conserve energy, recycle with ingenuity, and reconnect with nature.

If we don't, we humans may be the stupidest animals in the world.

thank you

May the sloths be with you!

(applause)

Nanahuatl, the weakest, sickly, and pimple-ridden god of the Aztec gods, was chosen to be the god of creation of the new world.

Four worlds have already been created, each set in motion by a "sun god" and destroyed in turn: the first world was destroyed by a jaguar, the next by the wind, the next by fire from the sky, and the fourth by a flood.

To raise the fifth sun, Quetzalcoatl, aka the Feathered Serpent, went to the underworld, returned with the bones of the people of the previous world, and energized with his own blood to create new life.

But to create a habitable world, another god had to jump into the great bonfire and become the fifth sun.

The Primordial God and the Fire God chose Nanahuatl for this mission, while the Rain God and the Four Gods decided to dedicate the proud and rich Teccestecatl.

First, the chosen ones had to undergo a four-day fasting and exsanguination ritual.

Nanahuatl had nothing but cactus needles to bleed from, and fir branches to paint the tribute's red blood, but he did his best.

On the other hand, Tekcistecatl flaunted his wealth, using branches adorned with sumptuous red-rimmed thorns and iridescent feathers of quetzal to offer his blood.

After four days, the flames were burning

The proud Teccistecatl approached the flames four times and withdrew four times in fear.

Humble Nanahuatl stepped forward

Other gods painted him white and glued feathers to his body.

Without hesitation, I jumped into the flames myself

A falcon swooped down into the flames, scorched by the flames, grabbed Nanahuatl and carried him up into the sky.

So the Primordial God and his wife bathed him, seated him on a feathered throne, and tied a red belt around his head.

Inspired by Nanahuatl, Teccistecatl threw himself into the cold ashes left behind by the flames.

The jaguar jumped over the furnace, but he couldn't take Teccistecatl to the sky.

When Teccistecatl reached the horizon, the goddesses gathered and clothed him in rags.

Yet he shined just as brightly as Nanahuatl.

But he was more timid and even more proud, so one of the gods lifted a rabbit and threw it in his face, dimming the light.

But the fifth world wasn't quite complete yet.

Nanahuatl, the sun god, stood still for four days, unlike the other suns that moved.

The gods were beginning to worry in their own land, Teotihuacan.

They sent an obsidian hawk up in the sky to ask what was the problem.

Nanahuatl sacrificed himself to become the sun god, but replied that he needed the nourishing blood of other gods to move through the skies.

Infuriated by this suggestion, the morning star god rose up and shot an arrow at the sun god.

The Sun God shot back, and a quetzal feathered arrow hit the Star God in the face, turning him into frost.

Before another god acted hastily, the gods faced each other and discussed what to do.

Of course, no one wanted to sacrifice themselves, but they also wanted to act like the God of the Morning Star.

However, since Nanahuatl has fulfilled its responsibility to feed the Earth, what if in return it refuses its nourishing blood?

The gods remembered that even that wimpy Teccistecatl eventually emulated Nanahuatl's bravery.

Finally, five gods agreed to sacrifice themselves.

One by one, the god of death pierced the heart with an obsidian knife and offered the bodies of the gods to the new sun god.

When the last god made his sacrifice, Quetzalcoatl revived the great embers of fire, and the sun finally began to move across the sky, ushering in the fifth generation.

The fortitude of the feeble, pimple-covered god inspires all the other gods, and the sun moves in its daily orbit, and the rabbit-faced moon follows in its footsteps.

Unless we do something about it, in the next 40 years we will be witnessing a global epidemic of neurological disease.

It's a cheerful thought, isn't it?

Countries colored blue on this map represent countries where more than 20% of the population is over the age of 65.

this is the world we live in

And this is the world our children will live in.

For 12,000 years, the distribution of population by age has been a pyramid, with the elderly at the top.

But in recent years it's starting to flatten out.

By 2050, it will be cylindrical and begin to approach an inverted pyramid.

I would like to explain why

Since 1840, life expectancy has more than doubled and is still growing at a rate of five hours per day.

The reason this is a concern is because the risk of developing Alzheimer's or Parkinson's disease increases exponentially after age 65.

By 2050, about 32 million people in the United States will be over the age of 80, half of whom will have Alzheimer's disease, and another 3 million will have Parkinson's disease, if nothing is done.

And right now, for which we have no cure or prevention, these two diseases and other neurological disorders cost us about $330 billion each year.

It is said that by 2050, it will easily exceed 1 trillion dollars.

Alzheimer's disease occurs when proteins that should be properly folded become crumpled.

So one of the approaches that we're working on right now is to create drugs that are kind of like molecular sellotapes that force proteins to fold correctly.

This prevents the "protein tangles" that can cripple large parts of the brain.

What's even more interesting is that other neurological disorders that affect completely different parts of the brain also show this protein tangle, so what it tells us is that perhaps this approach is general and could be applied to other neurological disorders, not just Alzheimer's disease.

And you can also see an interesting relationship with cancer here, which is that people with neurological disorders have a very low chance of getting cancer.

This relationship is currently not explored by very many researchers, but it's a very promising area of ​​research.

Much of the important creative research in this field is supported by private philanthropic donations.

This private support will increase, because unfortunately the government has made a huge mistake in this research.

There are a number of things you can do yourself before these studies come to fruition.

Caffeine is somewhat effective in reducing the risk of Parkinson's disease, but we don't yet know why.

Head trauma raises chances of Parkinson's disease

And getting bird flu is also not recommended.

As a preventive measure against Alzheimer's disease, fish oil was found to reduce the incidence of Alzheimer's disease.

And keep your blood pressure low, because chronic hypertension is the biggest risk factor for Alzheimer's disease.

It's also a risk factor for glaucoma, which is like Alzheimer's disease of the eye.

And of course, when it comes to cognitive benefits, it's something you don't use or lose, so keep yourself mentally stimulated.

you all heard me

Stimulation for today is fine

Lastly, wish others like me good luck.

Because time is carved equally for all people

thank you

Northern California has coastal temperate rainforests, where it rains more than 2,500 mm a year.

Redwood trees grow here

The scientific name is Sequoia sempervilens

Sequoias are the tallest creatures on earth

Grows to a height of 110 meters or more

38 stories high

It would stick out even in the center of Manhattan.

No one knows how old the oldest living sequoias are, because no one has ever drilled a hole in the trunk and counted the rings.

The longest-lived sequoias are thought to be around 2,500 years old, roughly at the time of the Parthenon, although it's been speculated that some individuals may have lived longer than that.

The red part is the distribution map of Sequoia.

The largest and flagship sequoias are found only in the coastal areas of Northern California, where rainfall is extremely high.

In our time, about 96 percent of the sequoia forests have been cut down, especially in the 1970s and early 1990s, because of the rapid succession of clearcutting.

Yet about four percent of the old-growth redwood forest remains intact and wild, now fully protected in Redwood National Park and other small parks along the coast of Northern California, a pearly chain.

Interestingly, the few surviving sequoia rainforests today have not been fully explored.

Sequoia rainforests are very difficult to move around, and even now, previously unknown individuals have been discovered, and in the summer of 2006, Hyperion, the world's tallest tree, was discovered.

Let's do a little thought experiment

I want you to imagine what a sequoia is as a living organism.

Chris, can you help me? here is the measure

TED lent me

have chris major edge

I'm going to show you the breast height diameter of a large sequoia tree.

Unfortunately this is too short, only 7.5 meters

Chris, please reach out your hand, yes.

This is the diameter of a large sequoia, about 9 meters.

then turn your imagination to the sky

This sequoia tree stretches 100 meters into the sky.

The Sequoia race seems to be living in a different timescale, not the human timescale, but what you might call Sequoia Time.

Sequoia time runs slower than human time

When humans look at the sequoias, they appear motionless and stationary, but the sequoias are always in motion. They push themselves up into the sky. They take thousands of sequoia years to fill the space.

After 2,000 years, this tiny seed looks like this: a tree called The Lost Monarch.

It was discovered in 1998 in the Titan Forest on the north coast.

You can't tell it's a sequoia by looking at its roots

It's like a mouse looking at an elephant's feet, because most of it is overhead and you can't see it.

I became very interested and wrote about a couple.

Steve Sillett and Marie Antoine are leading sequoia canopy explorers, world-class athletes and world-class forest ecologists.

When Steve was 19 years old at Reed College, he heard that the canopy of a redwood forest was thought to be like a desert.

So at the time, people thought there was nothing but a branch of a redwood tree.

So he and his friends decided to climb up the Sequoia without ropes or anything to see what was there.

I climbed a little tree next to this big sequoia and jumped from there and grabbed a branch of the tree and dangled like a trapeze.

From there we climbed the bark to reach the top.

A friend named Marwood Harris followed behind.

What they didn't realize was that the branch that Steve jumped to had a yellow hornet's nest the size of a bowling ball.

As Marwood jumped, wasps surrounded him and stung him all over his face, and he nearly let go.

It's 20 meters above the ground, and I'd be dead if I did.

But they climbed to the top, and what they saw was not a desert, but a lost world, a three-dimensional floating labyrinth filled with unknown creatures.

At the time, I was working on a different subject, the phenomenon of epidemics that originate in natural ecosystems and spread across species to humans.

I wrote three books on this subject, and I felt like I had had enough.

My wife and I love our children

I started climbing trees because I wanted to do something with my kids. It's called the arborist method.

Children are incredibly good at climbing trees.

this is my son oliver

Children are fine with heights that normally frighten humans.

(Laughter) If ontogeny repeats phylogeny, then the offspring may be more like tree-dwelling primates.

As far as I know, humans are the only primates that are afraid of heights.

All other primates, when frightened, run up trees, where they feel safe.

Spent the night in a tree using a tree boat

My daughter Laura, 15 years old at the time, peeking out of the tree boat.

I tie a rope to my body so that I don't fall

When you look out from your tree boat in the morning, you can hear birds singing in every direction.

At night the flying squirrels came. I've never seen a human in the tree canopy, so they didn't realize it was a human.

We also practiced advanced techniques like skywalking, where you can move through the air from tree to tree like Spider-Man.

became the theme of the book

Steve Sillett is climbing a giant sequoia tree, and he shoots an arrow with a fishing line attached to it, entangles it in a branch, and follows a rope attached to it to climb up.

Climb up to 30 stories high

Two people are climbing this tree called Gaya, which is thought to be one of the oldest sequoias.

Only climbs to 1/7th of the height

I feel defenseless

there is a small person on the ground

You'll feel like you're climbing a wooden wall

But when you reach the canopy of the sequoias, it's like walking through the clouds.

Suddenly the ground disappears, the sky disappears from view, and you enter a three-dimensional labyrinth in the air, a world filled with ferns and all kinds of microbes that grow without soil.

There are epiphytes that grow on trees

Huckleberry bush

There are also lichens covering various mosses and trees

When you're near the top of a tree, you don't feel like falling, in fact, it's hard to even move.

Unlike near the surface, it's crowded with creatures - you'll have to crawl through the branches.

It's like scuba diving on a coral reef, although there's a difference between underwater and air.

Many trees have broad tops that look like pedestals.

Maria sits on top

This part is about 500-600 years old.

The tops of the sequoias grow very slowly

A distinctive feature is the huckleberry bushes on top of the sequoias, technically known as huckleberry afros, where you can sit and rest while eating the berries.

Sequoias that stretch toward the sky have a huge surface area because they perform an act called replication.

Sequoias are self-similar in shape, branching out in a way that copies the body of the sequoia.

Take the old sequoia tree, Kronos, for example.

A duplicate is a giant flying beam that emerges from the tree itself.

This branch is lower than half of the tree body

And from here we will create a new sequoia forest.

The trunk you see here is about a meter in diameter at the base and extends upwards about 45 meters.

As tall as the largest tree east of the Mississippi, it's just one of the branches of Kronos.

This is a three-dimensional canopy map of a sequoia named Ilouvatar made by Steve Sillett and Marie Antoine and their colleagues.

What we can see from this is that this tree has developed six layers of self-similarity, with each trunk giving way to new trunks.

I asked Steve to put a human in the diagram so I could see the difference in scale.

I'm on the right, waving my hand

I wanted to ask Craig Venter, can we put synthetic chromosomes in the human body and replicate themselves?

If it were possible, the fingers of our hand would be human, and the fingers of that hand would also be human.

If we had a sequoia-like mechanism, we would have six layers of little humans around our hands.

Wouldn't it be nice if you could wave your hand to someone and all your duplicates would wave their hands at the same time?

(Laughter) Let's take a closer look at Ilúvatar.

Zoom in on the area circled in yellow

It's a hallucinatory picture, but it's all Illuvatar here.

These are millennial structures - parts of the tree that are thought to live for over 1,000 years.

There are four people 1,2,3,4

And there's one more thing I want to show you

this is flying ryang

Sequoia branches have the property of returning to the trunk as they grow. This flying beam is a branch that emerges from the thin trunk on the right and returns to the main trunk.

The flying liang strengthens the tree crown much like it strengthens a cathedral building, helping the tree live longer.

Scientists conduct various experiments on Sequoia

Wired Sequoias Like ICU Patients

We discovered that sequoias can take moisture from the air into their trunks and carry it far down, perhaps to the roots.

Sequoias also have the ability to root anywhere in the tree

Partially rotten sequoias send their roots into them in their own way, sucking nutrients from them and crumbling down.

If humans had this mechanism, it would mean that if there was a gangrene on the arm, it would suck nutrients and water out of it and drop it.

The soil in the tree canopy reaches a depth of about a meter, and this soil, tens of meters above the ground, contains unnamed organisms.

This is an unnamed copepod, or crustacean plankton.

These crustacean plankton are abundant in the ocean and are the primary food for baleen whales.

We have no idea why such a creature is in the canopy of a sequoia tens of meters above the sea, or how it got there.

I have some interesting theories that I'll share with you later if I have time.

But now, when I look closely at trees, I see more and more complexity.

See the summit of Gaya, thought to be the oldest sequoia

The Gaya is said to be between 3,000 and 5,000 years old. No one knows for sure, but the top of the Gaya has broken off and is beginning to rot.

It probably took about 700 years for something like this little Japanese garden you see to be so intricately formed.

You need a magnifying glass to see big trees

Unfortunately, I also have to show you something very sad at the end of this talk.

The Canadian hemlock tree is sometimes called the Sequoia of the East Coast

I'm trying to tell a completely different story with Sequoia

In the 1950s, a tiny creature appeared in Richmond, Virginia, the hemlock aphid.

In Asia, we live in hemlock trees, but across the tribes, we're obsessed with Canadian hemlock.

Aphid predators disappeared when hemlock became a new host, while hemlock had no resistance to aphids.

The Canadian hemlock forest is considered in some respects to be the last remaining virgin rainforest east of the Mississippi River.

I didn't know there was rainforest in the eastern United States at first, but the Great Smoky Mountains National Park can get more than 2,500 mm of rain a year.

In the last couple of summers, this invading aphid, you could call it the Ebola virus in the trees, swept through the primary hemlock forests in the east and completely devoured it, even though it climbed the trees last summer.

This is Great Smoky Mountain National Park, hemlock trees dead as far as the eye can see.

This isn't just about the Canadian hemlock species being at risk of extinction from nature due to an invading parasite, but also the incredibly complex ecosystems that weave in the aerial labyrinths that exist in the canopy of trees, also facing death.

it really hurts my heart

What I find utterly incomprehensible is the complete lack of national news coverage of this fact, when one of the most important ecosystems in North America is being destroyed.

What can we learn about humans through Sequoia?

I think it's about human time

A flickering human being's time, the shortness of life, and the need for love

But humans are different from trees, and we can learn from that difference.

We humans can love, we can wonder, we have boundless curiosity and insatiable inquisitiveness, and I think that's what makes us primates.

And at least I learned from the trees how to love children in a completely different way.

Exploring the tree canopy with my children was one of the greatest experiences of my life.

I am also happy that I was able to show the children that, for better or for worse, the very few people who still climb trees today.

thank you very much

(Applause) Chris Anderson: I think Nathan Myrvold said at TED last year that because these trees are over 2,000 years old, many of them create unique ecosystems that are not found anywhere else on Earth. Is that true?

RP: That's right, we talked about Hyperion, the tallest tree in the world.

I was part of the team that climbed the tree for the first time in 2006.

Halfway up the trunk, Marie Antoine spotted an unknown golden brown ant.

Interestingly, we didn't know that there were ants in the Sequoias, and I wondered if this species of ants was endemic to Hyperion or the region.

But when I climbed after that, I couldn't find the ant, nor was it sampled.

What was that? All I know is that it was there.

CA: If someone other than humans were documenting events on Earth, it would be Iraq, wars, politics, gossip.

But what you're talking about is another tragic race that could wipe out entire ecosystems.

I was very surprised when I heard your story, and it made me realize how fragile ecosystems can be.

RP: Well, I'm also thinking about human diseases, parasites that invade the human body.

But that's just one small aspect of a much deeper problem of encroachment on all ecosystems and on the planet itself.

RP: That's right. It's caused by human activity.

The Earth's biosphere can be compared to a palace, so the continents are the rooms and the islands are the chambers.

But lately the palace doors have been flung open and the walls are crumbling.

CA: Richard Preston, thank you very much.

PR: Thank you

First, let me introduce you to an interesting character named Oetzi.

He lives in the South Tyrol Archaeological Museum in Italy, he's a mummy.

This is an artist's reconstruction of what it looked like 5,300 years ago.

I wonder what he looks like now?

(Laughter) Be prepared. Here's a picture of a mummy.

Now, he's not as handsome as he was when he was younger, but he's in excellent mummy condition, because he was found frozen in ice.

Ötzi is the oldest mummy ever found with preserved skin.

At 5,300 years old, it's very old, older than the Egyptian pyramids, and Ötzi has 61 black tattoos on his skin.

So scientists believe it was used to mark the site for some kind of treatment, like acupuncture.

Tattooing is a very ancient practice, as the oldest surviving skin is covered with tattoos.

But even today, tattoos are ubiquitous.

One in four Americans has a tattoo, and it's a multi-billion dollar industry, so whether you're an advocate for tattoos or not, this talk will change the way you think about tattoos.

So why are tattoos so popular?

Unlike Ötzi, most modern tattoos are some form of self-expression.

I love tattoos because I love art, and what's also wonderful and romantic about tattooing as an art form for me is that it can't be commercialized.

Because your tattoo lives and dies with you

Tattoos on your body can't be bought or traded. Tattoos are of value only to you, and that's what I love.

I like colorful tattoos because I'm obsessed with color.

I also give a lecture on color in college.

But my first tattoo was all black, just like Otzi's.

I got a typical tattoo that young people get, a tattoo with words they can't even read.

(Laughter) But at the time, I was only 19. I had just returned from my first trip abroad, and climbing a mountain in Japan and going to a temple to meditate was a very meaningful experience for me.

Well I have a surprise

The tattoo I got 14 years ago and the one Ötzi got 5,300 years ago are the exact same raw material: soot. This black carbon powder is what you leave behind when you burn something.

If you look at mine and Otzi's tattoos under a microscope, they look like this.

A tattoo is nothing more than a collection of tiny pigments, in this case just soot embedded in the dermis, the tissue just below the surface of the skin.

So, in over 5,000 years, the art of tattooing hasn't changed much, except for the availability of more colors and slightly faster speeds.

I'm an artist and a scientist, and I'm leading a lab that studies nanotechnology, which is about making objects out of very small building blocks, thousands of times smaller than the width of a human hair.

I started asking myself, could nanotechnology be applied to tattoo technology?

So if a tattoo is just a bunch of particles in your skin, then maybe you could replace those particles with something more interesting.

Here's my idea: I think tattoos can give you superhuman powers.

(Laughter) That doesn't mean you can fly, though. And by superhuman powers, I mean that your tattoos give you new abilities that you don't currently have.

So by modifying the particles, we can apply tattoo technology to change not only how our skin looks, but how it functions.

Let's see it in action

This is a diagram of a microcapsule

It's very small, hollow inside, covered with a hard protective coating, about the size of a tattoo pigment, and you can fill it with whatever you want.

What if we put some interesting material in this capsule and made a tattoo dye?

What function could the tattoo have?

What problems do you think you can solve?

What human limits can you overcome?

I'll give you an idea. One of the weaknesses of humans is that we can't see ultraviolet light.

Some of the high-energy sunlight causes sunburn and increases the risk of skin cancer.

Many animals and insects can see ultraviolet light, but humans cannot.

If you can see ultraviolet light, you can also see sunscreen.

Unfortunately, most people don't use sunscreen, and even those who do, don't know when to reapply because it's invisible.

It's the main reason why more than five million preventable skin cancers occur each year in the United States alone, costing the economy more than $5 billion each year.

How can we overcome this weakness with tattoos?

If UV light blindness is your problem, you might be able to detect UV light with a tattoo.

So I thought, what if we put these microcapsules in a UV-sensitive colorant that changes color and turns them into tattoo dyes?

But one of the challenges for tattoo technicians is finding willing subjects.

(Laughter) I couldn't bear to torture my grad student to try this tattoo dye.

I got a few punctate tattoos on my arm.

The experiment was a success Please take a look

We call these "sun freckles" because they get their power from the sun.

You can't see it right now, but if you hit it with ultraviolet light instead of the sun like this, you'll immediately see a blue dot.

In this video, I'm not wearing sunscreen, but if you put on sunscreen, the blue dots won't show up. Over time, when the sunscreen wears off, the sun's freckles will show up in the UV rays, and you'll know when it's time to reapply the sunscreen.

This tattoo allows you to instantly see if your skin is exposed to UV light.

And, of course, you can use these color-changing tattoos to get very stylish and artistic tattoos, but they also solve the big problem of protecting your skin.

(Applause) Let me give you another example.

A person's normal body temperature is about 36 to 37 degrees Celsius, and if your body temperature falls outside of this range, you need to go to the hospital immediately.

The problem is that we don't know our own temperature without a thermometer.

The classic method of taking your temperature by placing your hand on your forehead has no scientific backing.

(Laughter) What if you could use a tattoo to create a thermometer that you can always check?

In sun freckles, you put a dye that can detect ultraviolet light inside the microcapsules.

And inside the microcapsules, you can also put thermosensitive dyes, so you can make tattoo dyes that change color at different temperatures.

For example 35.5 degrees, 36.7 degrees and 37.8 degrees

These inks, when lined up and tattooed, create a temperature scale that's tailored to the human body.

In this video, the different colored tattoos fade away in sequence because the temperature of the subject's skin gradually increases.

If you put these tattoos in places like your mouth or the back of your lips where they're less susceptible to external temperature changes, you can always check your body temperature by looking at your tattoo in the mirror.

Isn't that amazing?

(Applause) Thank you.

(Applause) Another human limitation is that our skin doesn't conduct electricity. That might be a good thing, but it might not -- (Laughter) if you're using an electronic medical device like a pacemaker, it's not.

Today, if you have a pacemaker, you have to have surgery every five to 10 years to replace the battery.

Wouldn't it be nice if instead you could easily recharge through your conductive skin?

If we want to solve this problem with tattoos, we first need to develop tattoos that can be energized.

I'm currently experimenting with conductive tattoo dyes in my lab.

So far, we've used conductive tattoo dyes to make it more than 300 times more conductive than normal skin.

We're still a long way from being as conductive as copper wire, but we're making progress, which is very exciting, because we think it's going to open up a whole new world of possibilities for tattoos.

I dream of a future in which tattoos make things possible, a future where our bodies and technology become one, with copper wires and electronics that can be tattooed, so that it feels like an extension of the body rather than an external device.

I've shown you some of the new abilities that you might get by evolving your tattoo with nanotechnology, but these are just the beginning.

Advanced tattoo technology knows no bounds

In the future, tattoos will not only be beautiful, but they will also be functional.

thank you

(applause)

I've been at MIT for 44 years and attended the first TED

I'm the only other person here

At every TED I attended during the Ricky era, I talked about the Media Lab, which currently employs about 500 people.

Last week it was reported that I had left the Media Lab.

I didn't quit, I just stepped down. It's a ridiculous title, but someone else took it. Among the choices you can make as a professor, you can choose to stay on.

I decided to devote the rest of my life to the "One Laptop for Each Child" activity, which I have been doing for about a year and a half

In the next 18 minutes, I'll tell you why, how and what I do.

I'm going to circulate a $100 laptop along the way to see what it's like because Chris asked me to bring up an important topic.

Let's talk about three reasons why we started this

The first is very easy

I think you will be surprised. When I met a head of state and asked, "What is your country's most precious natural resource?"

I won't say it's a child at first, but is this a child? If you say it, they will immediately agree

It's easy (laughs).

The second is to convince everyone. The solution to any important problem has something to do with education, and sometimes education is the solution.There is no solution without the element of education.

it's really part of the solution

Number 3 is a little trickier

All of you here learned how to walk and how to talk, not because you were taught how to walk and how to talk. You learned by interacting with the world.

But at about the age of six, they stop learning like this, and from that point on, they learn by being taught, whether it's from someone like me now or from books.

It can be "taught"

Generally speaking, what computers have brought to learning is a kind of learning behavior, similar to walking or speaking, in the sense that learners act independently.

I have a philosophy that goes something like this, and some of you may know Seymour Papert.

I'll tell you a story about 1982 when we were working in Senegal.

Because some people say the $100 laptop started a year or two ago, or it's just a spur of the moment thing, but it actually goes way back, in the 1960s.

This is what it looked like in the 1980s

For us in Senegal, Steve Jobs

I sent you my laptop. It wasn't a huge amount, but it was a movement to deliver computers to developing countries. I soon found out that children, like fish out of water, even though they couldn't speak English or even the Latin alphabet,

I manipulated it like I was playing the piano.

Somewhat recently, I was also personally involved in

I have two anecdotes, one in Cambodia, where the village had no electricity, no water, no television, no telephone, but they did have broadband internet access.

The first English that the kids learned there was Google.

I only use Skype

When I come home in the middle of the night, I can connect with broadband.The electricity is not yet here.

My parents love laptops because they're the brightest lights in the house.

It's a mix of metaphor and fact. This is a real school.

Around the same time, SeymourPapert lobbied the Governor of Maine to enact the "One Laptop per Child" plan into law in 2002.

At that point, let's be honest, 80% of teachers expressed concern.

actually opposed

Teachers would rather have a raise or more schools than laptops.

Now, three and a half years later, what happened?

There are five reports: first, hikikomori has almost disappeared, second, everyone now has meetings with parents and teachers that no one has ever done before, third, delinquency problems have decreased, and fourth, children's activities have increased.

Teacher says class is fun

Children are enthusiastic. Because I have a laptop. Fifth, what I found most interesting is turning off the server at night. Otherwise, kids will email and ask too many questions of teachers.

As you can see from this, no more trials needed

For those who say, "We want to try 3-4,000 in our country," we say that the pilot project phase is over.

Korat. Get in line and see what other countries are doing.It's your turn when you know it's going to work. Tone

this is what i do

(Laughter) (Applause) The "one laptop per kid" project started about a year and a half ago.

As a non-profit organization, with a budget of $20 million,

Procured as expenses for later manufacturing

size really matters

It's not because you can buy the parts cheaply

Let's say you go to a manufacturer, I won't name you, but they're looking for a small display. For me, the color reproducibility is imperfect.

It doesn't matter if one or two dots are missing, and it doesn't have to be so bright.

But the guy at the manufacturer says, "I'm not interested. It's for home use.

We are aiming for a large, bright screen with perfect color reproducibility.

Your request is outside our strategy."

But when I said, "Well, I'm in trouble, I need 100 million units a year" (laughs)

They say, "Then we might be able to work with your strategy."

That's why size matters

That's why we need 5 to 10 million units in the beginning.

The idea is to start big enough that the scale itself will help bring the price down, which is why I said 7 million to 10 million.

We don't have a sales or marketing team

you will see

To do that, we will first encourage the seven major powers to agree and participate, and then other countries will follow.

There are cooperating companies, and of course Google is also included.

Other companies under consideration

This has been widely reported in the press

It's called the Green Machine, which I introduced with Kofi Annan at the World Summit in Tunisia in November.

Those who paid attention to this call it the laptop plan

But it's more of an education plan than a laptop plan.

And there's something that's really interesting, and I really want to highlight it. I used to say I was a light bulb, now I'm a laser.

It turns out it's not that hard, because 50%, or even close to 60%, of the laptop price comes from sales, marketing, promotion, and profit.

don't we need it?

We don't need that kind of cost, first of all we sell it at cost and the government distributes it.

Distributed in schools like textbooks

Because there is no extra cost, you can get everything, including displays.

Laptop displays cost roughly $10 per diagonal inch.

It's going to go down to eight or seven dollars, but it's not going to be two dollars or one and a half dollars unless there's a smarter invention.

The rest is the brown part of the graph. It's funny because the rest goes to the operating system that runs the laptop itself.

It's like a fat person using the most energy to move their body (laughs).

It's unbelievable right now

I've been using laptops since the day they came out

My laptop is slower, less stable and less fun than it used to be

this year is the worst

Everyone applauds and cheers, but I say, "What's wrong? Why aren't you doing anything?"

Someone said the other day that this laptop is a toy.

But I said it's super fast

When you open it, you will hear a beep and start up sound, the power will turn on, and you can use it

Exactly the same as in 1985. It was when you bought Apple's Mac512K (laughs)

something that was working properly

it's definitely getting worse

I am always asked what this is

This is the answer

There are two points worth noting. One is a mesh network. When the kids unfold their laptops, they become part of the network themselves, and they need one or two points that connect to the outside network.

2 Mbps is sufficient even for 2,000 to 3,000 children.

You can bring it into villages, and you can connect villages to villages, and it works really well.

Dual-mode screen lets you use it outdoors Wouldn't it be fun to use your phone outdoors in the sun?

but i can't see the screen

One reason is that most cell phones have their backlights on most of the time.

We're going to be able to get the lighting from either the front or the back.

It is undecided whether to change manually or by software If you use the backlight, it will be color

When lit from the front, it's black and white with three times the resolution Do you think it worked? Do not do that

That's why the people involved are now virtually living in Taiwan.

In about 30 days, it should be clear if it works

The most important thing here is that the kids can maintain it.

Again, no one believes it, but it's true.

This is the machine we showed in Tunis, Tunisia.

more than we think

Something I thought I couldn't do before

I will pass it on to you

More than just to see

You can hold it in your hand and check the mechanical movement.

I have a working machine at MIT I'll give it to this handsome gentleman.

You can decide whether to hand it to the left or right. Eh, off-air broadcasting? sorry i forgot i have a camera

Thanks for pointing that out, Chris

This isn't just a laptop, by transforming it like this

It will be like an e-book

When you go outside, it will be displayed in black and white

There is no game button, but it can be a game machine or a book

This is how you become a TV

There are many other things. Can the people watching the outside broadcast also understand?

Let Jim decide who to turn

(Laughter) Look at these seven countries.

Massachusetts is a "maybe" because it needs a bid

The law requires bidding and other things, so I can't say anything.

Others are decided because there are no bids

It's all against the federal government, but the annoying thing is, you

They say, "Let's do it state by state."

But we care about scale.

actually negotiate with the federal government

We are negotiating with the Ministry of Education.

If you look at governments around the world, the Ministry of Education is usually the most conservative and has the most staff.

They're supposed to be the ones who understand education, and a lot of culture is built into that.

It's really difficult. It's a really tough road

Regional cultures vary from country to country

do you all agree? no

Thailand, Brazil and Nigeria are undoubtedly the most active.

We have reached an agreement. We will not dare to sign a contract with anyone until the actual machine is ready.

I visit these countries at least once every three months, so I'm circumnavigating the world every three weeks.

Here's the schedule, I've written it down, and in two years it'll be available here for free.

People say you can't afford a $100 laptop, but why can't you?

It will start at around $135, but it will get cheaper soon.

This is very important because most products are put on the market at a certain price and then raised.

It's like a featured product, and if it gets a lot of attention, you won't be able to buy it, and the scale won't expand.

Targeting $50 in 2010

The black market is a big problem, but one

There are ways to combat the black market, and make it special and unique, a little bit like the car case, where millions of cars are stolen every day in the United States.

Not a single mail truck is stolen (laughs). I wonder why?

Because even if you steal it, you can't sell it.

just like a mail truck

You can color it or whatever.

I recently learned that white Volvos are not stolen in South Africa

nothing, nothing, zero

We want to be like the white Volvo

Each country has a task force, but I'm not interested.

Rather, we are urging all nations to come together, which is not easy.

We're going to expand it to other areas, and we can think of things like child-to-child support. Children in this country will buy it for children in developing countries.

My uncle gave it to his niece and nephew as a birthday present

There are many possibilities, very, very exciting

Everyone listens when I say it's an educational project

Do you distribute software? and the device has software, but the answer is no

We do not distribute teaching materials

the country does it

We are true "constructivists"

We believe in learning by doing. This may be new to you, but everything from the language LOGO, which appeared in 1968, to the more recent language Scratch, has a role to play.

Are you dreaming? Is it real? no, it's real

I have one criticism. I don't really want to criticize anyone, because it's a humanitarian, non-commercial activity, and it's actually kind of stupid to criticize. (Laughter)

But they say it's a good idea to be told one thing, but they can't.

Even professors say they can't, they say it's impossible

But on December 12th, Quanta agreed to make it, the company that makes a third of the laptops on the planet, so the question was cleared.

It doesn't matter if it's feasible. it is coming true

Even if it's $138, why not?

Even if it's half a year late, isn't it okay?

Just land softer

Thank you for your attention. (Applause)

Now I'm going to do something a little different.

I'm not giving a presentation, I'm talking to you.

And at the same time, I'm going to look at the images, which are images that give a glimpse into life in Second Life, and I hope it's interesting for everyone.

The quirky images on your screen will draw you in.

Let's talk about the big ideas for Second Life, and bring John back here so we can have a conversation, and then we'll move on to Q&A.

So the first question is, why the hell did you create a virtual world?

I think the answer to that has always been to some extent the crazy people who thought of starting the project in the first place.

I'll start by telling you a little bit about my background, going all the way back to my teenage years, and then I'm going to talk about how I actually started making things like this as an adult.

I was a creative kid who loved to read.

I was always trying to make something

I was obsessed with taking things apart and building them again, and I was obsessed with wood, electronics, metal, and whatever else I could do with my hands.

And for me, it was like my second life, but I had my own bedroom.

I think every teenager has a bedroom they can hide in, and I thought it would be cool to have the bedroom door go up, instead of just opening and closing like in Star Trek.

I thought that would be cool, so I went up to the ceiling and cut the joints in the ceiling, and I think my parents were very pleased, so I made the door go up to the ceiling.

I installed a garage door opener in the attic, so it lifts the door.

You can imagine how long it took me to do that, and how angry my parents were.

I always think that we have a lot of great ideas about what we want to do, but most of the time we can't actually do it in the real world. It's very difficult to get to the point where you actually get the materials and actually make something that you imagine.

It's the same for me, and with the spread of the Internet, I'm doing computer programming, and I'm trying to run my own little company, and that's when I figured out what to do with the Internet and computers.

that was fascinating to me

I just wanted a place to make things

I think that's where Second Life started, and that's an important part of it.

I also think that using the internet and technology is a general trend for the space of creativity and design among us.

great human progress

Technology is allowing us to create social ways that everyone can share.

I think Second Life and virtual worlds in general are the best we can get to right now.

In other ways, it's similar to how we think about space. Virtual worlds and space are similar in some ways.

It might be fun to talk about it for a minute.

The thought of going to space is very exciting.

A lot of movies, kids, we all dream about space exploration, and I think why?

Let's stop for a moment and think about why

why we want to

I can think of a few things, the kind of dreams that we all have in our minds that we see in the movies.

One, when you go to space, you can start from scratch.

It's a journey that allows you to become, in a way, a different person, to step out of the society and life that you know.

When you start exploring, you must change yourself, perhaps irreversibly.

And two, perhaps when you travel to the farthest reaches of space, you have no idea what you're going to find there, once you're in space.

it will be different here

It's actually very different from what you see on Earth, and it feels like anything is possible.

The idea is to build the new identities that we humans want and go where anything is possible.

If you're serious about it, virtual worlds and places where there's more computer technology are the kind of space exploration that's practically possible.

We're driven by the idea of ​​virtual worlds, like the universe, where we can reinvent ourselves, where everything is there, and maybe we can do anything.

To give you an idea of ​​the magnitude of the scale, because space and Second Life might be confusing to most people, let's say the Internet in the early '90s.

The Second Life virtual world is like the internet in the early '90s today, where everyone's anticipation, and every single idea that comes up, there's a lot of excitement, and there's a lot of despair, and everyone thinks it's not going to work.

Everything that's happening in Second Life, and more broadly, everything that's happening in virtual worlds, was happening in the early '90s.

All the time, we're going to the office, fetching articles, finding articles that can be translated into Second Life, and playing games with them, the web is second life, the internet is virtual reality.

I'm sure you'll find articles that are very similar to what people have observed and found.

To imagine the scale of Second Life, there are currently about 20,000 CPUs in operation.

Right now, about 20,000 computers in three facilities in the United States are connected, and that creates a virtual space in which about 250,000 people walk around every day. The actual active population is that of a small city.

It's about 10 times the space of San Francisco, and it's just as densely built.

So that gives you an idea of ​​the scale. Right now, it's growing at a tremendous rate. New servers are currently being added at about 5 percent per month.

Of course, unlike the real world, exponentially, like the Internet, everything is expanding very quickly, exponentially.

That's why space exploration overlaps so well with this.

Virtual worlds are decisive because this space holds truly limitless possibilities.

As humans, we're very sensitive to that fact.

I'm sure you'll see it when you see it. If you thought you could do anything in space, sometimes you don't.

Second Life runs on 20,000 machines today, and there are about 100 million user-created objects that probably interact with each other.

There are tens of millions of objects thinking all the time, they have symbols attached to them

EnglishIt's already a huge world in terms of the amount of objects, and that's very important.

For example, if someone were to play "World of Warcraft," World of Warcraft would be about the size of four DVDs.

Second Life, by comparison, has about 100 terabytes of user-generated data, which is roughly 25,000 times larger.

Again, if you compare, for example, the Internet to AOL or the chatrooms of the time or what AOL was about, what's going on here is very different.

The last big idea, which is almost certainly true, is that whatever this evolves into, it's going to be much bigger in terms of usage than the web itself.

I have two things to say

In general, the purpose of using the web is to organize, exchange, produce and consume information.

It's like Irene said Google is data-driven.

I think the world has become information itself.

Everything we interact and experience is like we're floating in a sea of ​​information, and we interact in different ways.

The web creates information in the form of text and images.

Most of the web is made up of interconnected text.

This is one way to organize information. But in the virtual world, there are two other ways to access information. They're very different, and I think they're important ways. They're so good that they make the web look obsolete.

The first is, as I said, one of the big differences in virtual worlds is that virtual worlds allow you to use the most powerful symbolic symbols to represent information to you, which is to say, you use humans.

For example, the English word C-H-A-I-R refers to this, but this object is a symbol of the world in general.

You know what this means You don't need to translate this

And it would be even more memorable if I showed you this object while drawing C-H-A-I-R on paper and showing it to you.

I'm sure that in a few days, when you test your memory, I'm sure you'll remember very well that I was talking about the chair.

When you actually use symbols to organize information in your memory, when you use the most common symbols that are rooted in our lives, you're maximizing your brain stimulation, your memory, and your ability to move and manipulate data.

And virtual worlds are the best way we can organize and experience information.

I think this is something that people have been talking about for 20 years, and it's kind of a magical way to have a 3D, real-life environment that's important to us.

But second, and this is not so obvious, the experience of creating, consuming and exploring information is absolutely and intrinsically social in virtual worlds.

because you are always with other people

We humans are social creatures, we rely on information, and we must enjoy consuming information with other humans.

It's essential to us. You can't escape it.

If you're on Amazon and you're looking for a digital camera or something, and you're looking at that page, there's like 5,000 other people looking at the same page, and you can't talk to them.

You can't turn to people looking at the same page on your digital camera and say, "Hey, have you seen this? I'm thinking of buying one."

For example, a simple experience like shopping together is an example of how we, as social creatures, experience information.

So in terms of the second point, it's essential that we experience information together, or that we want to experience information together, and it's a tendency to use technology to connect us.

Ten years from now, virtual worlds will be the most popular way to use the Internet, to consume information together.

An example would be making a map of India.

Perhaps the way to resolve something there is to actually talk to other people or

Seeking advice is going to be a lot more involved than just any other method of making a map statistically.

So I think that's another big point.

Whatever direction this takes, whether it's Second Life, its descendants, or the broader stuff that's happening all over the world, that's what you'll discover as a result of the Internet.

It's a big idea, but I also think it's pretty well defended.

So let's stop here and ask John to come back. I think we can have a longer conversation.

thank you john

(Applause) I'm sure there was a strong creative urge to create Second Life, but why didn't you create a utopia?

For example, in the 19th century, many otherworldly works of literature were clearly utopian.

That's great. It's a deep question.

Virtual worlds are going to be a utopia, and in a way it might be.

But the answer is no, because the web itself is a great example of the bottom line.

So the infinite possibilities, the magic that anything can happen, can only happen in an environment where you know very well that you have fundamental freedom, at the level of the individual, at the level of the LEGO bricks, and if you want it, it creates a virtual world.

People have to have that level of freedom, and people often ask me if Second Life has utopian tendencies or something like that.

Those top-down plans keep you away, even if you're doing them with good intentions.

What's more, when human societies are in control, when they set out on grand schemes of rules, new ways of interacting with people, new ways of arranging cities, historically they never get any better than that.

The Kremlin is also quite large.

And yes, the Kremlin, yes, it's a big building.

Can you give an example of something that you created early on in Second Life that you were sure people would definitely want to use, but that people weren't really interested when they started using it in creating avatars or communication tools, or things that you didn't think of but immediately people started asking for?

Both examples come to mind

One thing I really like is that there's a feature in Second Life that I'm passionate about building into.

It's a feature that allows you to get closer to people and have more private conversations, not instant messaging, because you have to be friends to do that.

The idea is just to be able to have private conversations.

I remember it being one of the examples of data-driven design.

In my opinion, it seemed like a really good idea, but I remember it being used very little and eventually discontinuing the feature.

I finally gave up and took it from the code.

But let me give you a more general example, and one that has a lot to do with the idea of ​​utopia.

Second Life originally had 16 simulators, now it has 20,000.

When the simulator was only 16, it was roughly the size of this college campus.

We've divided it up into sections, with nightclubs, discos where you can actually dance, and areas where you can fight with guns.

We did zoning, but of course people could build whatever they wanted.

What was interesting from the beginning was that we basically had a plot, but we quickly ignored it completely, and in about two months, two months is a very short amount of time in terms of Second Life, but the users were people who were using Second Life at the time.

I mean, I didn't know what was going to happen there.

When you think about what people have built, it's famous, because CBGB has to close down at some point, so that's what flow is.

That's right, but it was Internet time and it was closed on the first day.

Another example is pregnancy.

In Second Life you can make babies

We can do this using tools within Second Life. Pregnancy and having a child is an innate concept, but Second Life has absolutely no gamification at the platform level within Linden Lab.

There's no attempt to create a structure for that kind of experience, because it would have a utopian meaning.

And of course, we weren't trying to create a mechanism for creating babies, like taking two avatars and putting them together.

But people are building their capacity to make babies, and they're loving them. That's the experience you get with buying in Second Life.

Of course, the existence of the economy is a whole other story.

We weren't talking about that, but it's a defining feature.

I think there are two things that people want to do when they're given the opportunity to create in the world.

One is rightfully owning what you create.

Second, if they want to, which isn't universally true, they want to sell what they make to make a living.

It's true on the web, it's true in Second Life.

Therefore, the existence of the economy is crucial.

Do you have any questions for Philip Rosedale, sir?

(First time meeting you, I think you look like your character.) Philip has been accused of looking like his character, Second Life's avatar.

Please respond and then answer the rest of the question

But it doesn't look like my avatar

(Laughter) How many people in this room have seen my avatar?

Probably not many. Are you trying to disparage someone else's avatar?

No, no, but a colleague of mine did an amazing avatar, a female avatar, which I sometimes pretended to be.

But my avatar is male and wears chaps.

I have spiky hair, I'm pinier than this, and I have orange hair.

And then there's Kamahige. It's a character that feels like a villager.

very cool

so the question is

([unintelligible]) The question is, I don't think Second Life was culturally aligned.

It doesn't seem to have its own culture, and the differences that exist in the real world aren't translated into the Second Life map.

First, we're still in the really early stages, and it's only been a few years.

What we're witnessing now is the same evolution of human behavior in social integration.

A fair criticism is that Second Life today is culturally more Wild West than Rome.

The evolution of the interactions that create culture is happening 10 times faster than in the real world. If you walk into a bar in Second Life, 65 percent of the people there are people from outside the United States, and they're speaking in every language.

In fact, one of the ways you can make money in Second Life is to bring a great translator into your life, and basically put Google or Babelfish or some other translation site on your screen and translate the written word from person to person on the fly.

The multicultural nature and cultural integration within Second Life has a lot to do with the real relationships in the real world that we're reaching for.

I think the culture will adjust and emerge, but it's going to take a few more years, and I'm sure you all expect that.

do you have any other questions sir

(What's the demographics like?) What's the demographics like

yes stats

The average age in Second Life is 32, but the usage of Second Life is increasing dramatically as the actual age increases. As you move from 30 to 60, there are many people in their 60s. I'm just doing it, but it might not be very appealing to people who play online games, because the graphics aren't quite up to par yet, and of course they're very good pictures, but in general the graphics aren't up to par with the beautiful graphics you see in Grand Theft Auto 4.

The average age is 32. Did I mention this? 65% of users are outside the United States.

The distribution by country is quite wide

We have users from almost all over the world

The main countries are the United Kingdom and Europe, combined with about 55% of Second Life.

Psychologically speaking, yes, there are roughly equal proportions of men and women in Second Life. About 45 percent of the people active in Second Life right now are women.

Women are about 30 to 40 percent more in Second Life than men, based on active time, which means that men have more enrollments, but women stay longer.

Another statistic

Psychologically, I think the people in Second Life are very different from what you think they are, and when you go into Second Life and talk to them and meet them, I'd encourage you to do it and see for yourself.

they are not a group of programmers

not easy to express in statistics

If I had to express myself, do you remember the eBay enthusiasts in the first few years when eBay came out?

They may be those people, in other words early adopters.

They're creative, they're entrepreneurial.

A lot of our users, about 55,000 people, are cash flow aggressive. They're making real money doing what they're doing in Second Life.

You described yourself as a very creative person, but when you were younger, you loved making things.

I don't think many people would describe themselves as creative.

I suspect it's a euphemism for a C grade student who spends a lot of time in his room.

(Laughter) I did get a C at one point, that's funny.

When I was in college, I studied physics, but I wasn't a social person, so

I used to read all the time. I was shy. I don't feel that way now, but I was very shy.

I've moved a lot and experienced things like that.

I was stuck in my own world, and obviously it worked for me and allowed me to spend time doing things that really interested me.

So you're currently in your fifth life?

If you count the cities, well, you didn't do very well in school, you're right.

I was never a student who thought I had to get an absolute A.

When I was in college, I had an amazing social experience that I hadn't had before. It's friendship. I met six or seven friends who were doing physics together, and they had a rivalry.

Last question, you guys.

(There is a word ~ ​​in the pamphlet ~) Do you want to restate it?

yes i'll say it again

The pamphlet says, "We may end up preferring our digital selves to our physical selves, our digital selves more malleable and manageable than our physical selves, and in fact much of human life and experience may move to the digital realm.

It's horrifying of course

It is a terrible change and a collapse

I'm sure you want to know what I think about it What is your response to those who say it's scary?

(What would you say if someone said it was creepy?) I'll say a few things.

First, it's as spooky as the internet and electricity used to be.

So big changes are happening and they can't be avoided.

No backtracking, no intentional action, no political action, nothing can stop technological change from connecting us, because the fundamental motivation for being creative and entrepreneurial is to put your energy into virtual worlds, as happened in the age of the web.

I think this change is a big change that will cause confusion.

Clearly, I'm an optimist and I have a lot of faith in what's going on, but whether you're cool-headed or uninterested in this, based on the data that economic forces are emerging from the outside, I'd have to conclude that there's definitely going to be a sea change, and that change is going to be intensely disruptive, fundamental to our lives and our identities.

I don't think I can escape this change

What we've been talking about so far is the challenge of being in, being inspired by, living in, and having a good life in a virtual world, which is multicultural, multilingual, entrepreneurial, and has the flea market nature of today's virtual world.

The virtual world challenges us to aim higher, and in many ways we outperform ourselves.

You have to be better, probably more learners, more tolerant, smarter, faster learners, and more creative than we in the real world.

If that's the case with the virtual world, then it's frightening and inevitable that these changes are ultimately for the better, and that's why we have to overcome them.

I'm sure many other writers and speakers have said this, but I would also like to say: Fasten your seatbelts, because the changes are coming, and the changes are very big.

I'm Philip Rosedale. Thank you.

(applause)

There's a scene that's becoming more commonplace in hospitals around the world, where nurses measure a patient's height, weight, and blood pressure while putting a glowing plastic clip onto their finger.

All of a sudden, the digital screen shows the oxygen level in your blood.

how did you measure it?

How does a plastic clip get information about blood, even though it hasn't been drawn?

Here's how it works: our bodies are translucent -- that is, they don't completely block and reflect light.

Rather, some light passes through skin, muscles, and blood vessels.

can't believe it?

Try shining a flashlight on your thumb

We can use light to look inside the body.

Think back to medical finger clips, called pulse oximeters.

When you breathe in, the oxygen in your lungs is carried into the hemoglobin molecule, and a pulse oximeter measures the percentage of hemoglobin that's been oxidized.

A tiny red light is emitted from one side of the finger clip and measured by a photodetector on the other side.

When a LED (light-emitting diode) shines on your finger, the hemoglobin that is not bound to oxygen absorbs the red light more intensely than the hemoglobin that is bound to oxygen in the blood vessels.

So whether light reaches the other side depends on the ratio of the concentrations of these two types of hemoglobin.

However, in any two patients, the blood vessels in the fingers are different in size.

Even if you get a reading that shows a healthy 95 percent oxygen saturation for a patient, the same reading for a patient with small arteries, dangerously, may not be telling you the true oxygen level.

This is compensated for by a second infrared wavelength LED.

The spectrum of incident light has a wide range of wavelengths, with infrared radiation just outside the visible spectrum.

All molecules, including hemoglobin, exhibit different absorption at each wavelength in the spectrum.

By comparing the absorption rate of red light and infrared light, it provides chemical fingerprint information that eliminates the influence of blood vessel thickness.

Now there's an emerging medical sensor industry developing precision chemical fingerprinting devices, using tiny light-manipulating devices less than 0.1 millimeters in size.

This microscopic technology, called integrated photonics, consists of silicon wires that guide the path of light, like water running through a pipe, and can redirect, wave, and even temporarily trap light.

The ring resonator is made of circular silicon wire that traps light and enhances the chemical fingerprint signal.

Placed right next to a silicon wire, the ring absorbs and temporarily traps certain light, that is, light whose wavelength is an integral multiple of the circumference of the circle.

This is the same effect as plucking a string on a guitar.

It's like a string of a certain length vibrating in a certain pattern, producing a fundamental tone and its overtones.

The original design goal of the ring resonator was to efficiently route different wavelengths of light corresponding to individual channels of digital data in optical networks.

Someday, this kind of data routing technology could be applied as a microscopic chemical fingerprint lab, on a chip the size of a dime.

This futuristic "laboratory on a chip" can identify many diseases easily, quickly and non-invasively in the doctor's office or conveniently at home by analyzing a person's saliva, sweat, etc.

Human saliva, in particular, reflects the protein and hormone composition of the human body, and can provide early warning of certain cancers, infectious diseases, autoimmune diseases, and more.

To pinpoint disease, the "laboratory on a chip" sifts through a myriad of trace substances in saliva samples by several methods, including chemical fingerprinting.

There are many different biomolecules in saliva that absorb the same wavelengths of light, each with a unique chemical fingerprint.

In the on-chip lab, after light passes through a saliva sample, many finely tuned rings absorb light at slightly different wavelengths and send it to a pair of photodetectors.

Thanks to the layered detectors, we can individually identify the mixed chemical fingerprint information in the sample.

This information is then matched against a database of chemical fingerprints of different molecules in a microcomputer on a chip to determine relative concentrations and diagnose specific diseases.

From global communications to labs on chips, to transmit and extract information, humans have found different ways to use light.

New inventions using the illuminating power of light will continue to surprise us.

People love cars. Cars take us where we want, when we want.

They're a form of entertainment, they're art, they bring pride to their owners.

car song written

Prince wrote a great song called 'Little Red Corvette'

Neither a "little red computer" nor a "little red vacuum cleaner"

I wrote a song about cars

My favorite has always been "Make love in a Chevy van" Chevy van was my college car

In fact, when we do market research around the world, we find that people have a universal aspiration to own a car. Worldwide, 750 million people own a car.

surprisingly many

But did you know that this is only 12% of the population?

We should ask: Can the world sustain this number of cars?

And if you look at the projections for the next 10, 15, 20 years, the world's parking lots will grow to about 1.1 billion vehicles.

If you parked them side by side end to end and wrapped them around the earth, they would circle the earth 125 times.

Automobile technology has come a long way in the last 100 years, and cars have dramatically reduced emissions, are safer and more efficient.

It's much closer than it was 100 years ago.

But the facts haven't changed: the basic DNA of the automobile is largely the same.

What if we reinvented the car, not 100 years ago, but with an understanding of the problems and technologies that exist in today's cars?

Affordable price preferred

Fuel cells look promising, with one-tenth the number of moving parts, the internal combustion engine uses a fuel cell propulsion system, and the only emissions are water.

Electronic controls and software are using Moore's Law to pursue a connection to the car.

We have embarked on a redevelopment of the electrochemical engine and its surroundings, a fuel cell that uses hydrogen as an energy carrier.

"Autonomy"

"Autonomy" pointed us in the right direction

We embodied all the major components of the fuel cell propulsion system

We did "High Wire" and we introduced "High Wire" here last year.

The "Highwire" was the world's first fuel cell vehicle, and then the "Sequel" was announced.

The 'Sequel' is a real car

watch the video

Now, I'm sure you have a question in your mind: where exactly are you going to get the hydrogen?

And the next question is when will this kind of car hit the market?

First, hydrogen

The great thing about hydrogen is that it can come from a variety of different fuels, whether it's from fossil fuels or from any means of generating electricity, including renewables.

Also available from biofuels

totally awesome

The idea here is that each local community has its own way of producing hydrogen.

A lot of hydrogen is being produced in the world today.

Ironically, it's produced when sulfur is removed from gasoline.

Hydrogen is produced in the fertilizer industry It is produced in the chemical manufacturing industry

Hydrogen is created because it has commercial uses.

What this means is that we know how to make hydrogen, how to produce it effectively, how to handle it safely.

So we analyzed where to put the stands in each city, and we set up a stand within a three-kilometer radius in each of the 100 largest cities in the United States.

A total of about 12,000 stands would be needed if installed every 40km on a highway.

That's about $12 billion total at $1 million each.

That's a lot of money, but if we build a pipeline in Alaska today,

This amount is half of the Alaska Pipeline

But what we really want to do is refuel at home, like charging your computer or your cell phone.

So I'm very excited about the future of hydrogen.

The question isn't if you can do it, it's when

Our goal (and we're making great strides toward that goal) is to develop a propulsion system based on hydrogen and fuel cells, designed and proven to compete with internal combustion engines --

(The plan is to obsolete the internal combustion engine.) And it's a propulsion system that's affordable, craftsmanship, performance and durability.

That's what we're doing for 2010

In development work, I haven't yet seen any indication that it's not possible.

I think the future will be event-driven

It's unpredictable, so we spend a lot of time trying to create the future.

I'm fascinated by the fact that cars and trucks are idle 90 percent of the time, parked all over the place.

Usually within 30m of the user

If you compare the power generation capabilities of your car to the US grid, you find that 4 percent of your car's power is equal to the US grid.

This is a huge generator It's a moving generator

And hydrogen and fuel cells offer us the opportunity to generate electricity into the grid while our cars and trucks are parked.

I talked about collective networks before.

And in the ultimate collectiveness story, make every processor and every car part of a global network of computer functions when idle.

This premise is very exciting, and then the car is not a necessity.

It becomes an appliance, a form of transportation, a mobility of information, a computer, a communication, a mobile platform.

And the important thing is to make it affordable, to make it exciting, to do it in a profitable way.

this is very big progress

A lot of people say, Can you sleep well when you're hustling around with such a big problem? Answer "Like a baby"

"I wake up crying every two hours"

The theme of this TED talk gave me a big tip for success: relationships and collaboration.

Thank you very much. (Applause)

Chris Anderson: Larry Larry Hold On

There are so many things I want to ask

I'll ask you one thing

I may be wrong, but the public opinion today is that it seems to me that GM, compared to its Japanese competitors and even Ford, doesn't take some of these environmental philosophies seriously.

Are you serious, not because the consumer wants it, or because the regulations impose it?

Are you really trying to take the lead on this matter?

Yes, we're serious. We've already spent over a billion dollars on this.

We're investing this much money, so I want you to think we're serious.

Second, because it's a basic business idea.

Because honestly, there are opportunities for business growth, and unless we solve these problems, we won't be able to expand.

If problems are not resolved, the growth of the auto industry will be hampered by persistent problems, and the strategy's simple tenet is:

"Do yourself before others do"

If we can imagine this future possibility, so can others.

we want to make it first

Thank you for your introduction

I'd like to start by talking about testicles.

(Laughter) Men who sleep five hours a night have statistically smaller testicles than men who sleep seven hours or more.

(Laughter) What's more, men who routinely sleep four to five hours a night have testosterone levels similar to men who are 10 years older.

Lack of sleep can age men by as much as 10 years in this important health dimension.

A woman's reproductive health is similarly compromised by sleep deprivation.

That's all the good news for today

(Laughter) It could only get worse from here.

Because I'm not only going to tell you the wonderful good things that enough sleep can do, but I'm also going to tell you about the shockingly bad things that a lack of sleep can do to both your brain and your body.

Let's start by talking about the brain and how learning and memory work. Over the last decade or so, research has shown that we need sleep after learning so that we can hit the save button, so to speak, and forget what we've just learned.

What I've recently learned is that you need sleep before you learn, too, to prepare your brain for learning, like a dry sponge, ready to absorb new information.

When you don't get enough sleep, your brain's memory circuits are kind of flooded and can't absorb new memories.

let me show you the data

This study tested the hypothesis that there are benefits to staying up all night.

We took a variety of individuals and assigned them to two experimental groups: the sleep group and the sleep deprivation group.

The sleep group gets a good eight hours of sleep, and the sleep-deprived group is kept under surveillance in the lab and kept awake.

No naps, no caffeine, so it's a tough situation for the subjects.

The next day, we put them through an MRI scanner, and while we're teaching them something new, we're taking pictures of their brain activity.

Then we'll have them solve the test to see the effect of their learning.

The vertical axis of this graph is the learning effect.

When you put the results of the two groups side by side, the sleep deprived group was actually 40 percent less efficient at consolidating new memories in their brains.

This is terrifying. Think about how people of educated age sleep.

In a concrete situation, a difference of 40 percent is the difference between doing well on a test and failing the test.

And then we explored what's going on in the brain that causes these learning disabilities.

On the left and right sides of the brain is a tissue called the hippocampus.

The hippocampus is the brain's inbox of information.

Adept at receiving and storing new memory files

People who slept well had more healthy learning-related activity in the hippocampus of the brain.

But the sleep-deprived people didn't show any significant signal at all.

It's like lack of sleep shut down your memory inbox and didn't accept new files.

They are unable to effectively remember new experiences.

Lack of sleep does all these bad things, but let's go back to the control group for a moment.

There was a group that got a good eight hours of sleep, right?

Now let's pose a different question: If we do get some sleep, what physiological properties of sleep restore and improve our memory and learning ability day by day?

When I put a lot of electrodes on my head, when I was in a very deep sleep, I saw large, intense brainwaves, and at the moment when these brainwaves were really high, there was a burst of electrical activity called a sleep spindle.

It is this combination of brain waves in deep sleep that acts like a file transfer system during the night, protecting and protecting memories by moving them from the somewhat fragile reservoir of short-term memory to the more permanent reservoir of long-term memory in the brain.

It's important to understand what exactly is going on with memory processing during sleep, because it has important medical and social implications.

Let me tell you about one area where this research has been applied clinically: aging and dementia.

We all know that as we age, our learning and memory abilities decline and decline.

But we've found that the physiological hallmark of aging is a decline in the quality of sleep, especially the deep sleep that I was talking about earlier.

Only last year did we publish evidence that these two phenomena are not only co-occurring, but are highly correlated.

What we do know is that disruption of deep sleep is one of the factors that contribute to age-related cognitive decline, memory decline, and, more recently, Alzheimer's disease.

This is very depressing news.

it will happen to all of you

But there may be a ray of hope

It's different from other factors that have been associated with aging, such as the brain, which has undergone physical structural changes that are extremely difficult to treat.

If sleep is the clue that explains aging and Alzheimer's disease, that's great, because we can do something about it.

Our sleep lab has an initiative that we're working on without sleeping pills.

Unfortunately, sleeping pills don't give you natural sleep.

Instead, the method we are developing

use direct current stimulation

It sends a very small amount of electrical current through your brain, so small that you don't feel anything, but it has a big effect.

If this stimulus is given during sleep in young, healthy adults and coincident with the emergence of deep sleep brainwaves, it not only further amplifies the magnitude of the deep sleep brainwaves, but it can also nearly double the memory benefits of sleep.

The question here is whether this potentially cheap and portable technology can be applied to older people and people with dementia.

Can we restore the healthy qualities of deep sleep and thereby protect our learning and memory functions?

this is my heartfelt wish

one of our grand challenges

That's just one example of what sleep does for the brain, but sleep is just as essential for the body.

We've already talked about the relationship between sleep deprivation and reproductive function.

I'm also going to talk about the relationship between sleep deprivation and cardiovascular function, and it's just one hour that makes a difference.

You know, there's this global experiment that's going on twice a year involving 1.6 billion people in 70 countries -- yes, it's summertime.

One hour less sleep in the spring is associated with a 24% increase in heart attack the next day.

An extra hour of sleep in the fall reduces the number of heart attacks by 21%.

Isn't it amazing?

Exactly the same pattern of change can be seen in car crashes, car crashes, even suicide rates.

But what I want you to take one step further is the relationship between sleep deprivation and immune function.

Let me introduce you to the beautiful blue thing in the image.

They're called natural killer cells, and natural killer cells are kind of like 007 in the immune system.

These cells are great at finding and eliminating dangerous and unwanted things.

This image shows a cancer tumor being destroyed.

It's tempting to hope that the powerful immune system assassins keep an eye on you, but unfortunately, sleep deprivation makes that impossible.

Now, in this experiment, instead of staying up all night, we decided to cut down to four hours of sleep for just one night and see what kind of reduction in immune cell activity.

The difference is not trivial, let alone 10% or 20%

Natural killer cell activity was reduced by 70 percent.

This is a serious immune-compromised condition, and as you can see, we're beginning to see a strong link between sleep deprivation and the risk of developing different types of cancer.

Current known associations include colorectal cancer, prostate cancer, and breast cancer.

In fact, the link between sleep deprivation and cancer is so strong that the World Health Organization has classified any job that involves night shifts as carcinogenic because it disrupts sleep rhythms.

You may have heard that old adage, "When you die, you sleep better."

I'm going to say this with all seriousness, but this is deadly naive advice.

It's clear from epidemiological studies involving millions of people.

It's absolutely true: the less you sleep, the less you live.

Short sleep duration is associated with various mortality risks.

If the increased risk of developing cancer or Alzheimer's disease still doesn't stir your anxiety, what about the fact that sleep deprivation undermines the very fabric of life, the genetic code in our DNA?

Another study recruited healthy adults and restricted their sleep to six hours a day for a week, and then measured the changes in gene activity compared to the same subjects who got a full eight hours of sleep.

I made two important discoveries.

First, the activity of 711 genes was disrupted due to sleep deprivation.

Second, while about half the genes were active,

the other half had decreased activity

The genes whose activity was reduced by sleep deprivation were those associated with immune function, indicating that immune deficiency occurs here as well.

In contrast, the genes that were elevated and activated by sleep deprivation were genes associated with promoting tumorigenesis, genes associated with chronic inflammation in the body, and genes associated with stress, all of which are likely to induce cardiovascular disease.

Simply put, if you're sleep-deprived, you can't get away from it and stay healthy without the negative consequences.

It's like a broken water pipe in your house.

Lack of sleep creeps into every crevice in your physiology, and can even alter the nucleic acid sequences of your DNA that make up your day-to-day health.

Now that you've heard this, you might be thinking, "Oh my God, how can I improve the quality of my sleep?

Do you have any tips for sleeping well? "and

This includes avoiding alcohol and caffeine, which are harmful and harmful, and if you're having trouble falling asleep at night, don't nap during the day.

The first is "regularity"

Go to bed at the same time and get up at the same time, whether it's weekdays or weekends.

A regular life beats nothing, it stabilizes your sleep and improves the quantity and quality of your sleep.

Second, keep the temperature low.

To fall asleep and stay asleep, your body's core body temperature must drop about 1 to 1.5 degrees Celsius, which is why you sleep better in a room that's too cold than in a room that's too hot.

A bedroom temperature of about 65 degrees Fahrenheit or about 18 degrees Celsius is a good idea.

It's the perfect temperature for most people to go to bed.

So in the end, let's step back for a moment. What is the message you want to convey most?

I think it goes something like this: Unfortunately, sleep is neither a luxury nor a lifestyle choice.

Sleep is arguably biologically necessary.

It's your life support machine, the result of Mother Nature's endless striving for immortality.

The drastic reduction in sleep time seen in developed countries is having a devastating impact on our physical and mental health, our safety, and even our children's education.

The sleep deprivation epidemic is quietly underway, and it's fast becoming one of the biggest public health challenges we face in the 21st century.

Now is the time to reclaim your right to sleep well, without feeling embarrassed or being stigmatized as lazy.

And then you're back with the most powerful elixir of life: sleep is the knife to health.

So much for my speech, good night, good luck, and above all—

sleep well

thank you

(Applause) Thank you.

(Applause) Thank you.

(David Vielo) No, no, just like that

thank you for not running away

it was a scary story

(Matt Walker) You're welcome. (David) Thank you.

What if I can't get my sleep back after being stuck in bed?

What should I do if I can't sleep at night, I'm constantly tossing and turning, or I work the night shift?

(Matt) You certainly can't get your sleep back.

Because sleep is not a bank

You can't pile up debt and hope you can pay it off someday.

I should also mention why it's so catastrophic and so rapidly debilitating. First, humans are the only creatures who intentionally lose sleep for no apparent reason.

(David) Because it's smart, isn't it?

Matt: So the thing is, nature has never had to face the challenge of sleep deprivation in its evolution.

And that's why there's no safety net, and that's why when you don't get enough sleep, your brain and your body crumble very quickly.

Anyway, I have no choice but to prioritize sleep

(David) Yeah, but what if you can't sleep?

(Matt) If you're still awake after you get in bed, get out of bed and go to another room and do something else.

Because the brain quickly recognizes the bedroom as a place to stay awake, so we need to break that link.

Only go to your bedroom when you're sleepy, so you can relearn those connections and recognize your bed as a place to sleep.

For example, you don't sit at the table and wait to be hungry, or you lie in bed and wait for sleep.

(David) Okay, I woke up.

That's excellent

(Matt) You're welcome. Thank you.

In 1952, Buckminster Fuller proposed a truly novel spatial principle for geoscopes.

A 200-foot diameter geodesic sphere was suspended above New York's East River, overlooking the United Nations Headquarters.

It was a grand idea, and one that Mr. Fuller felt could tell the truth and deeply influence the decision-making of this celestial body. The idea is to convey information about the Earth, about this sphere, such as Earth data/trends, through animation.

And now, 45 years later, we clearly need this clarity and perspective, but the technology is improving.

Today we don't need a million light bulbs to create this spherical display.

You can use light emitting diodes.

Light-emitting diodes are smaller, cheaper, and last longer than their predecessors.

And most importantly, it takes less time to emit light.

This speed is achieved by incorporating today's high performance microcontrollers, which in this work can actually simulate over 17000 light emitting diodes. And only 64 pieces.

This phenomenon is caused by afterimages.

But this wheel is spinning at about 1700 rpm, or 28 revolutions per second.

The Earth's rotation speed below the equator is actually about 60 miles per hour.

This sphere has four microcontrollers that pick up a position signal as it passes behind the display each time it rotates,

From that point on, an on-board microcontroller can estimate the wheel's position at all points during rotation, optionally displaying bitmap images and animations.

But this is just the beginning.

In addition to a high-resolution version of this display, my father and I are currently designing a new, patent-pending full volumetric display using the same phenomenon.

You can achieve this by rotating the LED around two axes.

Now, as you can see here, this is an 11 inch diameter circuit board.

The block here is the LED.

So you can see that when this disc rotates around this axis it creates a controllable disc of light.

It's nothing new. propeller clock. These are car rims that you can buy.

So what's new is that when you rotate this disk around this axis, the disk of light actually becomes a sphere of light.

And by manipulating this sphere with a microcontroller, a full volumetric 3D display can be created with just 256 LEDs.

While this work is still in the works and will be released in May, we have created a small demonstration piece. This is to demonstrate the geometric transformations where points become surfaces.

I'm going to show you a short video, but remember, it doesn't use any electrical controls, and it only uses 4 LEDs.

In fact, that's only about 1.5 percent of the final display, which will be announced in May.

Now, please take a look.

Now, you can see it rotating around the vertical axis only, drawing a circle.

Then, when the rotation about the other axis begins, the two axes merge to create a volume.

Due to the camera shutter speed, it doesn't actually look a little better this time.

This work will be announced in May.

It will be on display at the Spring Interactive Telecommunications Show in Greenwich Village, New York. The show is open to the public and we would like to invite you to join us. Great show.

Hundreds of students present their amazing work.

The work will be on display at the Sierra Saimulcast Lounge during intermission from now until the end of today's show.

I look forward to speaking with all of you there. Also, I would like you to come closer and take a good look at the work.

I am honored to be here today. Thank you for your attention.

(applause)

In 1995, a British medical journal published a startling study on a 29-year-old carpenter.

He accidentally stepped on a 15-centimeter long nail, which pierced his safety boot.

He was in so much pain that he couldn't stand the slightest movement.

But when the doctor took off his boots, he saw an astonishing sight: the nail hadn't even scratched his leg.

For hundreds of years, scientists have believed that pain is a direct response to injury.

The theory is that the more severe the injury, the more painful it will be.

But as we learned more about the science of pain, we realized that pain and tissue damage are not always directly related, even when the body's ability to signal threats is fully operational.

We can experience severe pain that is disproportionate to the depth of the actual wound, and we can even feel pain when there is no scar, such as the carpenter before us, or a well-reported example of a husband standing by a woman suffering from pain during pregnancy or childbirth.

what the hell is going on

This involves two phenomena: the experience of pain and the biological process of nociception.

Pain sensation is part of the nervous system's protective response to harmful or potentially harmful stimuli.

Sensors at specific synaptic terminals sense mechanical, thermal and chemical threats

If enough sensors are activated, an electrical signal rushes from the nerve to the spinal cord to the brain.

The brain perceives these signals as important and creates pain when it perceives the body as in need of protection.

Pain generally prevents the body from further injury or damage.

But there are many other factors besides pain sensation that can affect the experience of pain, but can be unnecessary pain.

The first is biological factors that amplify nociceptive signals to the brain.

Repeated responses from nerve fibers may cause the brain to become more sensitive and decide it needs to properly protect itself from threats.

It adds more stress sensors to the nerve fibers, and when they become so sensitive, even the slightest touch produces a strong electrical signal, like a spark.

In other cases, nerves adapt to send signals more efficiently, enhancing signal transmission.

This form of amplification is most common in people with "chronic pain," defined as lasting more than three months.

When the nervous system is signaled to go on high alert, pain prolongs physical injury.

This creates a vicious cycle of long-term pain that is more difficult to reverse.

Psychological factors also clearly influence pain, potentially stimulating pain sensations or acting directly on the brain.

A person's emotional state, memories, beliefs about pain, and expectations about treatment also influence how much pain they experience.

In one study, children who thought their pain was uncontrollable actually experienced more pain than those who thought their pain was controllable.

Surroundings also play a role.In one experiment, when participants applied a cold stick to the back of their hand, they felt more pain when exposed to red light than blue light, even though they were at the same temperature.

Finally, social factors, such as the availability of family support, can also affect pain perception.

All of this means that treating pain can benefit from a multidisciplinary approach, including pain specialists, physical therapists, psychotherapists, nurses, and other health care professionals.

We're just beginning to understand the mechanisms behind the experience of pain, but there are promising areas for future research.

Until recently, we thought that the glial cells that surround nerves were just structural support, but it was discovered that they play a crucial role in influencing pain sensation.

Studies have shown that disabling a brain circuit in the amygdala of rats reduces pain.

And genetic testing in people with a rare pain-insensitive disorder has pinpointed targets for drugs and possibly future gene therapy.

Hello

i'm not a real person

It's actually a copy of a real human.

I feel like a real person, but—

it's hard to explain

Wait, it looks like there was a real human—

let him go on stage

thx

(Applause) What you've seen is a CG human.

I'm wearing an inertial motion capture suit that captures my movements.

There's a camera right here, it's looking at my face, and it's using machine learning software to extract the expression, and it's transferring it to this person, like this.

He's "Desi Doug"

It's a 3D character that I'm manipulating in real time.

i work in visual effects

The hardest part of visual effects is creating a CG human that the viewer perceives as a real human.

humans to recognize other humans

surprisingly long

That's good because I like challenges

For the last 15 years, we've been creating believable people and creatures on film.

If that character is happy, everyone feels happy

If you're in pain, those who see it will feel the same way—

I've gotten pretty good at it

it's really hard

It takes hundreds of great artists and thousands of hours of work to produce that effect.

but things have changed

In the last five years or so, computers and graphics cards have gotten incredibly fast.

And then came machine learning — deep learning.

So I thought, can't we make a realistic CG character, like something you see in a movie, reflect the emotions and facial details of the person controlling it in real time?

That's the goal. Can you make it real enough that if Desi Doug is having a one-on-one conversation with you and he's lying, you'll know he's lying?

I came here with the goal

I started working on it a year and a half ago.

I'm going to show you what I had to do to get to where I am now.

We had to capture huge amounts of data

In fact, it ended up being the largest collection of facial data on the planet.

—You mean my face?

(laughs) Why me?

I will do anything for science

please look

how is it

The first thing I did was see what my face looked like—

It's not just one photo or a 3D scan, it's about capturing what it looks like in any photo, how light interacts with the skin.

Luckily, we have ICT near our studio in Los Angeles.

It's a research facility at the University of Southern California.

There's a device called a "light stage."

It has millions of individually controlled lights and millions of cameras.

This allows me to recreate my face under different lighting conditions.

It even captures the flow of blood to understand how different facial expressions change the face.

This gave me a stunning model of my face.

It's so detailed that I want you to pardon me.

(Laughter) I can see every single pore and wrinkle.

but i need it

Reality comes from those details.

It won't work without it

not finished yet

Now I have a face model that looks like me.

But you don't move like I do

That's where machine learning comes in.

Machine learning requires huge amounts of data

So I sat down in front of a high-definition motion capture device,

We also did motion capture using traditional markers.

I created a huge set of images of my face and a moving point cloud representing the shape of my face.

I made a lot of different facial expressions and said a variety of lines with a variety of emotions.

I had to do a lot of captchas

And once you have that huge amount of data, you can use it to train a deep neural network.

Once that was done, the neural network was able to look at my face and figure out everything in 16 milliseconds.

You can calculate facial expressions, wrinkles, blood flow, even the movement of eyelashes.

And then we render it and display it using the detail data we captured earlier.

not finished yet

is under development

This is the first time I've shown it outside the company.

It doesn't look very convincing either. There's a cable behind it, and there's a 1/6th of a second delay between capturing and displaying the footage.

It's very fast for what you're doing.

I still get an echo

machine learning is new to us

It can get weird

(Laughter) But why are we doing this?

there are two reasons

First, because I'm super cool

(Laughter) How cool is that?

You can change the character of the speaker with a single button

Introducing Elbow

It's a character I made to see if a different look would work.

The beauty of this technology is that even if I change characters, it's still me who's playing.

I have a habit of speaking with the right side of my mouth, and so does my elbow.

(Laughter) The second reason I'm doing this is, you guessed it, for movies.

This is a great tool for artists, directors and storytellers.

it goes without saying

it will be very helpful

After making it, it became clear that this wasn't just a movie.

but wait

I changed my appearance with the push of a button

I'm sure you've all heard of this, isn't it like a "deepfake" or a face swap?

surely

In fact, we're also using techniques similar to deepfakes.

Whereas deepfakes use two-dimensional images, this one is fully three-dimensional, and much more powerful.

is related

I can almost hear you screaming in your head, "Oh my god!

I thought the footage was trustworthy

If it's a live video, shouldn't it be real? ”

not necessarily

Even without this kind of technology, you can show something different from what's actually happening by using some simple tricks on how to shoot.

I've been doing visual effects for years, and I know that if you put enough effort into it, you can fool anyone about anything.

This technology, deepfakes, just made the manipulation of footage easy and accessible to everyone, in the same way that Photoshop made photo editing easy.

I'd rather think about how this could bring new technology to humanity and bring people together.

think about the possibility of this

You're going to see these things very soon at live events and concerts.

Coupled with new projection technology, virtual celebrities will become living beings, not just in movies, but in real time.

A new form of communication is born

You can already interact with Desi Dug in VR.

it's an amazing experience

It feels like you're in the same room, even though you're so far away.

The next time you make a video call, you may be able to choose who you want to show to the other person.

It's like really good makeup.

I did my scan a year and a half ago.

i'm getting old

i don't take desi dug

On a video call, I can stay young forever.

Imagine this being used as a virtual assistant with a face and a body.

very human

I like that the virtual assistant answers in a calm, human-like voice.

It will also have a face

Having nonverbal cues makes communication a lot easier.

I think it's great

When your virtual assistant is busy or confused or worried about something, you can tell —

You can't walk off the stage without showing your true face, so that you can make a comparison—

let's take cover

oh don't worry it's not as bad as it looks

(Laughter) This is the current technology.

turn your head

(laughs) Gacha!

this is the current technology

Whether it's a human or a machine operating it, it won't be long before we'll be interacting with CG humans that look amazingly realistic.

Like any new technology of our time, there are serious and real concerns that need to be addressed.

But I'm so excited that something that has always been a science fiction story since I was a kid is about to become a reality.

Talking to a computer became talking to a friend

Talking to friends far away feels like being in the same room together.

thank you

(applause)

On a cold January day in 2005, I took the most important drive of my life.

I was looking for an old factory on the road in upstate New York.

The leaflet I received the day before said, "We sell a fully-equipped yogurt factory."

i threw it in the trash

I picked it up after 20 minutes and tried calling.

It was an 85-year-old factory that was going to shut down.

so i decided to go see

At that point, I didn't know where the road or my life was leading.

I ran a little cheese shop, but I hated the business.

But there was something nostalgic about the hills and roads and smells there.

I grew up in a similar place near the mountains of Turkey.

My family makes cheese and yogurt, and I grew up hearing stories about shepherds.

We weren't rich, but we had the moon and the stars, we had simple food, we had company.

I ended up coming to America

I didn't know New York had a farm.

I came to the northern part of the state and have lived there all my life.

i lost my way

You've passed a "dead end" sign

There was a factory just ahead of it There was a factory just ahead of it There was a factory just ahead of it

first noticed the smell

It smells like a milk can left in the sun.

The walls were so thick, the paint was peeling off, there were cracks all over the place.

They thought it was a very old factory and worthless.

I couldn't believe the price because I thought I forgot to add a zero.

Once inside, things stopped paying attention.

I could only see people

there were 55 people there

it was very quiet

Their job was to dismantle the factory and shut it down permanently.

I met a production manager named Rich.

bought a guide and came out

I didn't say much, but there were stories all over the place.

Rich worked at that factory for 20 years.

Before him, his father made yogurt, and before that, his grandfather made cream cheese.

I could see how he felt guilty about the factories closing down on his behalf.

The thing that struck me the most at that time was that it wasn't just an old factory.

it's a time machine

It's a place where people built their lives, went off to war, and boasted of home runs and report cards.

it was about to be closed now

It wasn't just the yogurt that the company abandoned, it was the people.

As if to say it's not good enough

I was impressed with their resolute attitude

No anger, no tears

just be quiet

I was organizing the factory with a dignified attitude.

I got angry with the CEO, and he was in some distant building or something, and he was looking at a spreadsheet, and he was shutting down the factory.

Spreadsheets are lazy

Doesn't say anything about people or communities

Unfortunately, too many decisions are made that way in modern business.

What I saw then changed me forever.

When I got home, I called my lawyer, Mario, and said,

"I want to buy that factory."

Mario said, "The world's largest food company is shutting down its factory and exiting the yogurt business.

do you think you can do it ”

I said, "Well, sure."

But the next day I called again, "Mario, I really want that factory."

He said "Hamdi you don't have money"

(Laughs) "I haven't paid half a year either."

(Laughter) That's right.

(Laughter) Borrow money from all over the place.

I got the keys to the factory in August of 2005.

The first thing I did was hire four of the 55 people working there.

Maria, Director of Operations

Frank in charge of wastewater

maintenance manager mike

And this is Rich from the manufacturing department who showed us around the factory.

held its first board meeting

Mike asked, "What do you want to do first?"

They look at me like I have some magic answer

So I said, "Yeah, let's go to the hardware store and get some paint.

If you don't paint the walls

Mike looks unconvinced

looked at me and said

"That's fine, I'll do it, but do you have more ideas?"

(Laughter) I said yes

"Let's make the walls white"

(Laughter) To be honest, that was all I had in mind.

(Laughter) I painted the walls that summer.

I sometimes wonder what they would have said if I had said, "Look at the walls I'm painting.

In two years, we'll be sending out yogurt like no other American has ever seen or eaten.

Tasty and natural

The name is 'Chobani', which means shepherd in Turkish."

Or what if I say "I'm going to bring back all those 55 employees and hire them.

Then 100 more, then 100 more, then 1000 more."

Or what if I say "You can see that town

10 local jobs for each person we hire

The town will come to life and the trucks will roam the streets

Let's use our first money to build the best little league ballpark for our kids.

Five years later, it's the number one Greek yogurt brand in America."

Would they believe me?

you wouldn't believe

But that's what actually happened

(Applause) We got to know each other better while we were painting.

learned to trust each other

And we solved it together.

Not a single person quit the factory in five years.

I worked day and night and holidays to repair the factory.

The best thing about Chobani is that the very people who were abandoned are creating something 100 times better than before.

and they all have part of the company

(Applause) And all the while, I was wondering, I'm not a businessman by nature, and I was wondering what it was all about.

America's economy is all about profit.

Mainstream business says it's all about money

CEO tactics say it's all about shareholders

So many things have been sacrificed for that -- our factories, our communities, our jobs --

CEO is different

CEO is imposing on employees

And CEO salaries are only going up.

many people are left behind

I've come to say I've had enough I've come to say I've had enough

that's not right

It's time to admit that the tactics that companies and CEOs have followed for the last 40 years are no longer the tactics that companies and CEOs have followed for the last 40 years.

(Applause) It says something about business, but it doesn't say how to be a dignified leader.

We need new tactics

look at people

like seeing more than profit

In the world of cinema, there's a term for people who go out of their way to do the right thing.

"anti-hero"

I think we need the same mindset in business.

We need “anti-CEO” and “anti-CEO tactics”

Let me tell you what anti-CEO tactics are.

Gratitude is important there

Business books now say that the purpose of a company's existence is to maximize shareholder value.

It's the dumbest idea I've ever heard

(Laughter) Companies should put their employees first.

(Applause) A few years ago, when I said I was going to give stock to all 2,000 employees, some people said it was just PR, some people said it was a gift.

not a gift

I've been inside and I've been watching

It's something they've won with their talent and hard work, and I don't think there's any other way.

The new way of doing business is to care about employees first

not profit

Anti-CEO tactics focus on community

Today, companies ask their communities, "What tax benefits and incentives are they going to give us?"

Companies should go to communities in distress and ask, "Is there anything we can do?"

(Applause) When I wanted to build a second yogurt factory, Idaho was the place no one thought of.

Too rural Too far No incentives

so i decided to go

met locals and farmers

We shook hands and ate together.

And I thought, "I want to build here."

No need to look at economic analysis

The result is — the community is thriving

a new school opens every year

Every year new food companies enter the market.

They said, "You can't find trained workers here." They said, "You can't find trained workers here."

I replied, "Okay, I'll teach you."

Working with a local community college, we taught hundreds of people advanced manufacturing techniques while building factories.

That factory became the largest yogurt factory in the world.

(Applause) The new way of doing business is community.

Find a community that you can be a part of

ask for permission

open the door and thrive with the community

Anti-CEO Tactics Focus on Responsibility

Current tactics say companies should stay away from politics.

The reality is that companies need to demonstrate their civic status The reality is that businesses need to demonstrate their civic status

As my business grew in New York and I was trying to hire more people, I remembered that in Utica, about an hour away, there were immigrants from Southeast Asia and Africa looking for work.

"I don't speak English," someone said.

"Even I can't do much. Let's call an interpreter."

(Laughter) "They don't have transportation."

"Let's get the bus ready. It's not a difficult story."

Now, in the middle of nowhere in America, 30 percent of the people who work in Chobani are immigrants and refugees.

(Applause) (Cheers) It changed us for the better.

In the new way of doing business, companies, not governments, are best positioned to change the world today, whether it's gun violence, climate change, income inequality, refugees, race.

Companies need to take a stand

(Applause) Finally, anti-CEO tactics emphasize accountability.

The current tactic is that the CEO reports to the board of directors.

In my opinion, the CEO is the one who reports to the consumer.

In Chobani's first few years, the toll-free number on the yogurt cup was my personal phone number.

(Laughter) When someone called me or wrote me a letter, I responded personally.

After hearing that, I changed a lot because consumers have power.

Consumers are the reason companies exist

Each and every one of you has the power to make a difference.

If you don't like what a brand or company is doing, if you don't like what a brand or company is doing, you can throw it in the trash.

When companies are doing good things, we can reward them.

In the end it's everyone's responsibility

The new way of doing business reports to the consumer, not to the board of directors.

So if you treat your people right, if you treat your community right, if you build your product right, you'll be profitable, you'll be innovative, you'll have passionate people coming to work, and your community will support you.

That's the whole point of anti-CEO tactics.

The treasures that I found in that factory -- dignity at work, individuality, the human spirit -- we need to unleash it around the world.

Ladies and gentlemen, there are people and places around the world that are marginalized and marginalized.

But those people still have strong spirits.

We just need another chance, a chance to make something better than the original, not the same.

That's the difference between the return on investment and the return on compassion. That's the difference between the return on investment and the return on compassion.

It's the difference between profit and real wealth It's the difference between profit and real wealth

If it happens in upstate New York or small town Idaho, if it happens in upstate New York or small town Idaho, it can happen in any city or town or village in the world.

It's not time to build walls, it's time to start painting walls.

I'll leave it up to you to decide what colors to paint.

thank you

(applause)

When you see sea lions basking on rocks or trotting on the beach, you'll see these immobile mammals not as sea lions, but as "sea cats."

But don't let the sight of sea lions on the beach fool you.

When you go under the waves, the sea lions hunt very patiently.

Capable of sprinting at speeds of 6 to 30 kilometers per hour and hunting for up to 30 hours at a time, these majestic mammals are truly "sea lions."

My body adapted and adjusted over a million years to become a resourceful hunter.

For their favorite food, sea lions dive and hunt much deeper than other semi-aquatic animals.

Like some species that dive to nearly 400 meters, they can cope with increasing water pressure by folding their flexible ribs and compressing their elastic pair of lungs.

As oxygen leaves the lungs, the rings of cartilage collapse, pushing air into the narrow trachea and filling the wider upper trachea.

When you rise to the surface, this air is used to reinflate your lungs, but until then your pulse slows down to conserve oxygen.

Blood flow is diverted only to the most important organs, such as the heart, lungs and brain, which depend on oxygen stored in blood and muscles.

Once on the hunting grounds, sea lions use their excellent eyesight to search for prey.

Most mammalian eyes have a structure called the crystalline lens, which is transparent and convex and refracts light so that we can see.

In humans, the crystalline lens is curved to capture light as it travels through the air.

But sea lions must have the best possible vision in hundreds of meters of water.

To achieve this, the eye has a rounder lens that refracts light underwater and a teardrop-shaped pupil that can open up to 25 times its original size.

This lets in as much light as possible to pinpoint prey even in very dim environments.

But when it's completely out of sight, it catches prey with something like a sixth sense.

A sea lion's whiskers, or whiskers, are made of keratin and are packed with nerve fibers that extend into the connective tissue of the face.

Sea lions can freely control the direction of their whiskers, and they can lie along their faces or stand upright at right angles.

When properly adjusted, whiskers can detect micro-movements in the water when fish move.

It's so accurate that a blind sea lion can tell the difference between objects that are less than two centimeters apart.

In this way, healthy sea lions can catch large numbers of fish like sardines, mackerel and squid every time they go fishing.

And he has a very extraordinary memory, and he can remember multiple hunting grounds, even those he hasn't visited in decades.

They remember their breeding territories, where they calve, and which seals in their neighborhood are friends or foes.

And there's even evidence that they remember tasks they haven't done in 10 years, and that makes it easier to get to places they used to hang out.

Even with this amazing ability to adapt, sea lions are undergoing rapid environmental changes in their habitat that they cannot cope with.

A poisonous algae is flourishing as the ocean warms due to climate change.

This algae is harmless to fish that eat it directly, but to the sea lions that eat it, the algae's domoic acid causes seizures and brain damage.

Changes in the ocean environment have allowed this algae to grow year-round, and more sea lions are washing up on beaches.

This tragic discovery is just one of many ways to better understand our oceans by learning about the health of aquatic fauna.

Red flags like these help us take action to protect ourselves and other marine mammals.

And the more we learn about the changing oceans that sea lions live in, the more tools we have to help these clever animals thrive.

This is Aunt Zipp from Sodom, North Carolina.

At this time she was 105 years old

Her words always made me think.

(Laughter) He also said, "Take care of your friends."

"If you don't have friends, you're a stranger"

(Laughter) This is her song.

Sing along when you get on

Michael Manlin plays bass

a big round of applause

(Applause) 1 2 3 4

(music) My lover is a black-eyed daisy I think I'll go mad if I don't see you

I live upriver, I'll see her soon

Hey, hey, black-eyed Susie Hey, hey, black-eyed Susie

Hey, hey, black-eyed Susie Hey!

Aunt Zipp of Sodom is 105 years old

I learned this old song from her

I can't sing too much anymore, and I can't play an instrument

pulled her out onto the porch of the house

In the distance her grandson was plowing a tobacco field on a donkey.

I also saw a toilet hut

She's old and weak So I sing "hey hey" and she sings "black-eyed Susie"

Hey, hey, black-eyed Susie Hey, hey, black-eyed Susie

Hey, hey, black-eyed Susie Hey!

went picking blackberries

I got angry when I ate a snack

A duck in the pond A goose in the sea Cute girl is a little mean

Hey, hey, black-eyed Susie Hey, hey, black-eyed Susie

Hey, hey, black-eyed Susie Hey!

it's a banjo

I'm getting married on Thanksgiving

I'm lazy, she works

She making blackjack and me making gravy I want to eat chicken someday

Hey, hey, hey, hey, hey, black-eyed Susie Hey!

once again

Hey, hey, black-eyed Susie Hey, hey, black-eyed Susie

Hey, hey, black-eyed Susie Hey!

(Applause) Thank you, Michael.

this is ralph stanley

I was a student at the University of California, Santa Barbara, majoring in biology and art.

I think it was 1968 and he came to campus.

They played some bluegrass music But at the end of the concert they did some old-fashioned banjo picking That came from Africa with the banjo

It is said that he learned from his mother and grandmother a method of playing called clawhammer.

i fell in love

I asked him where he could learn

And he said, "My hometown of Clinch Mountain -- Asheville, North Carolina -- or Mount Airy, where the music thrives.

There are a lot of old people who play the same music as they used to," he said.

I went there in the summer of that year

I fell in love with the culture and people there.

Then I went back to college and graduated, and then I told my parents I was going to be a banjo player.

You can imagine how happy I was

I want you to see the picture.They are my masters.

I think I know just a little bit about what kind of people they are.

Let's play the banjo too, we'll play a medley

(Music) (Applause) The last few are Ray Hicks, who passed away last year.

He was a representative of American folktales.

The way he speaks, it's hard to hear, but his old stories were wonderful.

He lived in this house, built by his great-grandfather.

It's a house with no running water or electricity.

If you want more photos

Check out my website, there are lots of pictures of people I couldn't introduce.

I also have a picture of this instrument. This is a mouse bow.

I think it's the first stringed instrument in the world.It's still played in the mountains of the South.

In the old days, people didn't use guitar strings.

I put cat intestines on a stick

It's a nuisance for cats, but we've created a wonderful instrument.

This kind of tone

(music) Did you hear everyone talking happily? The Heroic Story of the Johnson Brothers

You're Kate I'm Sal Get the Johnson sisters

You're Kate I'm Sal Get the Johnson sisters

Together we made a name for ourselves in the rebel army.

When Union soldiers saw them, they put down their pistols and hid.

You're Kate I'm Sal Get the Johnson sisters

You're Kate I'm Sal Get the Johnson sisters

Sounds good, right?

(Applause) I think it was 1954.

I spent my childhood driving around the suburbs of Gatesville, Texas.

I was on my way home from shopping

My mom was driving me and my brother in the back seat

We were mad at our mother, out the window

Thousands of acres of cotton fields stretched out

On the way home from the grocery store, I was mad that they didn't buy me some ovaltine.I wanted a free Captain Midnight.

so we were very angry

My mother is stubborn, too. Take it easy!

Do you know how hard it is to make money? Daddy works hard

Even though I've never worked, I thought I could get anything

I'm really pissed off because I'll have you work for the summer vacation."

She suddenly stopped the car and said, "Get off!"

my brother and i got out of the car

Thousands of acres of cotton fields stretched before me

100 blacks were picking cotton

Mother grabbed us by the shoulders and went into the field

I went to the foreman and she said, "These kids have never worked."

That's right, 8 and 10 years old

(Laughter) She said, "Will you let me work?"

The foreman must have been surprised to see middle-class white kids working in the cotton fields, and it's hot in Texas in August.

He handed us a bag, it's three meters long, it's such a big bag.

Cotton is soft, but the outer shell is full of thorns.

If you don't know how to pick it, it will be full of blood in no time.

My brother and I started picking, my hands were bleeding and I said, "Mommy!"

But she was sitting like this by the car

didn't move

I guess the foreman thought it couldn't be helped

He quietly approached behind us and began to sing in a low voice

Heaven has long white robes

I don't want to be left behind

Heaven has long white robes

I don't want to be left behind

Then the people around them started singing along too Gospel Gospel A carriage is coming

Good news, the carriage is coming

Good news, the carriage is coming

I don't want to be left behind

It was the first time I heard such a song It was really great

We kept picking cotton Without complaining We didn't cry They sang songs like "Oh, Mary, don't you weep, don't you moan" and "Wade in the water" - "I done done" and "This little light of mine"

We worked till the end, but we only picked a quarter of the bag

But the foreman gave me a check for a dollar, and he wouldn't let me cash it.

I'm 57 and I still have my checks

my mother tried to teach me the value of work

But if you have kids, you'll know it doesn't work out that way.

But if you have kids, you'll know it doesn't work out that way.

What I felt strongly that day was that I never wanted to do such a difficult job again.

(Laughter) And so it happened.

But I learned that there are people in this world who work so hard every day But I learned that there are people in this world who work so hard every day

And I've learned that a great song can make the hard work easier.

It is the power of song that connects people's hearts.

I was only eight when I was pulled out of the cotton fields in Texas that hot summer day

I never cared about music

But that day when I worked in the cotton fields I heard them sing I felt I was in the middle of real music I wanted to be there forever

Sing along to this old song When I sing Heaven has long white robes

Sing that you don't want to be left behind

Heaven has long white robes

I don't want to be left behind

Gospel, gospel, the carriage is coming

Good news, the carriage is coming

Good news, the carriage is coming

I don't want to be left behind. It looks like you haven't picked cotton in a while!

let's do it again

heaven has a crown of stars

I don't want to be left behind

heaven has a crown of stars

I don't want to be left behind

Good news, the carriage is coming

Good news, the carriage is coming

Good news, the carriage is coming

I don't want to be left behind

I remembered this time a few years ago and spoke at a concert.

my mother was in the audience

I was happy that my story came up, but after the concert, I said, 'David, I have something to say.

that was planned

I asked the foreman and the landlord

I wanted you to know the value of labor

I didn't expect you to fall in love with music."

Good news, the carriage is coming

Good news, the carriage is coming

Good news, the carriage is coming

I don't want to be left behind

(Applause) This is a steel guitar, an instrument made in America.

It was invented by the Dopiera brothers, and they later made the wooden-bodied Doblo, a guitar with a metal soundboard.

I put it on my knee and play it

It was made in the 1920s for Hawaiian performances, and they were trying to make it louder, because there were no electrics in those days.

Then people of African descent thought about using bottlenecks, like this, good for expensive wines.

The wine I drank yesterday was perfect

Put it on your finger and slide it to play

This instrument saved my life

Fourteen years ago, I think, I lost my daughter, Sarah Jane, in a car accident.

That's when I learned about happiness The bitter sadness taught me I was standing on the edge of rock bottom I just wanted to dive in

That's why I thought about why I should live hard and wrote it down

I had to sit down and work 'cause I was going to say goodbye to this world

Of course, it was Jenny, her son Zeb, and her parents who wrote it first, and I didn't want to hurt them.

I thought about other things, it's a simple thing

I had my own radio show and a show called "Riverwalk," but it didn't matter, I didn't want the fame or the money.

I didn't need anything

I've also written Daffodils blooming in spring The smell of freshly cut straw Body surfing on waves The feel of a baby's hand The sound of Doc Watson's guitar Old records of Muddy Waters and Uncle Dave Macon

And the tone of the steel guitar I just got a steel guitar

I didn't know how to play it, I just played a sad tone with all my might

I've played many instruments, but this one was the only one that I could connect with.

A song born from that experience

(music) Are you in trouble?

it's hard

If you want to talk, I'll listen

But I always do this

Break the neck of the bottle and play the steel guitar

Some say forget it

it's easy to say

They don't know the sorrow that makes their bodies stop moving

Sometimes it's better to be in the depths of sorrow But try humming the steel guitar blues

You can hoard things inside yourself With alcohol and drugs and cigarettes But you can't be who you want to be

Steel guitar blues works

If you listen to this, please call me again tomorrow morning.

open your heart

(Applause) There's still time, let's talk about the inventor's father.

I moved to California in 1957, the year Sputnik was launched.

My father was working on gyroscopes, and he had several such patents.

Michael and John lived in the house across the street.

He's the same age as me

Then John and Michael got involved in developing computer animation.

Michael's father did computer research.

It was 1957. I was just a 10-year-old kid.

I thought I was going to wear big pants!

(Laughter) There's still time. Let's talk about Christmas that year.

I wanted to be an inventor like my father, and so was Michael.

His great-grandfather is Eli Whitney, who invented the cotton gin.

It's a commercial lab set It's a commercial lab set

It had three amazing chemicals in it: sulfur, potassium nitrate, and charcoal.

I was only 10 years old, but I knew you could make gunpowder with it.

I made a small amount of gunpowder and put it on the road in front of my house and lit it with a match and it went up in flames and it was awesome.

Of course, next we made a cannon.

Michael's garage had it all, and we put lids on the pipes, drilled holes in the pipes, pulled out the fireworks fuses, tied them together, put them in the holes, filled the pipes with gunpowder, put three iron balls in the garage.

(Laughter) I wasn't stupid because I put the plywood 1.5 meters in front.

We split and lit the ball that popped through the veneer like paper

across the garage

Hit the new Citroen door

(Laughter) We quickly cleaned it up and buried it in the backyard.

It happened at Palisades on the Pacific side, and it must still be buried there.

My brother heard about gunpowder

My brother and his friends were all older brats

I said I'd beat you up if you didn't make gunpowder.

we asked what it was used for

Said to melt it into rocket fuel

(laughs) I'll make a lot of them!

(Laughter) So I made a lot of gunpowder when I just moved to California.

The kitchen had just been remodeled, and the mother was away.

It was Chris Berquist's job to melt the gunpowder.

Michael and I were standing in the corner of the kitchen

"It's melting, it's melting, the sulfur is melting, it's okay."

That's when Chris said

The flames rose and he turned around and was like this

Burning hair and eyelashes

The kitchen cabinets were in tatters and black smoke was billowing

When his mother returned home, he took away the experimental tools and never saw them again.

But I often remembered that every time my mother made gratin, it tasted just like gunpowder.

I love to invent, let me show you something I invented a long time ago

In the early days of drum machines, I wondered, how could we recreate the old humbone rhythms with modern technology?

this is thunderware

Back then, drum triggers were still rare.

So I sewed 12 triggers onto this suit.

I introduced you to the humbone rhythm yesterday, I'll give it a try

There are triggers in various places

It hurts if you don't remove this

A drum trigger is connected to a drum machine with this tail.It makes various sounds like a drum.

Play it all together You can change the sound Step on this pedal Finally - I want to finish with a humbone

Thanks guys

(applause)

First of all, I would like to ask a question to all of you here. Please think about the following question for a moment.

what do you think is the most beautiful

It's not about the world of butterflies and flowers, it's about people.

What do you find most attractive about people?

is that an eye?

do you like cute eyes?

Do you have blue eyes?

curly hair?

long nails?

big feet? Some people like it

Where do we find people attractive?

I think the way we think about beauty is influenced by things like social media, the internet, magazines, if it's model-influenced.

I think it's a kind of "beauty as defined today."

Personally, I feel that beauty is in all things.

Some people may say that big feet aren't cute, but there are shoes that look better on me, a size 9, than a size 6.

That's why I believe that beauty exists in everything.

For example, I love your dreadlocks!

great

Thalia, how gorgeous your hair is!

I want to have voluminous hair like that too

Your shiny head is also wonderful

The brilliance is perfect!

As you can see, I believe beauty is in everything.

Of course, "beauty is in everything" is a transcendent cliché.

Beauty in everything-

I don't think everyone believes there's beauty in everything, but I think it's because of my childhood that I believe so.

I'm in the spotlight of millions of people around the world for one thing.

It's my skin, as you probably know, and it's a disease called vitiligo.

Vitiligo is basically when your immune system senses your own melanin, which is what gives your skin its color, but your immune system sees your melanin as a disease similar to the common cold and attacks it, resulting in white skin.

I stood out because of this skin

bullied

was alienated

Even those who didn't mean to keep me away-

For example, if I wanted to take a family photo like everyone else, my mother would bring the foundation, and it was hers.

My mother's skin is much darker than mine.

Can you imagine having a black face and brown or white elsewhere?

Frankly, it was uncomfortable, but my mother tried not to offend me.

i was alienated

At school, I changed schools around the second or third grade, and when I moved schools, it was already hard to make friends, especially at such a young age -- but I was lucky enough to find two girls to hang out with.

They didn't know who I was, but they wanted to play with me, and they wanted to know if I was cool.

I moved to that school and made some friends, and then a few weeks later, all of a sudden, my friends left.

I was a little confused as to why it was so hard to make friends.

Where did you go when you finally made friends?

They were avoiding me at recess and lunchtime, and one day I approached them and said, "Hey, what happened? Why aren't you talking to me?"

They said to me, "Sorry, I can't talk to you anymore.

Your parents say you might get sick."

Can you imagine how a 2nd or 3rd grader must have felt?

hurt

I was alienated and frankly confused

As a 2nd and 3rd year student, I didn't know anything about skin.

It's not like I got this skin because you asked me what I like

I didn't ask you to do this, but I was alienated because of this.

But here's the thing, when I got a little older, I hated the position I was in, the bullying.

What would I do if I stepped away from that position?

I became the bully

It's not a good idea to go either side.

Having experienced both sides, I can say -

I didn't want to be bullied anymore, and I stood in front of the kids who were bullying me there, and I thought, "This is good. If we all stay here, we won't be bullied, and I don't want to be over there."

That's why I'm sure it's good to be on the side of bullying."

I decided to be "this side"

determine the target of bullying

He said, "You have ugly hair!"

"Well, who did you get it from?"

"What if it's all right?"

But then I realized that I was trying to force myself into a "type" that didn't fit me.

Who says you have to fit into a mold anyway?

You can make your own mold

So I decided to move away from the "other side" and move away from the "this side" and create a "my side" and fit myself into the "new mold" --

That "type" is the cliché, "feeling that beauty is in everything."

Put this idea in your head, understand that beauty is in everything, and apply that to people.

You don't have to be one side or the other side, and you don't have to try to fit yourself into someone else's "type" or your mother's "type."

be yourself

Find out what beauty means to you, rather than looking at magazines and following my opinion.

Understand it with your own heart, know your own type of beauty

(applause)

When you think of a child, a close friend, or a romantic partner, the word "affection" probably springs to mind, and soon many other emotions come to mind, including joy, hope, excitement, trust, security, and sometimes sadness and disappointment.

There may be no words that connect more closely than the word "affection".

Isn't it interesting that something so important in our lives hasn't been explicitly taught how to love?

I think we'll find out as we develop friendships, fall in love when we're young, eventually get married, and bring our kids home from the hospital.

But in reality, they can hurt and treat their loved ones badly.

It might be the little things, like guilt-ridden dating friends, spying on your partner's phone, or blaming your kids for doing poorly in school.

All of us are subject to acts of unhealthy affection, and all of us do unhealthy things.

It's also because of humanity

At worst, the hurt we inflict on our loved ones takes the form of abuse and violence, and one in three women and one in four men will experience relationship abuse in their lifetime.

Like most people, when you hear these statistics, you think, "No, no, it's none of my business."

It's an instinctive reaction to avoid the words "abuse" and "violence" and think of it as something that happens to someone somewhere.

But the truth is, unhealthy relationships are just around the corner.

I just don't think so and don't make the connection.

Abuse creeps up on us in the form of unhealthy love.

The organization I work for, One Love, was started by a family member whose daughter, Yardley, was murdered by an ex-boyfriend.

It was a tragedy that no one expected. But looking back, there were red flags.

Calling him crazy, passionate, or over-drinking, his ex-boyfriend's behavior went unnoticed, even though it was a clear red flag.

The bereaved family wondered if someone knew about these red flags and could have prevented their daughter's death.

Our current mission is to spread information that Yardley and friends didn't know.

We have three main goals: to equip everyone with the language to talk about things that are hard to talk about and hard to talk about, to empower our friends on the front lines to reach out, and to develop the ability to love better.

To do this, it's important to start by uncovering unhealthy red flags that are easy to miss. We focus on creating content that inspires dialogue with young people.

Most of our content is pretty serious because it's all about the topic. Today, I'm going to show you a thought-provoking but relatively light-hearted couplet, "Couple Couplets," which gives you five signs of unhealthy love.

The first is "enthusiastic"

(Video) Blue: I missed you the last few days.

Orange: I missed you too (#healthy) Blue: It's been 5 minutes, it's been too long

What were you doing for five minutes without me?

Orange: Three minutes (#unhealthy) (Katie Hood) Do you understand? i understand

Abusive Relationships Are Not From The Beginning

It's exciting and exciting at first.

Passionate love and emotions run around

seems great

You'll feel lucky, like you've found treasure.

In unhealthy love, this feeling gradually changes, and excitement becomes an overwhelming burden, even suffocating.

It's intuitive

Your new boyfriend says "I love you" faster than you can feel it, or you follow him everywhere and get bombarded with texts and phone calls.

Even though they know you have other plans for the day, your late reply can irritate them.

It's not how relationships start that matters, but how they change.

It's important to pay attention to your feelings early in a relationship.

At the pace of intimacy Is it unreasonable?

Do you have time to catch your breath?

And it's also very important that you start practicing to be able to say what you want in your own words.

Does the other person respect your request?

The second sign is isolation

(Video) Orange 2: See you later

Orange 1: Monday is the day I spend with my boyfriend (#healthy)

Orange 2: See you later

Orange 1: Monday is the day I spend with my boyfriend

Orange 2: What about tomorrow? Orange 1: I can't do it on Tuesday

Orange 2: Wednesday? Orange 1: Muri (#unhealthy)

CA: Isolation is one of the most overlooked and misunderstood signs of unhealthy love.

why?

A new relationship is accompanied by an intense desire to be together at all times, so it's hard to notice the change.

Isolation creeps in when a new lover tries to pull you away from the support of friends, family, and others around you, trying to tie you to yourself.

They might say things like, "Why are you dating these guys? They're crap." They might belittle your best friend.

Isolation sows the seeds of suspicion against everyone you know even before you date.

Healthy love is about independence, where you like to spend time together, but you also stay connected to the people and activities you hold dear.

In the beginning, they may spend all their time together, but over time, independence becomes important.

Make plans to spend time with friends, don't cancel them, and encourage them to do the same.

The third sign of unhealthy love is extreme jealousy.

(Video) Blue 2: Did something good happen?

Blue 1: She followed me on Instagram! (#healthy)

Blue 2: What are you so worried about?

Blue 1: She follows me everywhere

(#unhealthy) (Katie) After the initial euphoria, it can lead to extreme jealousy.

Partners become so restrictive that they want to know where and who they're with all the time, and they start to follow them both online and in real life.

With extreme jealousy comes a desire for control and mistrust, often accusing someone of cheating on them, or saying, "I love you the only one, so don't worry," but they don't listen.

Jealousy is part of any relationship, but extreme jealousy is different.

threatening, desperate and angry

that's not love

The fourth is to "disrespect"

(Video) Blue: No play? Orange: I have to study

Blue: I'm sure you'll get good grades (#healthy) Blue: Shall we play? Orange: I have to study

Blue: You're a failure anyway. You can only get bad grades! (#Unhealthy) (Katie) What do you think?

Unhealthy love involves verbal violence

Conversations that were once fun and lighthearted become mean and embarrassing.

They make fun of you in hurtful ways or make jokes about you.

When I tried to explain that it hurt my feelings, they dismissed me as exaggerating.

"You're nervous." "Whatever you say." "Stop it."

These words silence me

It's a no-brainer, but your partner should be your ally.

You should support, but not overwhelm

should be confidential and honest

Give me confidence, but don't let me lose it

The last fifth is "violence."

(Video) Orange 1: It would be sad if we broke up

Orange 2: I think so too (#Healthy) Orange 1: I'll be really depressed if we break up

I'm going to throw myself down the stairs

It's True! It's no use stopping it!

(#Unhealthy) (Katie) Frequent break-ups and reunions, and intense emotional ups and downs, can lead to heightened tension and increased volatility.

After a tearful quarrel, we'll have an emotional make-up. We'll say things like, "You suck, you don't even know why we're together!"

Shortly thereafter, he apologizes and promises not to say it again.

Sometimes we're so used to the relationship roller coaster that we don't realize how unhealthy and even dangerous our relationship can be.

It's very difficult to notice when unhealthy affection turns into abuse. If you see many of these signs, it could be that the relationship you're in is unhealthy and potentially dangerous.

You might think about breaking up and leaving, and that's what you say to friends who are in unhealthy relationships, but that's not always the best thing to do.

A breakup can trigger violence.

If you think you're being abused or are being abused, talk to a professional about how to protect yourself safely.

This isn't just about romantic relationships, it's not just about violence.

By understanding the signs of unhealthy love, we can check and understand any relationship.

You may finally understand why you've been disappointed in a friendship, or why you feel down and insecure every time you interact with a particular family.

You may start to realize that you're causing trouble for your colleagues with your ardor and jealousy.

Understanding is the first step to improvement. You can't make every unhealthy relationship healthy. Some have to be let go, but you can try to improve every day.

I have good news for you. It's not that hard.

Open dialogue Mutual respect Kindness Patience There are so many things you can do every day.

If you keep practicing, you will definitely get better, but I can assure you that you will never be perfect.

I make it my job to talk about healthy relationships every day, but I still do unhealthy things.

Just the other day, as I was sending my four children out the door, I was pissed off as they were arguing and arguing and complaining about breakfast.

I purposely shouted in an angry tone, "Everybody shut up and listen to me!

All the bad boys!

Games, smartphones, TV, desserts, and all the fun things will be banned! ”

(laughs) Who can relate?

(Applause) Violent and demeaning.

My eldest son turned around and said to me, "Mom, that's not love."

(Laughter) Right after that, I wanted to go after my oldest son who was criticizing me.

It's true

But I picked myself up and realized that it was a proud feeling.

I was proud that my eldest son had the words to stop me.

I want all of my children to know the standards for how they are to be treated, and to speak and vocalize when those standards are not met, rather than just accepting them.

Relationships have long been a light topic, but relationship skills are very important in life and difficult to develop.

Not only can understanding the signs of unhealthy love help us avoid the dangers of falling into unhealthy love, but understanding and practicing the art of being healthy can improve every aspect of our lives.

I am convinced that love is an instinct, an emotion, but the ability to love better is a skill that can be developed and improved over time.

thank you

(applause)

I was singing and dancing on the red tiles of my living room in the living room where I grew up, to the tunes of "Gypsy," the TV show starring Bette Midler—

♪ I had a dream

Have a wonderful dream, Papa ♪

I sang while holding the uncontrollable passion of a 9-year-old girl in my heart That girl had a dream

dream of becoming an actress

I had never seen anyone who looked like me on TV or in the movies, and I was constantly being warned by family, friends, and teachers that someone who looked like me would never make it in Hollywood.

but i'm american

I've been taught that anyone can achieve anything, no matter what color your skin is, whether your parents are immigrants from Honduras or how poor you are.

I didn't ask for a dream to come true easily, if it was possible it was enough

When I was 15, I had my first professional audition.

It's a commercial for a cable TV contract -- maybe it was a bail bond business, but I don't really remember --

(Laughter) I remember the casting director saying, "Can you do it again, but this time it's a little more Latino?"

"Well then

should i do it in spanish? I heard

"No, in English — just more Latino."

"I'm Latino, don't I look Latino?"

There was an embarrassing silence for a while, then, "Okay then, thank you for coming. Thank you for your hard work."

After spending most of my time in the car driving home, I finally realized that "Latin-ish" means speaking in broken English.

What I didn't quite understand was that it didn't seem to matter that I was actually a true Latino.

This job never came

I wasn't hired for many of the roles expected of me— street gang girlfriend Cheeky Shoplifter Latino Pregnant Woman Part 2

(Laughter) It's a real-life role for a kid like me.

Too brown, too fat, too poor, too unrefined for the human eye.

It was a stereotypical role, a far cry from who I really was, and it wasn't the role I dreamed of playing.

I wanted to play someone with a complex, multifaceted personality who would be at the center of the stage called life.

It's not like a decoration in someone's background

But when I took the plunge and said that to my manager -- the person I was paying to find me a job -- he said, "Somebody tell this girl these are unrealistic expectations."

he was not wrong

I was fired, but it wasn't wrong

(Laughter) (Applause) Whenever I try to play a role that isn't a poor stereotype, the response I get is always, "This role wasn't cast for diversity."

"She's the best, but she's a little too ethnic"

"Unfortunately, if you're Latino, you already have one."

Same message keeps coming back

Being me is an obstacle to overcome

So I thought, "Disability-san, come on.

I'm American and my name is America

I've been training for this for a long time, so I'll just stick to my policy and work harder."

So I tried, I tried to do the best I could and try to overcome the areas that were identified as shortcomings.

I stayed out of the sun to keep my skin from getting darker. I straightened out my curly hair.

I was always losing weight, and I bought fancy, expensive clothes.

And it's all so that people who see me don't think I'm too fat, too brown, too poor Latino.

if you can see what i can do

I'm sure you'll get the chance

But through an ironic twist of fate, my dream came true and the role I got was exactly the role that required me to be myself.

In "Real Women Have Curves," Ana played a dark-skinned, poor, fat Latino woman.

I've never seen someone look like that -- someone like me as the protagonist of a life story.

I traveled all over the United States and visited many countries with this movie, and everyone, regardless of age, ethnicity, or body type, identified themselves with Anna.

It's about a 17-year-old overweight Mexican-American girl who struggles with cultural norms to make an unlikely dream come true.

Contrary to what I've been told all along, I've seen first-hand that people want to see the stories of people like me.

I realized that everyone expected me to portray my true self in society, which was said to be an unrealistic expectation.

"Real Women Have Curves" was a critical, cultural and financial success.

I thought, "I did it!"

“It made us realize that our story has value.

This should change the situation.”

But things never changed

I didn't come to a fork in the tide

No one in the film industry wanted to make more stories that audiences wanted and were willing to pay for.

Four years later, when I landed the role in "Ugly Betty," I witnessed the same phenomenon play out again.

"Ugly Betty" premiered to 16 million viewers across the country and was nominated for 11 Emmy Awards in its first year.

(Applause) Despite the success of "Ugly Betty," for the next eight years, there hasn't been a Latino starring American TV drama.

It's been 12 years since I was the only Latino actress to win an Emmy for Best Leading Role.

this is not something to be proud of

to feel intense irritation

Not because awards prove our worth, but because what we do in the world influences how we see ourselves, how we value ourselves, and what kind of future we dream about.

Every time I question that, I'm reminded of a girl in the Swat Valley in Pakistan.

The child watched American television dramas on DVDs that he managed to obtain, and developed his dream of becoming a writer.

(Nobel Peace Prize laureate) Malala wrote in her autobiography, "I became interested in journalism because I realized that my words could make a difference, and because I saw the DVD of Ugly Betty and dreamed of working for an American magazine."

(Applause) Over the course of my 17-year career, I've witnessed the power of our voices when they have a presence in a cultural society.

I have seen and experienced

everyone is watching

In entertainment, in politics, in business, in social reform

You can't deny it — presence creates possibility

But over the last 17 years, I've heard the same excuses all the time about how some people can make a difference in society and others can't.

No one wants to hear our stories Our experiences don't resonate with the mainstream of society It's too financially risky to make our voices heard

Just a few years ago, my agent contacted me and asked why I missed out on a role in a movie.

"People really liked you and wanted to have a really diverse cast, but you can't finance a movie without first deciding on a white character."

I could tell from his voice that he was sorry, and I could tell that he was saying, "That's terrible."

And yet, like I've experienced hundreds of times before, I felt tears running down my cheeks.

The pain of rejection welled up in my heart, and then I heard a voice of shame scolding me, saying, "You're a grown woman, don't cry because of your job."

I've been through this process for years.

But this time I heard a different voice

"I'm tired"

"enough"

That voice knew my tears and pain weren't caused by missing work.

because that's what i was actually told

It was because of what I've been told all my life -- executives, producers, directors, writers, agents, managers, teachers, friends, family.

That I'm a lesser person

I thought sunscreen and hair straighteners could change this deep-seated sense of values.

But in that moment, I realized that I had never asked you to change the way society works.

I just wanted you to put me in there, they're not the same

As long as I agree with what society thinks of me, I can't change what society thinks of me.

But I agreed

Like everyone else around me, I thought it was impossible for me to live my dreams in the way I am now.

And I tried to hide my identity

This realization reveals that while we genuinely desire change, our actions can contribute to maintaining the status quo.

And that's what made me think that dividing people into good people and bad people doesn't bring change.

In such a discussion, everyone becomes irrelevant.

most people are neither

Each of us has the courage to question our basic values ​​and beliefs.

If you align your actions with good intentions, change will come.

Millions of people, like me, have been told that in order to achieve their dreams, in order to show their talents in the world, they must deny who they really are.

I want to stop denying myself and start living as my true self.

If I could go back in time and talk to my nine-year-old self dancing in my living room and dreaming, I would say that being yourself is not an obstacle.

Being myself is my super power

Because my appearance is the appearance of the world

Your appearance is the appearance of the world

Because the appearance of us all together is the appearance of the true world

You don't have to create a new reality to reflect that in how society works.

All we have to do is stop denying the reality we live in now.

thank you

(applause)

I heard that the theme of this gathering is "from the past to the present."

It seems I was called in the "yet" example

Of course, I disagree with that. I'm 94, and I'm not working yet.

For those who ask, "Are you still doing that?"

I don't even reply because I'm not doing anything yet, I'm just doing the same things I've been doing.

I still... oh, did I say "yet"? I failed

(Laughter) I have a to-do list and a plan.

I have customers and I'm doing business as usual.

No more talking about age

I'll show you some of my work to help you understand what I do and why I'm here.

This work is from around 1925.

These works were made over the last 75 years.

(Laughter) (Applause) I've been working since 1925 and I've done something like what you see here, this is Castleton China.

This is an exhibit at the Museum of Modern Art in New York.

Currently on sale at the Metropolitan Museum of Art

These are still for sale at the Metropolitan Museum of Art.

this is my daughter and my portrait

(Applause) Part of what I've been building.

We've made hundreds of them in 75 years

i call myself a maker

I wouldn't call myself a commercial designer because I'm not.

commercial designers like to create novelty

"Novelty" is a commercial concept, not an aesthetic concept.

There's a commercial design magazine called Innovation.

Innovation is not the purpose of my work

Unlike craftsmen, people who make things create more beautiful, more elegant, and more comfortable things.

I have a lot to say, so I need to collect my thoughts

Our profession is to have a playful quest for beauty

Exploring beauty through play is said to be the first act of mankind.

Sarah Smith, a former professor of mathematics at MIT, said, "The playful exploration of beauty was the first human behavior, and the exploitation of usability and the quality of the thing evolved out of a playful pursuit of beauty."

This is tile, and "playfulness" is important to what we do. In fact, it's been a lifelong challenge to create something beautiful, and before I know it, I've been doing it for 75 years.

How can you create something for someone for so long without getting tired and with joy?

Playfulness is a very important part of the quality of our designers.

let me tell you about my life

As I said earlier, I started making things 75 years ago.

My first time exhibiting in the United States was at the 1926 World's Fair, commemorating the 150th anniversary of the Declaration of Independence, when the Hungarian government sent one of my handmade pieces as part of the exhibition.

I have traveled to many countries with my work and have been able to see many parts of the world.

It wasn't the work that I created that brought me into the world, but I made it because I wanted to use it to see the world.

I was very interested in learning about the world, and this inspired me to make things, and in the end, it showed me a lot of countries and cultures.

I started as an apprentice to a Hungarian craftsman, so I was able to learn about the medieval guild system.

The guild system, that is, when I first set foot in this world, if you wanted to be a pottery meister, you had to start as an apprentice.

In the workshops where I studied and was taught, there was a traditional hierarchy of masters, migrant craftsmen and craftsmen, apprentices, and I worked as an apprentice.

Working as an apprentice was quite old-fashioned.

In short, I had to learn all the elements of pottery by hand.

When clay emerges from the hillside, we crush it with our feet

I had to knead it by hand to make it mushy.

Finally, I prepared to put it on the potter's wheel.

I literally worked there as an apprentice.

My master had me prepare the furnace, because that was part of the pottery making process back then.

At the end, I received my diploma, and for having successfully completed my apprenticeship and for my moral conduct, I was awarded this certificate by roofing, track digging, furnace building, chimney sweeping, and the pottery guild.

(Laughter) At this point, I was given a standard document, which explained my rights and working conditions arrangements, and I still have this standard document.

For starters, I set up a workshop in my garden and sold the pottery I made in the Budapest market.

Sitting with my then-boyfriend Boyfriend doesn't mean what we call it now That boyfriend and I sat in the market selling pottery.

This worried my mother and she sat with us in the market to look good.

(Laughter) But after a while, a new factory was built in Budapest, a very large pottery factory.

I went there with a couple of women and asked the factory manager a lot of questions.

The factory manager asked me why I was asking so many questions.

I told him that I also make pottery.

He asked if he could come see the house, and when he did, he convinced me that what I was doing in the workshop was an anachronism -- that the world had just gone through the industrial revolution, and that I should join the factory.

He set up a design department for me and I worked there for a few months.

But everyone in the factory spends their time in the design department,

The factory manager told me that some women were producing my design and that it was being shipped to the United States.

I remember being pretty successful

But the factory manager, the chemical engineer, the mold maker, everyone was spending more time and effort on my job in the design department than on producing the toilets. Eventually, the bank, the owner of the factory, sent me a letter through headquarters telling me to put more effort into producing toilets, and my job was over.

As a migratory craftsman, I was given a chance.

As a craftsman, I put an ad in a newspaper saying I was a trained, solid potter, a migratory craftsman looking for work.

Of the several offers I received, I chose the one furthest from home, which at the time seemed like half the way to the United States.

I was working in Hamburg

My first job in Hamburg was artistic pottery, all done on a potter's wheel, and I worked in a workshop with several potters.

The first day, when I tried to sit in my place with the potter's wheel -- there were a few potter's wheels in the room, and behind me -- sat the Hunchback Man, who was deaf and mute and smelled very bad.

So I sprinkled him with copious amounts of perfume every day, and he seemed to really like it.

On my first day working at this workshop, there was a surprise gift on my potter's wheel.

On the potter's wheel that I'm going to use, my co-workers just put a very well-sculpted pottery of male genitalia on it.

(Laughter) I brushed it off with one hand, and they finally let me in, and I worked there for about six months.

this was my first job

At this rate, it will surely be midnight

(Laughter) (Applause) So we need to talk a little faster. (Laughter) Moderator: Eva, we have about five minutes left.

(laughs) Eva Seisel: Oh really?

Host: yeah it's true

If you say so, I have to tell you in five minutes, so I'll speak fast.

In fact, my job took me to many countries because I used my job to satisfy my own curiosity.

I worked in many different countries, but one time I went to the former Soviet Union, and I was there from 1932 to 1937... until 1936, to be exact.

I finally got there, but I had nothing to do, and I was greeted as a foreign expert.

I became the art director of the pottery and glass industry, which eventually came under Stalin's suppression, and at the beginning of Stalin's purges, I didn't know that hundreds of thousands of innocent people were being arrested.

I too was arrested early in Stalin's purges and spent 16 months in a Russian prison.

The reason for my arrest was my involvement in Stalin's life-threatening plot.

It was a very dangerous accusation.

Now that the five minutes I have left are over, I'd like to conclude by saying that I was actually surprised that I survived.

I survived and made it here. Now it looks like five minutes have passed. Host: When was the last time you visited Russia?

Have you been there recently?

Yes, it was this summer, and the Lomonosov factory was bought by an American company, and they invited me.

When he found out that I had worked in this factory in 1933, he brought 15 artists to my studio in Rockland County to see me.

Last July, they invited me to their factory in Russia to make and design some plates.

I don't like to travel alone, so I invited my daughter, my son-in-law and my granddaughter, to see modern Russia.

Is it over now? Thank you very much

(applause)

the devil came to town

But don't worry - he just wants to put on a magic show.

This kind of nonsense setting is the central plot of Mikhail Bulgakov's masterpiece "The Master and Margarita."

Written in 1930s Moscow, it's a surreal blend of political satire, historical fiction, and occult mysticism that has earned it a reputation as one of the 20th century's greatest masterpieces and for its quirkiness.

The story begins in Moscow when two members of the literary elite are interrupted in conversation by a mysterious gentleman who calls himself Voland, a foreign scholar who invites them to perform black magic.

Just as this stranger joins two men in a philosophical debate and predicts their ominous fate, the reader is suddenly transported to first-century Jerusalem.

There, the tormented Pontius Pilatus reluctantly condemns Jesus of Nazareth to death.

The story traverses between these two settings, with Volando and his entourage Azazello, Koroviev and Herla, and Begemort the giant cat wielding superhuman magic and wreaking havoc as a stage performance.

A lot of the dark humor in the novel isn't just due to demonic pranks, it's also historical.

Bulgakov's work is set in the same period as it was written, in the midst of the Stalinist Soviet Union.

There, artists and writers were subject to strict censorship, with imprisonment, exile, and the death penalty if they were found to mock the state's ideology.

Even when they were approved, everything from their work to their homes to their travels was governed by an intricate bureaucracy.

In this novel, in addition to the structure of reality, Voland manipulates this system to ludicrous consequences.

When the head is cut off from the torso and the wad of money floats in the air, Muscovites react selfishly, proving that Soviet society, unlike its ideals, is greedy and cynical.

The story moves indifferently, deliberately blending paranormal events with the absurdity of everyday Soviet life.

So how was Bulgakov able to publish such a subversive novel under an oppressive regime?

I actually didn't

He wrote "The Master and Margarita" over ten years.

Stalin's personal favors may have shielded Bulgakov from severe persecution, but many of his plays and works were never published, and although his safety was assured, they were effectively silenced.

He died in 1940, but his work remained unpublished.

A censored version was finally published in the 1960s, but the full version was secretly passed around among literature fans.

The full version was finally published in 1973, more than 30 years after the work was completed.

Bulgakov's experiences with censorship and his artistic frustration are revealed in autobiographical elements in the second half of the work, and the origin of the title is finally revealed.

A "master" is an obscure author who worked on a novel for years and then, like Bulgakov, burned the manuscript after it was rejected by the publisher.

But the real hero is Margarita, the master's mistress.

Her devotion to saving a dream abandoned by the master strangely leads to the erratic deeds of her demonic companions, and the story ends in a surreal way.

Despite its dark humor and complex structure, "The Master and Margarita" is at its core a meditation on art, love and redemption that never gets lost in irony.

The reason this book survived so long before it was published is because, as Woland told the master, "Manuscripts don't burn."

Just one vitamin reduces the risk of heart disease

Eating chocolate reduces student stress

New drug prolongs life of rare epidemic

Every day we see health articles with headlines like this, and some of them make contradictory claims to each other.

Sometimes there's a disconnect between a bold and intriguing headline and the degree of improvement that the underlying medical research often exemplifies.

So how do you avoid being misled by eye-catching headlines?

The number one way to determine the credibility of a headline is to look at the academic research behind it.

We created hypothetical research scenarios for each of these three headlines.

Let's take a closer look at the explanation in the first example and pause at the heading to answer the question.

These are simplified scenarios

Real research details many more factors and explains how that works, but for this exercise, I'm assuming you've got all the information you need.

So let's look at the effects of the vitamin helsium on the cardiovascular system.

A study found that subjects who took Helcium had higher levels of good cholesterol than those who took a placebo.

The numbers were similar to those of people with naturally high cholesterol.

Previous studies have shown that people with naturally high levels of good cholesterol are less likely to develop heart disease.

So what's so misleading about the headline "Helcium reduces risk of heart disease"?

The problem with this headline is that this study didn't actually investigate whether helcium reduces heart disease.

We only measured the effect of Helsium on specific types of cholesterol levels.

Just because people with naturally high levels of that type of cholesterol have a lower risk of heart attack doesn't mean that people who raise their cholesterol levels with Helcium will have the same results.

Now that we've solved the mystery of Helsium, let's solve a seductive mystery about the link between eating chocolate and stress.

This hypothetical study involved 10 students.

Half continue to eat chocolate every day and the other half avoid chocolate

Because we are students in the same class, we have the same schedule.

At the end of the experiment, students who ate chocolate were less stressed than those who didn't eat chocolate.

So what's wrong with the headline: "Eating chocolate reduces stress in students." It would be a stretch to draw conclusions from 10 subjects for the general population.

Because the smaller the number of randomly selected samples, the more difficult it is for the sample to be a faithful representation of the entire target population.

For example, if you have a lot of students, and they're 50% male and 50% female, if you pick 10 of them, there's about a 12% chance that you're going to be 70% male and 30% female.

If you pick 100 people (70:30), it's less than 0.0025%, and with a sample of 1000 people, the odds are less than 6 times (10 to the minus 36th power).

Similarly, with a smaller sample size, each individual's results have a greater impact on the overall result, skewing the overall trend.

Still, there are many good reasons for scientists to do small studies.

By starting with a small sample size, we can use the results to assess whether it's worth doing more complex and expensive studies.

Also, in some studies, it's impossible to recruit a large number of very specific subjects.

The point is reproducibility. If you try to draw a paper's conclusions from one small study, the conclusions are questionable, but if they're based on many studies with similar results, they're more reliable.

there is still one more puzzle left

In this scenario, we will research new drugs that are effective for patients with rare and intractable diseases.

In a sample of 2,000 patients, from the time of diagnosis, those who took the new drug lived longer than those who took a placebo.

The problem is a little different this time

What's one more thing we need to know before we can justify the headline "New Drugs Help Rare Diseases Live Longer"?

Before judging this as correct, you'd want to know how much the new drug helped patients live longer.

In research, scientifically valid results sometimes don't make much sense in the real world.

For example, in a real-world trial with a drug against pancreatic cancer, life expectancy was increased by 10 days.

So the next time you see a surprising medical headline, turn to the scientific literature behind it.

Even if you can't see the full article without paying, you can often find a summary of the experimental design and results in freely available abstracts and newspaper articles.

It's exciting to see news stories about scientific research, but it's important to understand the results.

I want you all to nod to the person on the right and nod to the person on the left.

(Laughter) What happened this winter was that if this was a beehive, either you or the person on either side of you died.

dead bees are very numerous

For the second year in a row, 30 percent of bees in hives have died, and we estimate that 30 percent of bees died this winter.

This is a really, really high number, and it's very serious.

Causes of most deaths have been identified

The varroa mite is known to be the cause of death, but there's also a new phenomenon, which I talked about last year, colony collapse disorder (CCD).

This is the Central Valley from the top of the hill, last December.

Shipping yard down below - temporary storage to store hives until February, waiting to be shipped to almond fields

A documentary filmmaker visited me two months after I was there and said that instead of beehives, it was a graveyard with nothing but white boxes of empty shells.

So let me briefly summarize the results of our year-long research. We've been trying to figure out the cause of this.

What we do know is that the bees were infected with a flu-like disease.

This flu caused a huge drop in bee populations.

In certain cases, and indeed most of the time throughout the year, the bacterium that causes this flu is a new strain of virus that we've identified as acute Israeli paralysis virus.

It was named so because the man of Israel discovered it.He now regrets this name because of its connotation.He now regrets this name because of its connotation.

This virus is widely distributed

Of course, bees can also get other viruses and flu, and the problem that we still struggle to understand and keep us up at night is why bees suddenly had this flu outbreak, and why they became so susceptible to other diseases.

I don't know the answer yet, and I'm spending a lot of time trying to figure it out.

I believe there are many factors

We've done large, extensive studies that show that a lot of pesticides accumulate in hives, and surprisingly, the healthiest hives sometimes have higher concentrations of pesticides.

There's a growing interest in the health of hives.

And of course, if too many hives are destroyed, beekeepers can quickly replace them with new hives.

That's why we were able to recover despite the mass deaths.

If one out of three cows died during the winter, the National Guard would be dispatched.

A beekeeper, on the other hand, can find a surviving hive and divide it into two halves.

And you can buy a queen bee for the hive that doesn't have a queen bee.

Queen bees are mailed from Australia Hawaii Florida and put the queen bee into the hive

In fact, the United States was the first country to mail the queen bee, and some of the zip codes have numbers that can be used to mail the queen bee, ensuring that bees are abundant throughout the United States.

If you need something other than the queen bee, you can buy 1.5 kilograms of bees in a parcel, and of course the post office has 1.5 kilograms.

And you can put it in a new hive and replace it with a dead bee.

So it's easy for beekeepers to replace dead bees, and this is how we've prevented the decline of bees.

Even if 30 percent of beehives disappeared each year, there would still be the same number of beehives in the United States -- 2.4 million.

Hive loss is tragic in many ways, especially for beekeepers.

Let's talk about beekeepers first, and it's very important, beekeepers are some of the most interesting people you'll ever meet.

If you're an audience of beekeepers, I'm sure everyone here is holding a National Rifle Association placard and protesting against the perverted would-be pig farmers of San Francisco.

(Laughter) If you put all these people in the same room, they'll interact and they'll get along very quickly, because they all share the same passion for bees.

There's another side to these people, which is the beekeepers by profession. There's another side to these people, which is the beekeepers by profession.

I make a living. Beekeepers are probably the most independent, patient, intuitive and inventive people you'll ever meet.

They're really fascinating people, beekeepers all over the world.

Earlier this year, I had the honor of visiting a beekeeper in Haiti for two weeks.

As anyone who has been there knows, the situation in Haiti is dire.

There are countless reasons why Haiti is so poor. There is no excuse for such poverty.

But this beekeeper, who I actually met, was the most knowledgeable beekeeper I've ever met.

I have no formal education, but I know everything.

We needed beeswax for our project, and he was very talented and he took out some of the most amazing beeswax I've ever seen.

Next, Mr. Dave Hackenberg is a symbol of CCD.

He was the first to check the status of the CCD and issue a warning.

He also made trucking history, he transported bees long distances.

Trucking bees has a bad reputation, but it's actually been done for thousands of years.

The ancient Egyptians carried bees on rafts to traverse the Nile River, and the idea of ​​bee couriers is nothing new.

What worries us most about colony collapse syndrome is the enormous cost of replacing destroyed hives.

The first year will be okay, even if it's the second year in a row

But if 50 to 80 percent of hives die three years in a row, recovery will be difficult, and we fear the bee industry will decline.

It's going to have a huge impact on many fronts, and agricultural culture is one of the most severely impacted.

Migratory beekeepers are America's last nomads.

I travel with my family once or twice a year to carry beehives.

Dade City, Florida, is the gathering place for beekeepers in Pennsylvania.

30 kilometers from there is Groveland, where Wisconsin's beekeepers congregate.

If you go to Central Valley in February, go to a cafe called Cathy & Kate at 10am.

There comes the beekeeper, who's finished transporting the bees to the almond fields, and they have breakfast.

The beekeepers will come and have breakfast, and we'll have a bit of a bit of a bit of a bit of a bit of a bit of a bit of a bit of a bit of a bit of a real American experience

When you look at this nomadic family, from father to son, they're all suffering.

But they won't ask for help themselves, but they're still really helpful people.

If someone loses all their bees to repair a truck, everyone divides their hives, like 20 hives, for their fellow hive losers.

It's really reassuring. I think they are warm-hearted people with history

Of course, bees are more important than just honey.

I highly recommend using honey.

Honey is the most ethical sweetener. It's a deep and enjoyable sweetener.

On the other hand, one-third of the food we eat is directly or indirectly pollinated by bees.

Let me illustrate this with the example of my breakfast yesterday: cranberry juice, fruit, granola. It should have been whole wheat bread. Now I realize that if you take out the jam coffee that you put in your Wonderbread, coffee, and all the other ingredients -- except the almonds in the granola -- and remove the food that the bees pollinate indirectly or directly from it, there's not much food left on your plate.

Without bees, we wouldn't starve to death, but our diet would be poor.

It is said that flowers are the fountain of life for bees, and bees are messengers of love for flowers.

It's a great way to put it. Bees are really like messengers of love for flowers.

In return for pollen and nectar, bees carry sperm, or pollen, from flower to flower.

Many flowers can't reproduce on their own, meaning they can't be fertilized by their own pollen.

Let's say you have an orchard with 10 apple trees per row, and each row has different varieties of apple trees with different pollen.

A bee is very obedient A bee collects pollen from a single flower

Bees are very docile. When a bee collects pollen from one flower, it only goes to the same variety of flower to fertilize the flower.

Bees, of course, are great carriers of pollen.

The bees create static electricity that makes it easier for the pollen to stick to them, and they carry the pollen from flower to flower.

but bees are in the minority

Honeybees were not native to America, but were introduced during the colonial era Honeybees were not native to America, but were introduced during the colonial era

There are actually more species of bees than mammals and birds combined.

In Pennsylvania alone, honeybee research has spanned 150 years, and the last three years have been particularly intensive.

And we've identified 400 species of bees in Pennsylvania.

32 of them have not been seen since 1950

It could be a matter of how the specimens were collected, but there could also be something wrong with the pollinators, the bees, which are wonderful creatures.

The bumblebee is the apex

Bumblebees are said to be eusocial, but they're actually not very sociable, and only the queen bee survives the winter and is sociable.

Bees are like flying little jewels

A very small species that flies around a lot

And then there's a class of bees that we call parasitic bees, which are bad-tempered and murderers -- what's that word? Murderers... bees?

yes bees

(Laughter) These bees are very inactive. They prefer to be solitary. These bees burrow into the ground or branches of trees to collect pollen and roll it into balls, where they lay their eggs.

A bee in a burrow waits for the egg-laying mother to fly away, eats the egg, and lays the egg. It's like a free ride.

The fact that you actually have parasitic wasps means that the environment is healthy, because they're at the top of the food chain.

There are so many parasitic wasps at the top of the recent pollinator list of endangered species that I'm afraid they're going extinct, and so are bumblebees.

If you live on the West Coast, look at this website, and I'm really looking for people to find bumblebees, because I think many of them are already extinct or declining.

It's not just bees, we don't know what's going on with endemic pollinators and other species.

Of course, the bees aren't the only important factor.

Bats are also pollinators, and bats have their own problems.

I'm a bee man and I'm glad I'm not Batman, because I have no money to study the bat problem.

Bats are dying at an alarming rate

Bats are dying because of white nose syndrome

If there were 15,000 bats in a cave in New York, and now there are 1,000 bats, it's as if half the population of this colony will be residents of San Francisco in the next three years.

i can't believe i have no money

But I think we know the cause. It's Natural Defect Disorder (NDD). It's Natural Defect Disorder (NDD).

And what's happening in our society is that we've lost touch with nature.

If we can bring back our relationship with nature, we can have the resources and the attention to address these issues.

I think there is an easy way to improve NDD

It is to make a meadow instead of a lawn

We've lost touch with nature, and it's a great way to bring back our environment.

I had the honor of living by the meadow for a while, and that's really interesting.

If you look at the history of the lawn, it's actually tragic.

Hundreds of years ago, the lawn was a symbol of prestige, so only the really rich owned a barren land that could be described as a green desert.

In 2001, Americans applied 11% of all pesticides to their lawns.

5% of greenhouse gases come from lawn mowing

I can't believe the amount of resources it takes to maintain an ecologically useless lawn.

we need to rethink

In fact, the White House had sheep in its front yard, which is not a bad idea in support of World War I. It's not a bad idea in support of World War I.

I'm not totally against mowing the lawn.

There's a lot of significance in having a lawn.It's okay to have a lawn if it's a limited area.

But let me re-emphasize the idea presented: owning or living near grasslands can make a dramatic difference.

The relationship with the grassland is very nice

It's milkweed that I've grown in my meadow for the last four years. It attracts many of the plants and insects that I've heard of before.

This is a companion and a relationship that never dries up

Even if you drink this wine, you won't lose your friends

I want you to experience it too

Not all of us have grasslands or convertible lawns. Let's plant flowers in pots.

Bees lead to many other things

I'm not telling you to build a meadow full of pots.

Beekeeping can be done in cities and on the roofs of buildings There are beekeepers living in cities This is a beekeeper in Paris.

I want you to own a birdhouse, it's an incredible and wonderful world.

I think it's also a very good way to treat our own natural deficit disorder (NDD).

Get a beehive, grow a meadow, and watch the creatures come back into your life.

What we can do is, if we do this, our future, our better future, will have beekeepers and bees and grasslands.

And this turning point journey begins with growing grasslands and growing bees, and it's really exciting to see wild bees flying.

Please experience it for yourself and tell me about it someday Please experience it for yourself and tell me about it someday

Thank you for coming Thank you very much

Seafood is an important source of protein and nutrition for three billion people around the world.

But a recent study found that 33 percent of wild fisheries are overfished, and 60 percent are maxed out.

In fact, more than half of the seafood we eat—fish, shellfish, seaweed—is not wild-caught.

we eat farmed seafood

Fish farming is one of the fastest growing segments of the food industry, expanding at an annual rate of 5.8%.

But there are many different methods of aquaculture, each with its own benefits and drawbacks, some of which have serious problems, such as those found in industrial agriculture.

How can we avoid making the same mistakes in agriculture as in fishing?

What are the current methods of aquaculture, and what are the types of sustainable aquaculture in the ocean?

The most common farming method uses large net pens, where the fish are raised offshore in pens of about 1,000 square meters.

This kind of farming is common off the coast of Chile and in the fjords of Norway, where, like many industrially farmed livestock, farmed fish are crammed into stressful pens.

Penned fish can produce large amounts of waste, contaminate the surrounding ocean and spread pathogens to wildlife.

To make matters worse, the antibiotics that protect against disease are not absorbed by the fish in the enclosure, and are then spread into the environment in the form of excrement.

Enclosure nets fail to prevent fish from escaping, and those that do escape compete with wild fish for food, bringing in captive-friendly genes and weakening wild ones.

Escaped farmed fish can disrupt ecosystems as invasive species.

Other aquaculture methods, such as the artificial coastal ponds used for shrimp farming in Southeast Asia, create new environmental problems.

Like corrals, ponds are prone to spreading contamination and pathogens.

Also, the construction of aquaculture ponds frequently destroys important ecosystems such as mangroves and wetlands, which protect coastal areas from storms, are home to a wide variety of flora and fauna, and absorb large amounts of greenhouse gases.

One way to prevent these problems from occurring is to create completely enclosed environments for aquaculture on land.

By circulating and filtering water in aquariums and waterways, we can prevent environmental pollution.

But even in a completely closed-environment facility, a major challenge remains: fish meal.

About 10% of the world's seafood is used as animal feed, including for carnivorous farmed fish.

Research is underway to use insect and plant proteins to feed farmed fish, but land-based aquaculture is currently one of the causes of overfishing.

Sustainable aquaculture seems like a long way to go, but some innovative fish farmers are looking for new, cleaner ways of farming.

Thinking a little further down the food chain may be the most useful solution.

Rather than cramming large carnivorous fish into enclosures, they use the mechanics of the ocean to produce large amounts of shellfish and seaweed.

These plants and animals grow without feeding.

On the contrary, it filters the seawater and improves its quality while absorbing sunlight and nutrients from the seawater.

By absorbing carbon dioxide through photosynthesis, they help combat climate change and ocean acidification, while also providing habitat for other organisms.

A shift to restorative aquaculture will bring good jobs to coastal communities and promote healthy diets centered around seaweed and shellfish with an amazingly low carbon footprint.

In just five months, 4,000 square meters of ocean can produce 25 tons of seaweed and 250,000 shellfish.

With the right distribution network, a few small farms, collectively the size of Washington State, could feed the world's population.

Farms like this are starting to pop up all over the world, and a new generation of fish farmers is emerging in search of a more sustainable future.

Done properly, restorative marine aquaculture can play a crucial role in saving our oceans, our climate and ourselves.

"The Opposite Words Game" Dedicated to Patricia Meish On this day I'm playing an opposite word game with my students Using a line from Emily Dickinson's poem It's a poem that begins with "My life stood one gun" Writing on the blackboard Pausing every now and then for the student to say the antonym My life your life Death stood Trying to sit down One many empty guns?

gun

Like a flash of lightning and a roar of thunder The kids just stare at me And then like a hail All sorts of answers fly around It's a flower Somebody says No, it's a book Someone else says It's funny The opposite of a gun is a pillow Or maybe a hug? No one agrees It's a song, it's a prayer, it's a promise, something like a wedding ring, and a baby, who's going to help that baby be born?

Midwife? That's right, it's the midwife It's not, it's not at all I'll never know what you are Whispering stars Whispering love in your hand Touching someone's ear Are you stupid? Are you the president of a stupid country? You look good. When is the next election?

Stuffed bear Sword Perfectly shaped peach

Let's go back to the beginning! It's a flower, right? A pure white rose flower

The chime for the end of the day goes off Reaching for the blackboard eraser But the girl says she'll snatch it Nothing's decided! It's not over yet I'll leave all the answers on the blackboard The next day there will be kids who won't talk to each other Divided into teams and fighting each other

There is a flower team, and there is a kitten team.The two boys call themselves the snowball team.The others continue the original game.It's a game where you write something like poetry.

It's a diamond, it's a dance, the opposite of a gun is a French museum

It's the moon It's the mirror It's the bells and who hears them

Arguments start again and there's a lot of yelling and soon a new team is formed.

Maybe everyone is right I say

Maybe it's all the things you said It might be all the things you didn't say It's the same with the words and the spaces between the words

Children look at each other Everything in this room and everything outside this room Everything in the road and in the sky

All the people on campus and the mall, all the people waiting in line at the hospital, even the people waiting at the post office, oh, and so are the flowers, all the flowers, the garden itself.

The opposite of a gun is what the gun is pointing at

Don't write that on the blackboard, the students say

Let it be a poem "Your death is a lot of empty poems to sit on"

My parents gave me an amazing name, "Baratunde Rafik Thurston."

Baratunde is a Yoruba name used in Nigeria, but we are not Nigerians.

(Laughter) It's just that my mother was a black hardcore.

(Laughter) I wanted to give him the blackest name, so I thought I'd look it up.

(Laughter) Rafiq is an Arabic name, but we're not Arabs.

My mother must have made it difficult for me to fly in the 21st century.

(Laughter) I foresaw America moving toward anti-immigration.

I was a prophetic black man

(Applause) Thurston is a British name, but we're not British.

Maybe it's a cry for generations of inhuman American slave economy.

Thurston is convenient at Starbucks.

(looks "thirsty") Hurry up and make it

(Laughter) My mother was a Renaissance person.

Arnita Lorraine Thurston Programmer, Former Domestic Worker, Sexual Assault Survivor, Artist and Activist

My mother taught me the lessons of this world: black history, martial arts, urban agriculture She sent me from middle school to the private Sidwell Friends School, the school that the president's daughters go to.

(Laughter) I had two tasks to do at school: remember to be black and remember to wear glasses.

both accomplished

(Laughter) Sidwell was a great place to learn liberal arts and science, but I also learned how to live among white people.

What I learned there helped me later, whether it was at Harvard, or as a corporate consultant, or at work on "The Daily Show" or "The Onion."

I wrote many of those lessons in my memoir, How to Live Black, and if you haven't read it yet, you're probably racist.

But America, the country, keeps reminding us what it means to be black in America.

In December 2018, my fiancée and I were in suburban Wisconsin.

I was on my way to see her parents, and they were both white, and she turned out to be white.

It's not my fault

(Laughter) I was driving her parents' car because she was drinking a little, and the police stopped me.

i felt scared

Flash your lights to show your submission

I slowly pulled over to the brightest street light, just in case I needed witnesses or dashcam footage—

I pulled out my ID and vehicle registration, unfolded the windows, and put my hands on the steering wheel—before the cop got out of the car.

this is the way not to die

While I was waiting, a headline popped into my head: "Cops shoot another unarmed black man."

Fortunately, the policeman is a friendly person.

Told me my license plate was expired

I'd like to ask all white parents, if your child is dating someone who's darker than Dwayne Johnson -- (Laughter) make sure the vehicle inspections and paperwork are up to date when your kids visit.

That's the bare minimum of courtesy

(Laughter) (Applause) I was lucky.

I got hit by a proper cop

I survived—that survival shouldn't matter

I think about news stories like, "Cops shoot another unarmed black man."

While browsing social media, there were reports of a baby being born with a photo [new baby! ]

Yesterday there was an ad for a product I just talked to a friend about [surveillance economy! ]

There's footage of a cop shooting someone who looks like me [You're not safe! ]

Millennials choose avocado toast over sex, according to commentary article [Millennial shock again! ]

(Laughter) It's a confusing time.

That kind of story kept coming up, but in 2018, we started seeing a different kind of story, like, "A white woman calls the cops on a black woman waiting for an Uber."

This is #Brooklyn Becky

"White woman sells drinking water, reports 8-year-old black girl to police"

This is #Permit Patty

``White woman calls police for black family BBQing by lake in Oakland''

This is #BBQ Becky

I'd like to say that these stories are progress in being black.

In the past, you would only know about it after an extrajudicial execution by a police officer happened.

Now there are videos of people calling 911.

The closer we get to the problem, the closer we get to the source, the closer we get to the solution.

So I started collecting news like this

I created an evolving and growing database at baratunde.com/livingwhileblack

I've found that the best way to understand news like this is to diagram the text.

I want to thank Erica Berry from Sidwell and all the other English teachers.

gave me the weapons to fight for my freedom

It's about breaking down news headlines and understanding the coherent structure in which [subject] is doing something [against a target] [taking action] [white woman] [selling drinking water] [eight-year-old black girl] [calling police] is the same as [white man] [uses neighborhood pool] [black woman] [calling police] is the same as [woman] [running local election] [black Oregon legislator] [calling police].

everyone is the same

By schematizing sentences, we can schematize the white supremacy that makes such sentences possible.

When I say "white supremacy," I'm not only referring to Nazis and "white power" activists, and I'm not saying that all white people are racist.

What I'm talking about is a system that systematically favors whites over other races socially, economically, and politically.

What Brian Stevenson of the Justice Equality Initiative calls "the story of racial differences" is the story people tell themselves to justify slavery, Jim Crow laws and mass incarceration.

As I watched this pattern repeat, I was angry and thought I could make a game out of it, a wordplay to turn this traumatic experience into a healing one.

let me tell you about the game

The first level is a practice level and requires your participation.

The purpose is to determine the truth

Did this actually happen?

``Catholic University Law Librarian calls police on controversial student.'' If you think it's true, please clap.

(Applause) If you think I'm lying, please clap.

(Longer applause) Unfortunately, this actually happened. The point of this story is that the law library is exactly the right place to be controversial.

(Laughter) That student should be promoted to professor.

practice level is over let's get into the real thing

The purpose of Level 1 is to reverse roles.

[woman] [camping locally] [black Oregon legislator] [call police] becomes [black Oregon legislator] [camping locally] [woman] [call police]

[white man] [use neighborhood pool] [black woman] [call police] becomes [black woman] [use neighborhood pool] [white man] [call police]

What do you think of the reverse racist example?

That's it for Level 1. Let's move on to Level 2. The goal here is to make the reversed example plausible.

[black woman] [use local pool] [white man] [call police] is not stupid enough "He tried to touch my hair without permission" What if? Or "Ride a unicycle and make oat milk"? Or what if it was "discussing with everyone at a meeting"?

(Laughter) It's what everyone is doing, isn't it?

sheer story

Level 2 is over

One caveat: reversing injustice doesn't make it fair.

It's revenge, it's not our goal, it's a different game. Let's go to level three, where the goal is to change behavior.

(Applause) Let's pause here and remember the structure.

[subject] [does some activity] [to target] [takes action]

[white woman] [inspect her property] [black real estate investor] [call the police]

[Safeway in California] [Feeding the homeless] [A black woman] [Calling the police]

[golf club] [play too slow] [black woman] [call police twice]

In all of these, the subject is usually white, the target is usually black, and the target's activity can be anything: sitting at a Starbucks, using the wrong kind of barbecue grill, falling asleep, walking frustrated to work, though I would simply say, "walk to work."

(Laughter) My favorite one is, "Don't stop my dog ​​from mating with another dog." This is probably a dog police problem, not a human police problem.

All of these activities are summed up to be life.

Our very existence is being criminalized.

Now here's the routine part of any presentation, it's not all about race.

The only thing I want you to ask yourself is that crimes should be reported, whether it was necessary to ask armed men to come in to solve these situations, because their appearance is a different story to me.

We all know that cops use force more often against blacks than against whites, and we're starting to understand the role of 911 in that.

Preliminary research by the Center for Policing Equity found that in some cities most police-citizen engagement comes from 911 calls rather than police patrols, and police use of force against citizens is almost always in response to calls.

What's more, the rate at which cops use force when they call is higher in areas with a higher percentage of white residents, i.e., more gentrified, i.e., making oat milk on a unicycle.

Try to be quiet, act like you're treading on thin ice, and park your car under the brightest street light so that the camera can properly capture the scene of you being killed, because the system we live in makes it easy for white people to call in kill squads for their own comfort.

(Applause) Safeway in California didn't just call the police on a black woman who was feeding the homeless.

They sent an impunity armed force against her.

It's basically the same as requesting drone bombing.

This is weaponized discomfort, and it's nothing new.

Between 1877 and 1950, there were at least 4,400 recorded racist lynchings of black people in America.

It also has a headline

[Reverend T. A. Allen] [in Hernando, Mississippi] [for organizing sharecroppers] [was lynched]

[Oliver Moore] [in Edgecombe County, North Carolina] [for scaring a white girl] [lynched]

[Nathan Byrd was] [lynched] [near Lulling, Texas] [for failing to surrender his son to the crowd]

You have to change your behavior, whether it's "lynching" or "calling the police."

Now that we've closed the distance between those two, let's get back to the game.

The purpose of level 3 is to change behavior.

Instead of "calling the police" on a black woman feeding the homeless, what if Safeway in California just said "thank you" to her?

It's a lot cheaper to say thank you than to call the police to the scene.

(Applause.) Or "give her some extra food."

Or instead of calling the police on an eight-year-old black girl, a white woman could "buy all the inventory" to support her business.

As for the white woman who "called the police" on a black real estate investor, the police would agree that she would have been better off just ignoring it without interfering.

(Laughter) It's a great choice not to interfere.

should be more often

Level 3 is over, but there's a bonus level, the goal is inclusion.

I've also seen headlines like [a man in power] [came to his office] [to a young woman] [masturbates to her]

It's an absolutely bizarre choice for a person in power.

There would have been many other options

(Laughter) For example, "listen," or "mentor," or be inspired to "start a joint venture and get rich together."

(Laughter) I'd love to live in a world where everyone gets rich, but because of his bad choices, we're all living in a poorer world.

it doesn't have to be like this

This wordplay reminds us that there is structural white supremacy, structural misogyny, and structural abuse of power.

Being structural makes it systemic

I want you to look at the structure, where the power is, and more importantly, the humanity of the people targeted by this structure.

I'm here because I've been loved and cared for and protected and lucky, I've been to a good school, I'm reasonably famous, I'm generally happy, and I meditate twice a day.

I'm tired of carrying the invisible burden of other people's fears. Like many of us, it shouldn't be like that, because this is something that can be changed.

A system is just a collection of stories that people believe in.

When we change that, we create a better reality for everyone.

please use the power to choose

please level up

thank you

It was Baratunde Rafik Thurston

(applause)

This is a strange and wonderful brain that makes you think there is another kind of intelligence on Earth.

This brain is formed in a strange body, with tiny satellite-like brains scattered throughout the body.

How different is it from the human brain?

It's so different that it's hard for me and my fellow scientists to understand how such a brain works.

But what I can say for certain is that this brain is capable of great feats.

Who is the owner of this brain?

Let's dive together into the sea where life began and see.

You may have seen this footage. We're behind a coral reef, and there's rocks, lots of sand, and fish swimming around.

And then all of a sudden, this octopus appears, turns white, sprays ink in my face, and swims away.

If you play it slowly in reverse, it creates rings around the eyes and spreads the pattern across the skin.

The three-dimensional shape of the surface of the skin changes, creating this stunning three-dimensional camouflage.

That skin has 25 million organs called chromatophores, and the projections are called papillae, and they're all nerve-controlled, and they change in an instant.

I like to say that dynamic camouflage is a form of intelligence.

It's amazing how complex this skin is, how fast and precise it changes.

What can this skin do?

Think for a moment about what you can do other than camouflage.

I can see the Mimic Octopus pattern.

All of a sudden there's a big change. This isn't camouflage, it's a signal.

then go back to the original pattern

Kobushime displays something like this flowing cloud when approaching its prey crabs.

There is a red squid in camouflage.It instantly changes to a bright warning color.

What we're seeing here is a continuous transformation between gaudy pattern and camouflage.

this takes a lot of control

Speaking of control

This is what the brain is good at

This octopus brain has 35 lobes and 80 million cells.

That's interesting enough, but what's really strange is that octopuses have even more nerve cells in their skin, shown here in yellow.

We have 300 million nerve cells in our skin, four times more than our 80 million brains.

Each of its eight legs has a small satellite equivalent to the brain and spinal cord.

It's a very strange way of organizing the nervous system.

What is this brain good at?

You have to outwit the big, smart brains that are trying to eat you, including porpoises, seals, barracudas, sharks and humans.

Decision making is one thing the brain does, and this brain does it very well.

An octopus roams around, but suddenly stops to create the perfect camouflage.

It's amazing, octopuses have to make more than 100 camouflage decisions during a two-hour foraging period, and they make two such foraging a day.

It's a decision

Then where do you go and how do you get back to the nest

It's also a matter of decision

To test the camouflage, the squid in the background took the rug from underneath to reveal a plaid, and even with all these strange visual cues, the squid does its best to improvise and match patterns.

Other cognitive skills are also important

Squid have a different kind of intelligence

I have a very complicated and interesting sex life.

Fight, flirt, court, protect your mate, deceive

Sounds familiar, doesn't it?

(Laughter) The intuitive ability of squid to enable this kind of behavior is amazing.

There are male and female squid

The male on the left chases away the other males to mate with the female, revealing these two-color patterns.

A pattern of courtship towards the female and a pattern of attack on the opposite side.

And when they switch places (Laughter), they quickly move their courtship pattern to the female side.

It's really cool to be able to send out two signals at the same time as the situation changes.

requires a lot of intelligence

Or put another way, this could be evidence that males have two faces from 50 million years ago.

(Laughter) Shall we move on?

(Laughter) An octopus on a reef has a tough job.

do it very well

It has short-term and long-term memory and learns things in three to five trials, a superior brain.

Spatial memory is noticeably better

After searching for food, it takes the shortest route back to its nest.

The observing diver gets lost, but the octopus finds its way back. It has a very good memory.

Let's look at the behavior of squid during sleep in relation to cognitive performance.

The one on the right is twitching.

They're dreaming and doing rapid eye movements, something that was once thought to be only found in mammals and birds.

It's colored so you can see the flickering skin pattern, which happens a lot.

It's completely different from what you do when you're awake.

When you're dreaming, memory consolidation happens, and that's probably what's happening in this squid.

Another thing that stands out is the episodic memory ability.

Even in human children, this memory requires brain development up to the age of four: what happened, where it happened, and when it happened for a particular event.

"When" is especially difficult, even a four-year-old can do it.

That cunning squid also has that ability

I recently discovered that in an experiment last summer, I fed squid different foods at different times so that I had to know exactly when and where I had seen it before.

We need to change our foraging strategies to match the replenishment needs of each type of food.

Sound complicated?

The experiment was so complex that it was difficult to understand.

It's a very sophisticated cognitive process.

In terms of brain evolution, on the right side is the evolutionary lineage of vertebrate brains that humans have superior brains.

i think everyone will agree

If you look to the left, you'll see the lineage that leads to the octopus, both of which are similar in terms of complex behavior and some kind of intelligence.

These two lineages split 600 million years ago, like worms with very few nerves, and they're very separate lineages, but they're converging in terms of complex behavior.

The fundamental question that arises here is, is the structure of the octopus brain fundamentally different from that of vertebrate brains, down to a very small level?

We don't know the answer, but if so, there are different pathways that have created intelligence on Earth, and artificial intelligence researchers might be interested in how it works.

Let's talk a little bit about genetics

We have a genome, we have DNA, and DNA is transcribed into RNA, and RNA is translated into protein, and that's how we are made.

cephalopods do it differently

You have a large genome, you have DNA, and the DNA is transcribed into RNA, but something very different happens there.

There's a tremendous rate of RNA editing, a hundred times higher than in humans and other animals.

so many proteins are produced

What is most of it for?

nervous system

It may be an anomalous way to develop behavioral flexibility.

Some of it is speculative, but it's thought-provoking.

I'd like to share a little bit of my experience, where I used the wisdom of myself and my colleagues to try to get this kind of information.

When you're submerged, you can't breathe, so you can't stay underwater forever, and you have to be efficient.

Being fully immersed in this ocean world helps us understand what these animals are doing, and I hope I can tell you how wonderful it is to be in the ocean, interacting with octopuses and divers, and discovering that they're thinking, curious creatures.

Octopuses are endlessly stimulating

Let's get back to smart skin.

This is a squid camouflage pattern.

If you zoom in, you can see beautiful pigments and reflectors.

The chromatophores are opening and closing rapidly.

The next layer of skin is very interesting.

When the chromatophores close, you see these strange iridescent colors.

It's also neurally controlled, and the combination of the two is shown in high-definition images of squid, and it's an amazing pigmentation mechanism that makes even the tint of color so beautiful.

How can this information help you?

I talked about the papillae, the bumps on the skin.

this is an australian cuttlefish

It has smooth skin and a flashy pattern.

I took five shots every second to see how this creature transforms -- 1 2 3 4 5 It's no longer indistinguishable from seaweed.

If you turn it backwards, it will return to smooth skin and flashy patterns.

It's skin that transforms quite beautifully.

Let's take a closer look

It's a beautiful nipple that stands like a periscope.

If you zoom in a little more, you can see the individual papillae coming out, there are little ridges, and there are papillae on top of the papillae.

Each species has more than a dozen projections of different shapes and sizes, creating a highly neurally controlled camouflage.

A colleague of mine, an engineer at Cornell, saw our work and said, "Looks like we can build something."

Because flexible materials that can control their shape like this are rare, whether in industry or society.

They worked with us to make a prototype of the artificial nipple, which is the flexible material you see here.

It swells into different shapes, and when you push it with your finger, you can see that it's flexible.

Here is one application

Now let's talk about the color of the fabric, which has many applications.

Look at this kaleidoscope of colors due to the dynamically controlled pigments and reflectors found in cephalopods.

We know enough about how this works that not only can we apply it to fabrics, but we might even be able to create transforming cosmetics.

In addition, the recent discovery of light-sensitive molecules in octopus skin may pave the way for creating smart materials that can themselves sense and respond.

This form of bioengineering, biomimetic technology, could change the way we see the world.

For example, an octopus' distributed brain and behavior-inspired artificial intelligence, or cutting-edge fashion inspired by the squid's smart skin.

How do we get there?

Maybe what we should do is get a little smarter about how smart cephalopods are.

thank you

(applause)

Rocks like this have been crashing into Earth for the last three billion years, and they've been responsible for a lot of things happening on this planet.

This is a sample of a meteorite, and it has traces of melted iron, which is lost and melted due to the speed and heat it hits the Earth.

Next to the meteorite from space, we're looking at the original Sputnik.

This was one of seven Sputniks that never actually launched.

not a duplicate

The space age began 50 years ago in October, and Sputnik was the first to do so.

It wouldn't be interesting to talk about the space age without seeing the flag that was brought to the moon on the Apollo 11 mission and brought back.

The astronauts included about 10 silk flags in their carry-on.

I took it home and framed it

So this flag actually went to the moon and back.

It's fun is not it

The dawn of the book is, of course, also important

And it wouldn't be interesting to talk about the dawn of the book without a copy of the Gutenberg Bible.

You can see how portable Gutenberg's book of 1455 was.

But it's not the books that are interesting about the Gutenberg Bible or the technological revolution.

As you can see, this book didn't spread because it was read.

In 1455 no one could read or write.

So why was typography so successful?

This is a genuine page from the Gutenberg Bible

You're looking at one of the first publications in human history to use 550-year-old letterpress printing.

We live in an era where books are dead and electronic paper is about to replace them.

But why is it interesting? This is what it is

Around 1450, the Catholic Church needed money and issued "forgiveness." In fact, they were handwriting paper pardons called "indulgences."

They traveled all over Europe, selling by the hundreds and thousands.

So that I can get out of purgatory early

And when the printing press was invented and we realized we could print letters of indulgence, it was like printing money.

So in 1455, all over Western Europe started buying letterpress printing, and they printed out thousands, tens of thousands, and eventually millions of little pieces of paper that would deliver you out of purgatory and take you to heaven.

And then, with the success of the printing press, Martin Luther wrote about 90 theses, which he claimed was a maddening thing for the Catholic Church to print and sell indulgences in towns, villages and cities all over Western Europe.

So letterpress was born out of printing indulgences, not out of reading.

See you tomorrow, I brought some for those who said they want to see pictures of the museum.

let's see it tomorrow

(Applause) Instead of showing something from the stage, this is the first time we're going to do something special.

I'll show you what the library looks like okay?

I married the most beautiful woman in the world

It's easy to see why, because when I met Eileen, she said she wanted to make something like this.

A library of human imagination

The room has three floors.

Inside the glass panel, 5000 years of human wisdom is managed by a computer.

The room is a theater and you can change the color

There are various objects and spaces in the library,

It looks like an Escher painting

It's downstairs in the library, and the exhibits are constantly changing.

You can walk inside, you can touch

All this fits in one room

I have my own Saturn 5 rocket,

Everyone should have one. Downstairs in the library, here are the books and other exhibits.

Something like the history of wisdom is packed in the glass panel

You can walk on a glass bridge that hangs in the air.

this is a leap of imagination

How do you create it?

One of the questions I've already answered is that we create new things with our surroundings and our stimuli, our human achievements, our history, what makes us human: passionate discoveries, dinosaur bones from the distant past, maps of the universe we've seen, and ultimately passageways that stimulate our minds and our imaginations.

So tomorrow, hopefully, I'll show you some stuff from the stage, but for today, I just want to say thank you to everyone who's come this far and talked to me.

Eileen and I are excited to open up our home and share it with the TED community.

(Applause) TED is a pattern of clouds,

it is a connection,

It's about looking at something that everyone has already seen and thinking about it like no one else has.

And that's what discovering and imagining

For example, we can look at a model of a DNA molecule

No one has really seen this, but we know it's there from what we've been taught about this molecule.

You can see this Enigma cipher machine used by the Nazis in World War II to encrypt and decrypt.

Now, you might be wondering, what is the relationship between the two?

This is the code of life, and this is the code of death

These two molecules, encryption and decryption

But you might look at these and say they're machines and molecules.

But with a new perspective, you'll realize that these two things are actually connected.

And these are connected mainly by this

So this is a model of the human brain

It's rare because you don't usually get to see the brain.

You can see the head, but this is what's inside

Everything we imagine, everything we think, feel and perceive is manifested by the human brain.

And when you create new patterns in this brain, once thoughts change shape, they never return to their original shape.

Let me show you a simple example

Think of the Internet We think of the information exchanged on the Internet

And don't think about hidden connections

But I brought a piece of coal here, one piece of coal

What does coal have to do with the internet?

The amount of energy it takes to move a megabyte of information across the Internet is one coal.

When you download a file, one megabyte equals one piece of coal.

What about 200 megabytes, it looks like this

In other words, downloading 1 giga or 2 giga (bytes) of data is not free.

Connectivity is the energy we need to power the web and make it possible for us to do what we think we can do.

thank you Chris

(applause)

The world is achieving one of several major goals in modern public health: eradicating AIDS.

You don't need to be cured of HIV to accomplish this.

We just need to stop the transmission of HIV and eventually eliminate it.

This goal was once considered impossible.

HIV has taken so many lives and is one of the most serious diseases facing mankind.

But now, thanks to scientific advances, we can effectively tackle HIV by taking one pill once a day.

HIV is a retrovirus that replicates and infects other cells by integrating its replication into the infected cell's DNA.

HIV has evolved so many times to evade the human immune system that it is difficult to cure.

But by suppressing HIV replication, we can stop the spread of HIV itself.

That's where antiretroviral drugs called ARVs come in.

ARVs are various drugs that act on HIV in different ways.

Some prevent HIV from entering immune cells, while others stop the virus from replicating.

ARVs can be used as a preventive measure even in people who are not infected with HIV.

This type of approach is called pre-exposure prophylaxis or PrEP.

Accumulation of PrEP in the body can prevent HIV from maturing.

So if you're HIV-negative and you're at risk of contracting HIV, you can protect yourself from HIV by taking certain ARVs before you're exposed to it.

Now here's the really cool part: administering ARVs to people with HIV can dramatically reduce transmission.

In other words, preventive treatment, which has the potential to end the global HIV epidemic.

It's based on the idea that HIV-infected people given ARVs can reduce their viral counts to undetectable levels.

The virus never goes away. It stays dormant inside the cell and will reactivate if treatment is interrupted.

But as long as the drugs keep the virus dormant, HIV remains undetectable.

If HIV is undetectable, it means it's not contagious.

In theory, if we could test everyone at risk of HIV infection and treat everyone who tested positive, we could stop the transmission and ultimately eradicate HIV.

But the reality is more complicated

Many HIV-negative, at-risk people around the world do not have access to PrEP or ARVs, and taking ARVs can be difficult for people living with HIV.

These problems are especially pronounced in the countries with the highest HIV prevalence.

The availability of these drugs depends on a healthy health system, and they're not available to everyone.

This is one of the reasons why stopping the spread of HIV requires massive investments to improve these systems.

A UNAIDS study estimates that $20-30 billion will be needed each year to reduce new HIV cases by 90% by 2030.

This investment will allow more people to be tested and more people to continue treatment.

Achieving this goal, and improving the health system in general, is of great benefit to individuals and to society as a whole.

We are already charting the path to ending the HIV epidemic in the near future, and potentially eradicating the disease itself in the next few generations.

Between 1996 and 2017, we were able to cut the number of new HIV cases by almost half, and millions of people living with the virus are living longer and healthier lives thanks to ARV treatments.

With continued investment, we can lower infection rates and end the HIV epidemic.

An HIV-free world is no longer impossible.It's closer than ever.

Watch this short video

£50,000 December 5, 1985 1787 Lafite sold £105,000 nine times the previous world record

Mr. Forbes, the buyer was Mr. Kip Forbes, the son of the 20th century's most glamorous billionaire.

The bottle's original owner was one of the most enthusiastic wine enthusiasts of the 18th century.

Château Lafitte is one of the world's finest wines and the prince of wine cellars.

This video reminds me of an event that is a long-running mystery in the modern wine world.

The mystery existed because there was a gentleman named Hardy Rondstock

In 1985, he announced to his friends in the wine world that he had made an incredible discovery.

Construction workers in Paris broke through a brick wall and found a hidden vault of wine, apparently belonging to Thomas Jefferson, dating from 1787 and 1784.

He didn't reveal the exact number of bottles, nor did he reveal the exact location of the building, nor did he reveal the owner of the building.

The mystery lasted for about 20 years

It was finally solved in 2005 by this man, Bill Coke.

He's a Florida billionaire who owns four bottles of Jefferson's, and he's starting to get suspicious.

We ended up spending over a million dollars to hire a former FBI agent and a former London Metropolitan Police agent to find out the truth.

Now there's ample evidence that Hardy Rondostock was a fraudster, Jefferson's bottle was a fake.

But during those 20 years, an incredible number of prominent and learned figures in the wine world were deceived by those bottles.

They wanted to believe that the most expensive wine in the world was the best and rarest wine in the world.

This question got me interested: Why do people spend crazy amounts of money on wine and so much more, and do they have a better life than I do?

So I set out to find the answer.

With the generous support of one of the magazines I write for from time to time, I decided to try the best, very expensive ones in various categories, and it was a very arduous endeavor.

(laughs) First of all, this

Kobe beef commonly seen in the US is not real

It may be Wagyu beef, but it's not real from Hyogo, Japan.

In the United States, it is very rare to see real Kobe beef. One of them is Wolfgang Park's restaurant CUT in Los Angeles.

I went there and ordered 8 oz $160 ribs.

And then it came and it was so small

i felt angry

Does this cost $160? and

Then I took a bite and wished it was smaller because the Kobe beef was so rich.

More like foie gras than steak

I finally finished eating it

I was really happy when I finished eating

(Laughter) And the photographer who took the photos for this project has taken my dog ​​in many different poses, so you'll see them again and again.

I'm sure you all agree, but one of the things I didn't think was worth the price was

white truffle

One of the most expensive and luxurious foods per weight

To try this, I went to Mario Patali's restaurant, Del Posto in Manhattan.

The waiter brought a white truffle and scraped it over my pasta and said, "Do you like truffles, Senorre?"

The charm of the white truffle is its scent

not taste or texture

it's in the scent

When the white pearl-like pieces fell on the noodles, the wonderful, flavorful mushroom scent that haunts my heart wafts through the air.

The scent disappeared in 10 seconds

Afterwards there was an ugly little crumb on top of my pasta It served its purpose and unfortunately I was disappointed again

There were some other disappointing things

(laughs) yes

I didn't pay for staying here.

(Laughter) They just let me watch.

Hotel suites are 4,300 square feet

360-degree view spreads out

there were 4 balconies

Designed by architect I.M. Pei

With a Rolls Royce and a driver

There is also a wine cellar that you can use freely.

During the tour, I was able to see several Opus Ones inside.

It costs $30,000 to stay in a hotel for one night.

It's a soap made from silver nanoparticles, and it's antibacterial.

For this time, I washed my face with this soap this morning.

It was a little itchy and smelled good, but no one here complimented me on how clean my face was today.

(Laughter) And nobody even complimented me on the jeans I'm wearing right now.

I have something that looks like something out of a fancy magazine, but in fact, it wasn't admired by anyone in this room, and in the months that I got it and wore it, no one noticed.

I don't believe that receiving praise or not is a measure of value, but I do believe that fashion, especially when it comes to clothing, is a criterion.

These jeans have been touched

Hand-picked organic Zimbabwean cotton is shuttle-woven and hand-dyed 24 times with natural indigo.

but not praised at all

(laughs) Thank you.

Former film director Armandro Manni's olive oil is made from olives grown in the hills of Tuscany.

He went to great lengths to protect the olives from oxidation and light.

We use small, colored jars filled with an inert gas.

And with each lot that ships, we periodically run molecular analyzes and publish the results online, so you can see your lot number on the internet, how much phenolic acid it contains and, you know, how fresh it is.

Twenty people, including myself, did a blind test against five other olive oils.

It was delicious and had an interesting taste

It was so green and spicy

But in a blindfold test, the oil came out last.

The first thing that came out was Whole Foods olive oil that had been oxidizing by our stove for six months.

(Laughter) A lot of things from Japan are being introduced over and over again.

I don't play golf, so I haven't tried it, but I've spoken to someone who owns one.

Even the people who sell these clubs will probably say, "It's got a four-axis shaft that doesn't slow you down, so you'll get more distance, but you're not going to get $57,000 worth of performance."

It's just for show, and it's adorned with gold and platinum."

The man who owns this club says he gets a lot of pleasure from it.

do you know this?

This coffee is made in a bizarre way

Luwak is the Malaysian civet cat.

This cat lives in a tree and comes down at night to roam the coffee plantations.

They are very gourmet and bring only the most ripe coffee cherries back to their nests.

And then the enzymes in the digestive system stick to the coffee beans, and then there are people who collect the excrement from the cats, and they go around the forest and turn it into coffee, though you can buy it before it's turned into coffee.

you guessed it

(Laughter) Toilets are a big deal in Japan.

(Laughter) Some toilets have built-in MP3 players.

Some have a scent function

Like analyzing what's in your toilet bowl and emailing the results to your doctor.

There are things like medical centers, and that's where Japanese toilet technology is headed.

This one doesn't have a lot of features, but it's the best pure feature, the Neorest 600.

I wasn't able to borrow a demo to try this out, but the manufacturer, TOTO, has a working toilet in their Manhattan exhibit, and I went and used it.

Everything's automated.

the toilet seat is warm

There is a buttocks wash

air will dry

If you stand up, it will flow automatically

The cover closes and automatically cleans

I believe that this is not just a technological innovation, but a kind of cultural innovation.

A toilet that does not use hands or paper

i want one

(Laughter) This is also a demo machine that I couldn't borrow.

It's a bed that Tom Cruise seems to have

It has a small ornament on the edge with the buyer's name engraved on it.

(Laughter) The manufacturer let me and my wife spend the night at an exhibit in Manhattan.

With the lights shining outside, I had to hire a security guard.

Either way, I had a great night's sleep.

If you think you spend a third of your life in bed

not a bad buy

(Laughter) This was funny.

It's the fastest legal road car in the world, and it's also the most expensive car you'll ever sell.

I was able to drive it, escorted by a professional racer from the company as a guard, around the canyons outside of Los Angeles and down the Pacific Coast Highway.

And when I stopped at a traffic light, I was looked at with respect by the people in the cars nearby.

it was really amazing

It was so smooth I've driven

Most cars rattle around 80 miles

As I was changing lanes on the freeway, my chaperone said, "I was just 110 miles out."

I didn't think so at all, but I've become one of those people who occasionally change lanes, and it was so smooth.

if i was a millionaire i would buy

(Laughter) What I'm going to show you now is superfluous footage, but it shows the pitfalls of technology.

At the premiere of Tom Cruise's "Mission Impossible 3".

You're about to open the door. This is "Mission Impossible 4."

There's one thing I never got my hands on, and that's a Cheval Blanc from 1947.

The 47 Cheval Blanc is probably the most celebrated wine of the 20th century

And for Bordeaux, Cheval Blanc is a heresy in terms of the amount of Cabernet Franc used.

The 1947s are miracle wines, especially those from the right bank of Bordeaux.

Vineyards and wine combine to create something similar to this worship.

But 60 years ago

not much left

Even if there is, I don't know if it's real.It's also the wine with the most fakes.

Not many people open their wine for someone like me.

So I was about to give up on this wine.

I've searched with dealers and auctioneers, but nothing came of it.

Then I received an email from a person named Bipin Desai.

Bipin Desai is a theoretical physicist at the University of California, Riverside, but he's also very good at holding rare wine tastings.

And not only that, but 30 varieties each of Cheval Blanc and Château d'Yquem were to be released.

who can refuse this

went

I had four meals in three days.

And at lunch on Saturday, I opened the 47-year-old.

The scent was soft with a faint hint of linseed oil.

And when you put it in your mouth, uh, in a way, it's kind of dense, like a port wine.

Some people were raving about the wine

Some people weren't so impressed

I am also one of them

I have a common taste, so it's not that I wasn't unaffected, but other people had similar reactions.

It's not just about the wine

Any of the wines served at this tasting, if they were served at a dinner party, would have been unforgettable.

But after drinking 60 great wines over the course of three days, the impression of each wine is blurred and I'm very tired.

And finally, I'd like to share with you a very interesting study, published earlier this year by researchers at Stanford University and the California Institute of Technology.

Give the subjects the same wine, but with different price tags.

It turned out that most people preferred the most expensive wine, which was actually the same wine, but they felt that the more expensive ones were different.

But what was unexpected was that the MRIs while the participants were drinking wine showed that it wasn't just that they lipped the expensive things, but that the brain felt more good when they were drinking the expensive things.

thank you

Suppose you get a message like this from a friend

"Something impossible has happened. You're just kidding me!"

As a friend, when I listened to the story in detail,

They start talking about the gym, work, and the date the night before.

You listen and try to understand the reason for your anger.

You may secretly wonder if you should be so angry

(Laughter) I might try to advise.

This is what I do every day, because my job is to study anger. Professionally, I spend a lot of time at work, and I spend a lot of time in my personal life studying why people get angry.

What do people think and do when they're angry?

(Laughter) Again, as you can imagine, when people learn about my work, they want to talk about their own anger and anger, not because they need a therapist --

It happens sometimes, but it's because anger is universal.

Everyone can feel it, everyone can understand it

It's a feeling you already had when you were a few months old. You would have cried and complained that your needs weren't met.

(Laughter) The anger continues into my teenage years, and in my case, my mother is a witness.

sorry mom

And I feel it until the very end

In fact, anger can happen during the most difficult times in our lives.

It's something you feel naturally and rightly as part of your grief and grief.

And it happens even in the best moments of our lives. Even special milestones like weddings and vacations can be ruined by mundane grievances. Bad weather and transportation delays can be really frustrating moments, but once you get the hang of them, they're unforgettable.

I talk a lot about anger with a lot of people, and what I've come to realize through those conversations is that a lot of people -- and I'm sure many of you in the audience -- see anger as a problem, like having your life thrown at you.

Maybe it's because I feel even afraid that my relationship will be destroyed.

I know how you feel, but my perspective is a little different, and today I want to share with you something very important about anger: it's a healthy force and a powerful ally in life.

it's good to feel angry

it is necessary

To understand all of this, I have to go back a little and talk about why people get angry in the first place.

It's largely based on a 1996 book by an anger researcher named Dr. Jerry Diffenbacker about how to deal with bad types of anger.

For most people, and for all of you, the mechanics of anger are pretty simple: when you're provoked, you get angry.

This is reflected in the many words people use

"This kind of sluggish driving really annoys me."

Ultimately, "I'm not troubled by anger. I just want people around me not to offend me."

(Laughter) To get a better understanding of this kind of stimulation, I talked to a lot of people, including friends, colleagues, and even family members, and they said, "What kind of clicks do you get?

What are you angry about?"

By the way, just because it's a good opportunity, one of the things that I think I've gained from doing this job is that I spent more than 10 years trying to come up with a complete list of ways to piss my co-workers on their nerves.

someday it will be useful

(Laughter) Anyway, we got some very interesting answers, like, "When your sports team loses."

By the way, this is an incredibly common answer.

"Someone who walks too slowly." I agree with you.

And you can't miss

"Roundabout." (Laughter) No joke, there's nothing more frustrating than a roundabout.

(Laughter) I can't say I don't care.

Some people say they're outraged by global problems facing all of humanity, such as racism, sexism, bullying, and environmental destruction.

But sometimes there are very special, even rare, answers

"When your shirt gets wet in a straight line, when you accidentally lean against the washbasin in a public restroom."

(Laughs) It sure feels bad.

(laughs) “It’s a USB memory.

(Laughter) Whether it's big or small, whether it's for general reasons or specific reasons, when you look at these examples side by side, you can find common ground.

People get angry in situations that make them feel uncomfortable or unfair Situations that prevent them from achieving their goals Situations that could have been avoided Situations that make them feel helpless

All cause anger

But anger isn't the only emotion you feel there.

Anger Doesn't Happen Alone

When we feel anger, it can be accompanied by a variety of other emotions, such as fear and sadness.

But anger, at least, isn't triggered by a single stimulus.

Of course, otherwise everyone would have to be pissed off for the same reason.

If you and I have different reasons for being angry, there must be something else.

what it is

What the person is doing and feeling at the moment of stimulation is said to have an effect.

It's called "the stage before you get angry" and you're hungry, you're tired, you're worried about something, you're running late

In such a state, I feel a strong stimulus that much.

But the key is neither the stimulus itself nor the pre-anger phase, but how you interpret the stimulus, how you receive it in your context.

When something happens to us, we first make a decision, good or bad.

fair or unfair, condemnable or punishable

This is "primary appraisal." It assesses the event itself.

You decide what it means in your situation, and then decide how bad it is.

This is the "secondary evaluation"

It's a decision of, "Is this the worst thing I've ever done in my life, or is it something I can live with?"

For example, imagine you're driving somewhere

First of all, if I want to set up a situation that will piss you off because I'm a genius at doing bad things, I'll almost certainly choose to do it while I'm driving.

(Laughter) It's true.

It's all about getting somewhere, so the traffic, the other cars, the road construction, everything you come across along the way can feel like it's going to get in the way of your goal.

Even legal traffic rules and unspoken rules are being broken in front of us on a daily basis. Usually, nothing happens.

is breaking the rules

Anonymous someone you'll never meet again. Perfect to point your anger at.

(Laughter) Anyway, you're driving, so be prepared to get mad, and the car in front of you is going way slower than the legal speed limit.

It's frustrating because I have no way of knowing why you're sluggish.

This is the "primary evaluation"

I look at the situation and decide that it's "horrible and worthy of condemnation."

But then you might decide, "I'm in no hurry, and I don't care."

This is the "secondary evaluation" I'm not angry

But let's say this was on the way to a job interview.

what is happening is the same

The result of the primary evaluation remains the same.

But your own leeway is definitely different.

On the contrary, this time it seems that I will be late for the interview.

In a complete turn, my ideal job is getting farther away.

(Laughter) Someone took my dream job, and I'm broke.

a life of poverty awaits

Should I just give up and turn back? Should I go back to my parents' house?

(laughs) That and this

It's because of that person in front of me

No, it's not a human, it's a demon

(Laughter) A demon who came just to ruin my life.

(Laughter) Now, this train of thought is called catastrophic thinking, and it's about seeing things in the worst possible way.

This is the type of thinking that is most common in people with chronic anger.

There are many other

"Misunderstanding of Causality"

Angry people tend to shift their reasons to irrelevant things.

Moreover, the opponent is not limited to people.

If you think you're stupid, when you can't find your car keys, you probably said, "Where did the keys go?"

The key is something that escapes on its own.

(Laughter) I also tend to over-generalize. "Always," "never," and "every time."

There's also selfishness, where you put your own needs ahead of others: "Do you know why he's driving slowly? Speed ​​up so I can get to the interview, or get out of the way."

The end is "labeling that stirs anger"

Others are called idiots, idiots, demons, etc. Sometimes words that shouldn't be said in this place pop out all over the place (laughs)

For a long time, psychologists have called these kinds of thoughts "cognitive distortions," "unreasonable assumptions," and so on.

Certainly there are unreasonable things

well most of the time

But sometimes there's justified anger, too.

There is injustice in the world

There are people who are cruel and selfish, and when they're treated badly, it's not only right to be angry, but it's right to be angry.

If there's one thing I want you to remember from today's talk, it's that the emotion of anger is endowed with us because it gave our ancestors an evolutionary advantage, both before and after they became humans.

Just as fear alerts us to danger, anger alerts us to the existence of injustice.

It's a message from your brain that it can't take it any longer.

Anger can also be the driving force behind the injustice.

Remember the last time you got angry

heart rate up

You're breathing hard and you're starting to sweat

This is the action of the sympathetic nervous system, also known as the "fight or flight instinct," which activates the ability to respond.

These are conscious reactions

At the same time, digestion slows down to conserve energy.

That's why my mouth is dry

The blood vessels also widen to send blood to all the limbs.

That's why my face turns red

They're all part of the complex physiological response inherited by modern humans that helped our ancestors to face the harsh forces of nature.

The problem is that the physical battles that our ancestors used to manage their anger are neither rational nor appropriate today.

I can't swing my golf club around every time I lose my temper.

(Laughter) But there are also good things.

They have abilities that their pre-human ancestors didn't have.

it is the ability to control emotions

When you're tempted to get involved, you can hold yourself back and direct your anger to something else and more productive.

When people talk about anger, they tend to talk about how to avoid getting angry.

calm down relax

Don't worry

They all assume that anger is bad and that feeling angry is bad.

I would rather think of anger as motivation.

Just as when you're thirsty, you want a glass of water, and when you're hungry, you want a bite, anger can motivate you to deal with injustices.

You don't have to think about what to get angry about

But going back to the beginning, yes, there are some silly things that aren't even worth getting angry about.

Racism, sexism, bullying, environmental destruction are real and unacceptable. The only way to solve these problems is to feel anger and fight with that anger.

When you fight, you don't need aggression, hostility, or violence.

There are endless ways to express anger

You can protest, you can write letters to the editorial office, you can donate or volunteer to social causes, you can create art and literature, you can write poetry and music, you can create communities of compassion for each other, and you won't tolerate outrage.

The next time anger arises, don't try to suppress it, focus on what your anger is teaching you.

Aim for something positive and productive

thank you

(applause)

If you pick 10,000 people at random, 9,999 of them will have something in common, a common interest somewhere on Earth.

But the other one is an astronomer, and I'm one of those oddballs.

(Laughter) My story is in two parts.

Let's start by remembering what Darwin showed, that we humans are the result of four billion years of evolution.

What we're doing in astronomy and cosmology is to elucidate the birth of the earth, from the perspective of the formation of the universe, before Darwin's biological evolution began.

Let me show you a few slides first.

This is what happened to the comet impact last week.

If this had been a nuclear bomb, it would have been even worse than what happened last Monday.

It's another NASA project.

This is Mars from the Mars Express, taken on New Year's Day.

This vision of a parachute landing on Titan, Saturn's giant moon, has become a reality.

We landed on the ground. The photo was taken during the descent.

just like the coast

In fact, it's a sea of ​​liquid methane, and the temperature is minus 170 degrees Celsius.

When we ventured beyond our solar system, we found that the stars weren't sparkling.

Each is like a sun with planets orbiting around it.

You can also see where stars are born, like the Eagle Nebula, and you can see star deaths.

In six billion years, our sun will look like this.

Some explode supernovae and scatter spectacularly, leaving debris like this.

On a much larger scale, you're looking at the entire nebula.

You could say it's a huge ecosystem where gas is recycled.

As a cosmologist, even a nebula like this looks like an atom in the universe on a much larger scale.

This picture is a very small slice of the sky, and it takes 100 pictures to cover the full moon.

A small telescope wouldn't show anything, but here you can see hundreds of tiny specks.

Each one is a galaxy, like our galaxy or the Andromeda galaxy, but they're very small and they look like faint light because they come from 10 billion light years away.

A star in a galaxy like this would not have planets orbiting around it.

It's also very unlikely that life exists, because nuclear fusion within stars simply doesn't have time to create the major building blocks of planets and life: silicon, carbon, and iron.

Everything is believed to have arisen from the big bang, a hot, condensed state. So how did this shapeless big bang create the complex universe?

I'm going to show you a simulation video that shows a tiny fraction of the universe at 1016 times faster than real time, ignoring the expansion of the universe.

As you can see, over billions of years, gravitational effects create small, dense irregularities that evolve into structures.

And 13 billion years from now, it will look like our universe.

Let's compare the simulated universes like this, and I'll show you at the end of the talk a much nicer simulation that looks like the real sky.

So let's trace the early stages of the Big Bang, but we still don't know what exploded and why.

This is the challenge of 21st century science.

If my research team had a logo, it would look something like this - Ouroboros, with the microscopic world on the left - the quantum world - and on the right is the cosmic scale of planets, stars and galaxies.

Our universe is linked and integrated with these left and right worlds.

The everyday world is made up of atoms sticking together to form molecules.

Stars produce energy through reactions between the nuclei within their atoms.

Over the last few years, research has shown that galaxies are pulled together by the gravitational pull of so-called dark matter, particles that are much smaller than atomic nuclei but form large clusters.

I want to know this integration relationship symbolically written at the top of the diagram.

I understand the micro world by quantum

The right side is dominated by gravity, which Einstein figured out.

What 21st-century science has yet to solve is the unification theory that connects the universe and the microscopic world -- you can see that delicious picture at the top of the diagram.

And we need a theory that connects the gigantic scale with the microscale, which we don't have.

It just occurred to me that I'm starting to think that there was more than one big bang when I saw this "Caution!" sign.

There is also the idea that our three-dimensional world is embedded in a higher-dimensional space. Imagine something like these two sheets of paper.

The ants that live here think they're in a two-dimensional world, and they don't notice the ants in the other world.

There may be other worlds just a few millimeters away from the one we live in. Just a few millimeters away, but it's a fourth dimension, so we can't see it when we're trapped in a three-dimensional world.

In this way, I believe that there is an entity of the universe that is different from the general universe that has been believed by the big bang theory.

The bottom right represents our universe, the horizon belongs to this universe, but what looks like a single bubble is a giant entity.

Many people have expanded their thinking from just one solar system to millions of solar systems and from one galaxy to many galaxies, but now we're beginning to wonder if there were many big bangs, not just one.

Let's go back to this picture

The top part of the picture is the hardest part to figure out, but there's another part, right below, that's also a challenge for science.

I'd like to know not only the unification of physics on the huge scale and the microscopic scale, but also the complex physics in between.

The most complex is ourselves, somewhere between atoms and stars.

We are made up of atoms made by stars.

Our complex structures depend on chemistry.

It's clearly a much larger scale than an atom, and it's a complex structure with many layers.

We should be small compared to stars and planets, otherwise -- we'd be crushed by gravity -- in fact, somewhere in between.

If you put together as many people as there are atoms in your body, you'd have the mass of the sun.

The geometric mean of the mass of the proton and the mass of the sun is 50 kg, and your masses here are in the range of up to twice that.

most people are

The science of complex systems is probably the most difficult field, more difficult than the small world on the left and the big world on the right.

This field of science is not only unlocking the biological world, it's rapidly changing the way we live.

There is something new in the way that change itself

Now let's move on to the second topic, which is my book, "Our Final Century."

I'm not a typical Englishman, so I'll show you my book.Yes, it's also available in paperback.

(Laughter) In America, it's called "Our Final Hour," because Americans are impatient.

(Laughter) But today's topic is this century. Science is not only changing the world faster than ever before, it's changing it in new and different ways.

There will be targeted drugs, genetic manipulation, artificial intelligence, and perhaps even implanting devices in the brain.

There may be changes in this century

new in human history

Humans are impacting the planet's environment - greenhouse effects, mass extinctions, etc. - also unprecedented.

As a result, many challenges lie ahead in this century.

Biotechnology and cyber technology have a small impact on the environment, they have great prospects, but they can consume less energy and resources.

But there are also negative sides

In an interconnected world, great technology might empower one lunatic or a few freaks to wreak havoc with a computer virus.

In fact, the catastrophe may not be a deliberate act of terrorism, but merely a technical accident.

If the impact is global, even the slightest chance of catastrophe is unacceptable.

In fact, a few years ago, Bill Joy wrote a serious story about the potential for robots to rule the world.

I disagree with this, but Joy's simple solution is interesting.

It's called "fine-grained renunciation."

Abandon the dangerous kind of science and leave only the good. He's stupidly naive for two reasons.

First, every scientific discovery has a harmless side and a dangerous side.

When scientists discover something, they have no idea of ​​its application.

So, when you want to reap the benefits of science, you also have to be willing to take risks.

We should be prepared for the danger that awaits us

We should look back at what happened after the war. After World War II, many of the nuclear scientists involved in the building of atomic bombs seriously thought that we should warn the world about the dangers of nuclear weapons.

They were inspired not by the young Einstein with his remarkable achievement in relativity, but by the old Einstein, whose posters and T-shirts symbolized his failed attempt to unify the laws of physics.

His theory was incomplete, but it provided a moral compass for scientists interested in disarmament.

The most amazing person I know alive is Joe Rothblatt.

As you can see, his room is all messy.

He's 96, and he once started the Pugwash movement.

As a final act, he persuaded Einstein to sign Bertrand Russell's famous memorandum.

He was also a concerned scientist.

We're thinking about which aspects to keep, and which ones to suppress, and for the latter, we need someone like Joseph Rothblatt.

We don't just push physics, we need biologists, we need computer experts, we need environmentalists.

I think academics and independent entrepreneurs have a special obligation, because they have more freedom than employees of government-affiliated organizations or companies under commercial pressure.

I wrote "Our Final Century" as a scientist in general because I had a concern, and as a cosmologist, I wanted to offer a particular perspective, a perception of the far future.

Evolution took an incredible amount of time, and it's now common knowledge -- except in the Bible region of America -- (Laughter) that even many people familiar with evolution don't pay attention to the fact that there's a much longer time ahead.

The sun has been shining for 4.5 billion years, but it still has 6 billion years left before it runs out of fuel.

We're still about halfway through this conceptual diagram of the flow of time.

We still have six billion years before the end, and life on Earth is disappearing.

I have no doubt that human beings will exist until the sun is about to die, which tends to be the case.

There's a tremendous amount of time left for the evolution of intelligence and complexity on Earth, or perhaps extraterrestrial.

The evolution of complexity on and off Earth is just beginning.

If you compare the life of the earth to one year from January to December, the 21st century is just a quarter of a second in June - a fraction of a year.

But even from this astronomical point of view, this century is very, very special.

As I said earlier, it's not the humans who will see the death of the sun. Life is as different from humans as humans are to bacteria.

When Einstein died in 1955, a world-famous cartoon tribute to him was written by Harbrock for The Washington Post.

It says, "Einstein used to live here."

Let's end the story with this little photo that touched me.

In this image we've been familiar with for 40 years, the ephemeral beauty of land, oceans and clouds contrasts with the barren lunar landscape where astronauts have left their footprints.

But imagine that aliens have been watching this pale dot from far away space, not just for 40 years, but for the entire 4.5 billion years of Earth's history.

what will they see?

Earth would have changed very slowly over a long period of time.

The only sudden change would have been the impact of a large meteorite or a massive volcanic eruption.

Except for such disasters, there were no sudden events.

the continent moves

The ice covering the surface is melting

One new species after another was born, evolved, and died out.

But in that tiny fraction of Earth's history, the last millionth, or millennia, vegetation patterns changed at an unprecedented rate.

This means the beginning of agriculture

Change accelerated with population growth

what happened more quickly

In just the last 50 years, in one-hundred-millionth of the Earth's age, the amount of carbon dioxide in the atmosphere has begun to increase at an ominously rapid rate.

On this planet, the strength of radio waves emitted by televisions, cell phones, and even radars has increased, and not only that.

Metal objects -- very small, a few tons at most -- began to fly out of Earth's orbit.

some traveled to the moon and other planets

Evolved extraterrestrials will observe our solar system from a distance and confidently predict the fate of our planet over the next six billion years.

But could they have predicted it? An unprecedented change occurred in less than half of the earth's lifetime.

that the changes caused by mankind happened at an incredible speed in less than a millionth of a time.

What will this hypothetical alien witness see if it continues its surveillance for a few hundred more years?

Will something happen suddenly and the earth will come to an end?

Or will stability come to the biosphere?

Or will a metal object fly out of the earth and create a new oasis somewhere and live a new human life?

The science that young Einstein created will last as long as civilization exists, but civilization needs the human, big-picture, forward-looking wisdom of old Einstein to survive.

Whatever happens in this peculiarly important century, it will have repercussions in the distant future, and, as I said, perhaps even far beyond the Earth.

thank you very much

(applause)

We make decisions every day about what is the right thing to do -- from financial matters to food to work to love.

And indeed, if there was someone who always taught me how to do the right thing, that would be a wonderful gift.

In fact, the world was given this gift in 1738 by the Dutch polymath Daniel Bernoulli.

Today I would like to explain what this gift is and why this generous gift is not working at all.

Now this is Bernoulli's gift This is the original quote

looks greek? yes it's greek

Here's a simple English translation -- not exactly accurate, but one that captures the point Bernoulli was trying to make: The expected value of our actions -- the benefits we can expect to get -- consists of two simple things: the odds of us getting something, and the value it brings to us.

In a sense, what Bernoulli was saying is that if we measure these two things and multiply them together, we will always know exactly how we should behave.

Now, this simple equation looks familiar even to people who don't like equations.

Here's an example. Let's say you play a coin toss game and get 10 dollars for heads, but you have to pay 4 dollars to play this game.

This is, according to statisticians, a very good bet.

Now, while this idea is simple when applied to coin tossing, it's not so straightforward in everyday life.

People are really bad at predicting these things, and that's what I want to talk to you about today.

There are two kinds of mistakes that people make when trying to decide the right course of action: mistakes in estimating the probability of success and mistakes in estimating the value of success.

Let's start with the first mistake

Calculating probability may seem simple: a dice has 6 sides, a coin has 2 sides, and a playing card has 52 cards.

We know how likely we are to draw an ace of spades or to land a coin heads.

But when it comes to everyday life, it's not that simple. Here's why Americans spend more money gambling than all other pastimes combined -- no, they lose money gambling.

people don't use exact probabilities

To see how people come up with probabilities, I'm going to start by talking about pigs.

One day in Oxford Dogs on leashes or pigs Which do you think you'll see more often?

Of course, we all know the answer is a dog.

I know the answer is a dog because I can quickly recall a scene where a dog or a pig was on a leash.

Dogs are easy to remember, but pigs aren't so easy, and if dogs on leashes come to mind sooner, then dogs are more likely.

This rule of thumb isn't bad, except in one case.

For example here is a word puzzle

In four-letter words, which is more likely, the R comes third -- or comes first?

I can quickly recall and check my memory and can say RING, RANG, RUNG, etc. very easily, but PARE, PARK, etc. are difficult and difficult to remember.

But in reality, there are more English words that have an R in the third position than in the first.

The reason why it's hard to come up with words that come with the third letter "R" is not because we don't use those words very often, or because there aren't many words.

because you remember words from their initials

Like making the S sound and then coming up with a word

Like a dictionary, it's hard to look up from the third letter.

This is one of those examples that confuses and instills in you the idea that the faster things come to mind, the more likely they are to happen. This isn't just about games.

For example, if you were to ask the probability that an American would die from a variety of odd causes -- here's an estimate of the number of deaths per year for 200 million Americans.

I asked him how many people he thought would die from tornadoes, fireworks, asthma, drowning.

Compare these with the actual numbers

We see a very interesting pattern. First, two causes of death are overestimated: tornadoes and fireworks.

And two causes of death are much underestimated, and they're drowning and asthma. Why?

Have you ever seen a newspaper headline that said: "boy dies of asthma"

too general to be of interest

It's so easy for us to think of news stories and images of tornadoes destroying cities, or idiots blowing their hands off with fireworks on Independence Day.

Drowning and asthma deaths aren't often reported.

We can't immediately recall it, and as a result, we underestimate the cause of death.

It's kind of like a game of Sesame Street, "Which one is the ostracist?"

More people are likely to die than the other three on the slide combined.

As you know, the lottery is a great example of how you can see people's ability to predict odds.

And among economists -- I apologize to lottery ticket buyers -- the lottery is called the tax that the idiots pay, because the odds of making a profit by investing in lottery tickets are so low that it's almost like flushing your money straight down the toilet -- by the way, you don't have to go to the store and buy it.

why would you buy a lottery ticket

There are many answers, but one thing is certain: we will see many winners, right? This couple won the lottery, or Ed McMahan shows up on your doorstep with a big check -- how in the world do you cash something this size?

We see this on TV and read it in the newspaper.

You've never seen interviews with lottery losers, have you?

If you oblige a TV station to interview each winner for 30 seconds each time it interviews a winner, you'd have to interview 100 million people for nine and a half years without a break, just to see them say, "I'm wrong, I'm wrong."

Now, if you've been watching TV for nine and a half years -- no sleep, no trips to the bathroom -- you've seen it lost, lost, lost, and at the end of that 30-second interview saying, "I won," you probably won't buy a lottery ticket.

let's prove this

Here are 10 lottery tickets

9 people bought 9 of them

This lottery ticket is $1. If you win, you get $20. Is this a good bet?

Bernoulli says

The expected value of this lottery ticket is $2 This is a lottery ticket worth investing in

And most people say "of course buy"

So here's a slightly different version of this lottery ticket: the nine tickets were bought by a fat guy named Leroy.

Leroy has 9 cards, 1 card left

would you like to buy? most people wouldn't buy

Even though the odds of winning the lottery haven't changed, it's now very easy to imagine who will win.

It seems certain that Leroy will win, right?

You can't say, "I'm as likely to win as anyone else," because I'm not as likely to win as Leroy.

The fact that one man owns the whole lottery can change your decision to buy a lottery ticket, even if it doesn't affect your odds in any way.

Now, measuring probability may seem difficult, but it's nothing compared to measuring value. Think about what something is worth, how much we enjoy it, how much pleasure it brings us.

I'm going to talk to you about the error in value.

How much is this Big Mac? $25?

Most people have a gut feeling that they won't pay that much, and they won't pay that much.

But really, to decide if a Big Mac is worth $25, all you have to do is ask, "What else can you do with $25?"

If you're on a long-haul flight to Australia, and you realize there's no food, and the person in the front row unpacks the McDonald's and a delicious aroma wafts through your seat, you think, 'There's nothing else you can do for $25 for 16 hours.

Even light a bill - because the cigarette lighter was taken

Suddenly a $25 Big Mac seems like a good deal

On the other hand, if you're visiting an underdeveloped country, $25 can buy you a fancy meal and a Big Mac seems outrageous.

Why did you assume the answer to the question was no before I even told you the situation?

Because most of you compared it to the price of a Big Mac that you're paying all the time. Instead of comparing this investment to other investments and asking, "What else can I do with this money?" you compared it to the past.

And this is the mistake people make all the time.

All you know is that $25 is exorbitant for having spent $3 in the past.

This is wrong, and I will try to prove it by showing you an absurd case that arises from this.

For example, here's an example of one of the most delicious marketing tricks to make something that was expensive suddenly look like a bargain.

When people are presented with two jobs, one that pays $60,000, then $50,000, then $40,000 every year, and one that pays more and more, they prefer the second job to the first, even though they are told that the latter pays much less. Why?

Because they have the feeling that going down pay is worse than going up, even if the total pay going down is higher.

A $2000 Hawaii vacation package is on sale for $1600

Would you buy this pack if you wanted to go to Hawaii?

Most people will buy it. Now, it's a little bit different. A $2,000 vacation package to Hawaii is $700. Think about it for a week.

When I went to the travel agency, the bargain was gone - the package now costs $1,500. Would you like to buy it? most people say no

I wonder why? Because you can't pay $1,500 for something that just last week was $700.

It's this tendency to make comparisons to the past that causes people to miss out on better deals.

Here's another example of how comparisons with the past can derail our choices.

Imagine going to the theater

you are on your way to the theater

I have a ticket I bought for $20 in my wallet

you also have a $20 bill

When you get to the theater, you realize you've lost your ticket somewhere along the way.

Would you pay to buy another ticket?

most people answer no

Now let's change this scenario in one place.

You're on your way to the theater and you have two $20 bills in your wallet.

When I get to the theater, I realize I've lost one of them.

Would you buy a ticket with the remaining $20?

Yes, of course. I came to the theater to see a play.

What does that have to do with the $20 you lost along the way?

If you don't understand, here's a diagram, okay?

(Laughter) Along the way, you lose something.

In both cases it's a piece of paper

One side has the President of the United States The other side does not

What's the difference?

The difference is that when you lose your ticket, you remind yourself that you're not going to pay for the same thing twice.

You compare the price of the play -- now $40 -- to the original price -- $20 -- and you say it's a bad deal.

Behavioral economists and psychologists say that most of the problems people have in assigning value are in comparison to the past.

But we make some mistakes, even when we compare possibilities instead of the past.

I'm going to show you an example or two.

One of the things we know about comparison is that when you compare something to something else, its value changes.

So in 1992, this guy, George Bush, didn't look all that great in the eyes of the politically liberal public.

suddenly we long for him to come back

(Laughter) Comparison changes how you rate him.

Now retailers, of course, know this better than anyone else, and they use this knowledge to help you -- to get you to spend more money.

Suppose you go to a retail wine store and you have to buy a bottle of wine, and you have $8, $27, $33, what do you do?

Most people don't want the most expensive wine or the cheapest wine.

choose the middle one

A smart retailer would put a very expensive wine on the shelf that no one would buy, because suddenly a $33 wine doesn't look so expensive in comparison.

I'm talking about something you already know, that comparison changes the value of things.

And the reason it's a problem is that when you take that $33 bottle of wine home, it doesn't matter what was next to the shelf.

The comparisons that we make when estimating value, how much we like a product, are not the same comparisons that we make when consuming the product.

It's this shift in comparison that makes us so confused when it comes to making rational choices.

Let me give you an example

I have something from my lab that I'd like to show you.

We asked participants in the experiment a simple question: How much would you enjoy eating potato chips one minute later? and

They're sitting in the room with potato chips in front of them.

In the corner of one subject's room is a box of Godiva chocolates, and in the other subject's side is a can of Spam.

In fact, these items change participants' expectations of how much they enjoy potato chips.

In other words, subjects looking at Spam thought potato chips would be very tasty, and those looking at Godiva chocolates thought they didn't look so appetizing.

Of course if they actually ate potato chips?

You don't need to ask a psychologist to know that what's in the corner of your room makes no difference to your taste buds -- when you're eating a delicious snack -- mouthfuls of oil, salt and crisps.

Yet their expectations are derailed by comparisons that neither last long nor alter their experience.

Even if you don't come to our lab to eat potato chips, you've probably experienced it yourself. So here's the question. You want to buy a car stereo.

My local dealer sells a stereo for $200, but if you drive across town you can get one for $100.

Would you go across town to save half the $100?

most people say go

I can't imagine paying double the price when it's half the price just to go to the other side of town.

So let's say you're looking for a car with a stereo instead, and your local dealer sells it for $31,000.

But if you drive to the other side of town, you can get it for $30,900.

Are you going? $100 at this point is a savings of 0.003 percent

Most people say they don't bother going across town to save $100 on a car purchase.

This kind of thinking is a funny thing that frustrates economists.

Because the $100 you saved is—hey! ― Where did you come from?

It doesn't matter what you save

And when you go to buy groceries with that money, that $100, I wouldn't say it's money saved on a car stereo or money saved on a car, because it's money.

And if it's worth $100 to go across town, whatever you save is worth $100, but people don't think that way.

That's why you don't know if the fee that a mutual fund manager takes is 0.1 percent or 0.15 percent, but you cut out the $1 coupon for toothpaste.

Now, you can see that this is a comparison-shifting problem, because you compare the $100 to what you buy, but when you spend that money, you don't compare.

I'm sure you've experienced something like that

If you're American, for example, you've probably been to France.

And somewhere along the line, you may have met a couple who are from the same place as you, and you think, "How warm and kind these people are to me.

People in this country don't like it when I speak French -- they look even worse when I don't speak it, but these people are wonderful." So you take them on a tour of France, and when you get home, you invite them to dinner. And what do you think?

Are they boring and uninteresting compared to your usual friends? Because in this new situation, the comparisons are wildly different, and in fact, I hate them as much as I hate being granted French citizenship.

Now, when you buy a stereo, you run into exactly the same problem.

You go to a stereo store and you find a set of two speakers, one big and ugly and the other small and fancy.

You buy it and take it home and it completely ruins your home decor.

The problem, of course, is that the comparisons you made in the store are comparisons you'll never make again.

Do you have any hopes that in a few years you'll turn on your stereo and say, 'It sounds so much better than that little one'? I can't even remember the sound

The problem of changing comparisons becomes more difficult the larger the time interval between these choices.

People are bad at making choices about events that are staggered.

And what psychologists and behavioral economists have discovered is that most people use two simple laws.

I'm going to give you a very easy problem, a second easiest problem, and then a hard problem.

It's an easy question to start with.You can now get $50 or $60.Which would you like?

This is a very simple IQ test OK?

We all choose to have more money, because more is better than less.

Second question, do you want $60 today or $60 in a month?

It's also easy, because we all know it's better now than later.

It's when these two rules collide that it's hard to make decisions.

For example, $50 now or $60 in a month.

This is a classic example of many everyday situations where waiting pays a lot but requires patience.

What do you know? What would a person do in such a situation?

People are generally very impatient

So to put off the fun of getting that extra $10 and wait a month, you need interest from 100 percent to a few thousand percent.

This probably isn't all that surprising, but it's surprising how quickly this impatience can disappear just by changing the timing of these money transfers.

Imagine you get $50 in 12 months, or $60 in 13 months.

Well what will happen?

People will be happy to wait 12 months, they can wait 13 months.

What causes this constant contradiction?

It's a comparison Awkward comparison Look at this

If you take the time to answer them, you'll end up with a graph like the one I talked about earlier, which means that the subjective value of $50 is higher than the subjective value of $60 now or one month from now, or 30 days from now, but if you postpone all your decisions to a year later, you'll get the opposite result.

So why is this happening?

they will tell

Here are two young men, one bigger than the other, a firefighter and a fiddler.

They recede back until they disappeared into the horizon.

Everywhere you look, a firefighter looks bigger than a fiddler, everywhere.

But the difference between them seems to be getting smaller and smaller.

First one inch, then ½ inch, ¼ inch, and then finally disappearing at the edge of the earth.

This is the result of what I just showed you

This is the subjective height - the height as you see them from different positions.

And notice two facts

First, they look smaller the farther they go, and second, firefighters are always bigger than fiddlers.

But look what happens when you erase some of them.

At close range, the fiddler appears to be taller than the firefighter, but at a greater distance, their actual heights are kept in relation to each other.

As Plato said, distance is to size what time is to value.

So here's the result of the hard question I asked you, is it 50 dollars now or 60 dollars a month from now?

These are subjective values, and what you're seeing here is that the two rules above are being followed.

People always think that more is better than less -- 60 is better than 50 -- and it's better now than later, so the bar on this side is higher than the bar next door.

What if we take away some conditions?

All of a sudden we're in a terrible contradiction that's confusing our heads.

We tend to think we'd rather get $50 now than wait a month, but this is when those actions aren't that far in the future.

The interesting thing that this shows is that people change their minds over time.

You're approaching your 12th month and you say, What were you thinking, waiting another month for $60?

I'll give you $50 now

Well, I'd like to end with this last question: How could we get to the moon if we were so stupid?

A little over two hours is enough to prove that humans are bad at calculating probabilities and values.

You've already heard the answer to this question in other TED talks, and I think you'll hear it again, because our brains have evolved to adapt to a world that's very different from the one we live in.

Our brains evolved in a world where people lived in small groups, rarely met people who were very different from them, had shorter lives, had fewer options, and prioritized eating and producing offspring.

Bernoulli's gift Bernoulli's equations teach us how to think in a world that nature didn't design.

That's why we're so bad at using that gift -- and it's important that we learn to use it quickly.

We are the only seeds on this planet that can control our own destiny

We can control our environment without fear of predation, and events that would normally cause species extinction are no longer a threat to us.

The only thing - the only thing that can destroy us and destroy us is our own choices.

If humans don't exist 10,000 years from now, it's because we didn't make the best use of the gift that Dutch youth gave us in 1738, because we underestimated the potential for pain in the future and overestimated the value of present pleasure.

thank you

(Applause) Chris Anderson: Great speech.

We have time to ask questions to Dan Gilbert, the first and the second.

Bill Lyle: Are these habits of thinking part of the reason we actually feel threatened by terrorism?

Dan Gilbert: Actually, recently, I was an adviser to the U.S. Department of Homeland Security, who believes that the security budget should be spent more on border security.

I pointed out that "terrorism" is the name for people's psychological reactions to certain events, and that if we fear terrorism, it's better not to prevent the atrocities that we all fear -- but in addition, to look at what causes it and how to reduce it.

It's true that terrorism gets a lot of attention, at least in the American media, but excuse me - it's a very small accident if you just look at the numbers.

As we all know, for example, in the United States, more people have died in road accidents because they were afraid to fly, so they took the highways than the September 11 attacks, right?

If I told you that 15,000 Americans would die from an epidemic next year, people would be upset unless they knew it was the flu.

Terrorism is a relatively small-scale incident, and we should consider whether the current media treatment is appropriate.

The media overreaction makes people overestimate the odds of being involved in these events, empowering those who try to scare us.

Chris: I'd love to hear more about that. Are you saying that our response to terrorism is sort of a psychological flaw?

please explain a little more

Dan: Our reaction is exaggerated.

For example, if Australia were to suddenly disappear tomorrow, fear would probably be an appropriate response.

Because a lot of really good people die. On the other hand, if a bus explodes and 30 people die, more people die in the same country because they don't fasten their seatbelts.

Is fear an appropriate response?

Chris: What causes this psychological defect? Dramatic of the event? Is it eye-catching?

Is it because it is a deliberate attack by "outsiders" and "people who are different from us"?

what is it?

Dan: Well, there are many reasons, including what Chris said.

First of all, it's the humans who are trying to kill us, and it's not like a tree accidentally falling on us.

Second, this enemy may also attack us and deal damage.

Some people die for a reason, while others are killed for no reason. Of course, there is no good reason to die, but sometimes I think there is.

All of these factors combine to make us think it's an extraordinary event. But let's not forget that newspapers sell when they publish what their subscribers want to read.

Chris: So how do we get the media to downplay the case?

Let's take Israel.

An Israeli mother said, "I will not give in to them by canceling the wedding."

So this is -- and there are other examples -- a society that has learned to live in the midst of a certain amount of terrorism and not be shaken by it, unlike a country like ours where terrorism is rare.

But in fact, rational fear, can we also anticipate and fear a decisive attack such as September 11th?

Dan: Yes, of course, but if this was the worst attack in history, and if 30 people were killed in Busterrorism were to happen more frequently in the future, we wouldn't be so afraid.

I'm not saying, "Terrorism is fine. Don't worry."

that's not what i mean

What I'm saying is that it's certainly rational that our anxiety about certain events and threats should be roughly commensurate with the magnitude of those threats and the threats to come.

In the case of terrorism, I think it's out of proportion.

We heard a lot of people talk today - how many people spoke so powerfully? It's "poverty." The impact of poverty on us is unbelievable.

But in everyday life, most people don't care about the problem of poverty.

It doesn't make headlines, it doesn't make the news, it doesn't attract attention.

no guns are fired

So if you could only solve one of these two problems, Chris, which one would you solve? Terrorism or Poverty?

(Laughter) (Applause) It's difficult.

Chris: Without a doubt

Poverty is a much bigger problem than terrorism, unless it can be proven that terrorists with nuclear weapons are actually likely to come.

I recently read that it would be very difficult for a terrorist to carry out a nuclear attack.

But if that's wrong, we're fools, but there's also a little bit more -- Dan: Even with the nuclear attacks, the death toll from poverty is still higher.

Chris: We've evolved to be excited by such dramatic attacks. Is it because in the past, long ago, we didn't understand the mechanisms that cause disease and poverty, so it just didn't make sense for us humans to spend our energy worrying about them?

people died and it was seen as inevitable

But if you're attacked, you can do something about it.

have evolved such reactions

Is that so?

Dan: Evolutionary psychologists themselves are the most skeptical of the evolutionary explanation for everything.

I don't think there's been anything special about our evolutionary past, but -- if you look for an evolutionary explanation, you might say that most organisms have neophobia -- that is, they're a little afraid of the new and foreign.

There's a reason it's always been there, it won't eat you, right?

Animals you've seen are less likely to be predators than animals you've never seen

So when a school bus explodes, you've never seen anything like it before, so you have a general tendency to look at things that are new and wacky.

I don't think it's the specific mechanism that Chris mentioned, but I think it's more of a fundamental mechanism.

Jay Walker: Economists love to talk about the stupidity of people who buy lottery tickets, but I think you're making the very same mistake of blaming those people, the value error.

I know this because I've interviewed about 1,000 lottery ticket buyers over the years.

The value of buying a lottery ticket, as Dan thinks

It wasn't about that, do you understand?

Lottery buyers, on average, buy about 150 lottery tickets a year, and they know they're going to lose, but they still buy 150 tickets a year. Why?

it's not because he's an idiot

The anticipation that you might win releases serotonin in your brain, which actually makes you feel good until you know you missed.

In other words, a dollar investment can make you feel a lot better than flushing money down the toilet, which doesn't feel good.

Economists -- (Applause) Economists tend to see the world from their point of view, and all they see is a crowd of idiots.

As a result, many people think economists are idiots.

So the reason we got to the moon in the first place was because we didn't listen to the economists.

(Applause) Dan: That's a good point. It's just that it hasn't been proven that the anticipatory joy before the lottery is exactly the same as the disappointment after the lottery.

I disagree that you are fully aware that you will not be hit.

I think the odds of winning are low, but the potential remains, so people buy lottery tickets instead of flushing them down the toilet.

But Jay does have a point: there are benefits to buying lottery tickets other than winning.

Well, there are many reasons why you shouldn't listen to economists.

To me, this story is different, but there are many others.

Chris: Last question.

I'm Aubry da Gray and I'm from Cambridge.

I study the thing that kills more people than any cause of death: aging.

I really agree with what you're saying, because I think one of the things that makes it hard for me to get people interested in anti-aging is because people think that people don't die of old age, they die of cancer, heart disease, and so on. Do you have any advice?

(laughs) Dan: Mr. Aubry or everyone?

Aubry: So that I can persuade you

Dan: Oh so you can convince everyone

Making people have foresight is, as you know, incredibly difficult.

But one way that psychologists have discovered that seems to work is to get people to imagine the future more vividly.

One of the problems with making decisions about the far future and the near future is that we can imagine the near future much more vividly than the distant future.

The more detailed you let people imagine the distant future and the nearer future in their minds, the more similar their decisions about the two futures will be.

Asking if you want another $100,000 when you're 65 isn't asking you to imagine what you'll look like when you're 65. Will you still be alive?

And when all of those imaginary scenarios come together, we suddenly think it's important to save money and prepare for retirement.

But these methods of persuading people are not very effective.

I'm Aubrey, and I think in general you're fighting a very basic human tendency to say, "I'm here today, so the present is more important than the future."

Chris: Thank you, Mr. Dan. Dear audience, it was a great meeting. Thank you.

(applause)

In 1593, in Nördlingen, Germany, innkeeper Maria Holl was accused of being a witch.

She was arrested for questioning but denied the charges.

She was tortured 62 times by her accusers, but was finally released after insisting she was not a witch.

Rebecca Lemp, who was accused in the same town a few years ago, had more bad luck.

From prison, she wrote to her husband, expressing her fear that she would be tortured and confessed despite her innocence.

After making a false confession, she was burned at the stake in front of her family.

Both Hol and Lemp were victims of witch-hunting, which took place in Europe and the colonies of the United States from the late 15th century to the early 18th century.

Witch hunts weren't led by a single authority and carried out in a unified manner, but were sporadic phenomena that followed similar patterns each time.

The term "witch" has many meanings, but in witch hunts, it's said that someone who has magical powers by following Satan rather than God.

The definition of witchcraft spread from the Western European churches beginning in the late 15th century.

It gained momentum in 1485 when the pope authorized a monk and professor of theology named Heinrich Kramer to interrogate the hunt for witches.

An initial search in the town of Innsbruck did not garner much support from the local authorities, who refused to accept the ruthless interrogation of sober citizens and called off the trial.

Undeterred, he wrote a book called "The Hammer for Witches."

In that book, he laid out a ruthless ruse to preach, hunt, and prosecute witches.

It was possible that there were male wizards who were inspired by demons, but as an easy target he targeted only women.

Cramer's book spurred others to write and preach the dangers of witchcraft.

According to these books, witches' rituals included kissing the devil's anus, poisoning and cursing those whom the devil chose.

There was no evidence to substantiate these claims, but the idea that witches existed was widespread.

Witch hunts usually started with an unfortunate event - a crop failure, a sick cow or a stillbirth.

Residents blamed witchcraft and accused each other of being witches.

Many of those accused were marginalized, the elderly, the poor, the marginalized, but anyone in the population could be targeted, children being no exception.

Religious authorities encouraged witch-hunting, but local governments, supposedly secular, were responsible for detaining and punishing the accused witches.

Those suspected of using witchcraft were interrogated and many were tortured, during which time many innocent people confessed to using witchcraft, in turn implicating others.

Because witch hunts have been sporadically carried out across continents for hundreds of years, there was a big difference in how they were carried out.

Punishments for accused witches ranged from small fines to burning at the stake.

The witch hunts accused of Hol and Lemp lasted nine years, some lasting just a few months.

The number of victims varied from a few to hundreds.

The motives of those who hunt witches probably differed, too. Many did not appear to be consciously trying to incriminate anyone, but instead genuinely believed in witchcraft and thought they were doing good by seeking out witches from their communities.

It allowed organizations in power to actually persecute on the basis of this idea.

But there have always been opponents, jurists, scholars, doctors, and others, who have written books countering Cramer's Hammer for Witches and others, pointing out the brutality of witch-hunting, the use of coercive confessions, and the lack of evidence for witchcraft.

In the late 17th century and mid-18th century, these debates were fueled by the rise of more powerful central governments and laws such as due process.

The witch hunt slowly died down until it completely disappeared.

This violent act began and ended in a seemingly mundane situation.

While there is still the possibility that those in power can use their power to influence society in response to false threats, there is also the power to theoretically challenge and counter such errors.

Insulin pumps are improving the lives of 415 million people with diabetes worldwide by monitoring their blood sugar levels and injecting insulin, without the need for constant fingertips and blood tests.

With a pump and a needle, these little devices measure blood sugar, feed it back to the pump, and then calculate how much insulin to infuse.

But there's a problem: it's only temporary.

I need to replace my blood glucose sensor within a few days

This is not just a problem with blood glucose meters or insulin pumps, but with all implants in the body on different timescales.

In the case of artificial knee joints made of plastic, they need to be replaced after about 20 years.

Other implants, such as those used in cosmetic surgery, will suffer the same fate in a decade or so.

Not only is it cumbersome, it's also expensive and dangerous.

This inconvenience is caused by the body's immune system.

Honed by hundreds of millions of years of evolution, these front lines of defense have dramatically improved foreign object detection.

Our immune system has an amazing mechanism for attacking, interfering and destroying anything that shouldn't be there.

But as a result of constant surveillance, useful implants like insulin pumps are under the same suspicion as harmful viruses and bacteria.

As soon as the insulin pump is implanted through the skin, its presence triggers a "foreign body reaction," which begins with the attachment of free-floating proteins to the surface of the implant.

This protein contains antibodies that try to neutralize the unfamiliar substance and send signals to other immune cells to step up the attack.

Early responders -- inflammatory cells like neutrophils and macrophages respond to this danger signal.

Neutrophils release enzyme-rich granules that try to break down the surface of the insulin pump needle.

Macrophages, along with the radical molecule nitric oxide, also secrete enzymes that initiate chemical reactions that accelerate the decay of matter.

When macrophages can't quickly "eat" a foreign object, they fuse together to form a clump of cells called "giant cells." At the same time, cells called fibroblasts migrate to the point and begin to build up layers of dense connective tissue.

The pump delivers insulin, and these cells coat the needles used to measure blood sugar levels.

Deposits build up over time and create scars around the implant.

This scar can act like a solid fortress, blocking important interactions between the body and the implant.

For example, a scar around a pacemaker can interfere with the transmission of electrical signals that are essential for it to function.

As the artificial knee joint wears out, it releases small particles, and immune cells around these particles may become inflamed.

Tragically, immune system attacks can be life-threatening.

But researchers are finding ways to trick the immune system into accepting new devices implanted in the body's tissues.

We discovered that coating the surface of implants with certain chemicals and drugs can suppress the immune response.

They basically hide the implant from the immune system.

Also, by making more implants using natural materials to mimic body tissue, it's a weaker attack than if the body were to come across a completely artificial implant.

Some treatments that use implants are intended to regenerate tissue that has been lost or damaged.

In that case, a possible implant design would be to include components that produce specific signals and carefully alter the immune system.

In the future, working with the immune system in this way may help us develop fully artificial organs, fully integrated prosthetic limbs, and self-healing wound treatments.

These treatments may one day revolutionize medicine and reshape our bodies forever.

At the beginning of my career, I searched for unusual creatures in unusual places, and at that time, I explored the Antarctic, the Arctic, deserts everywhere.

After getting interested in caves a decade or so ago, I turned my research to caves.

Everyday research was a lot of fun and I was able to do some really amazing work.

Visit one of the toughest caves on earth

It felt life-threatening, but the caves were all so fascinating, so incredible, full of biological mysteries, almost impossible to believe they were on Earth.

Biology, mineralogy, geomicrobiology, in addition to exploring its original purpose, we use our research findings to search for life on other planets.

They're particularly interested in Europa, the small moons of Mars and Jupiter that are covered in ice.

And perhaps in the future, beyond our solar system.

My passion is the future of humanity on the Moon, Mars and other planets in our solar system.

It's time for humanity to look at civilizations and life throughout the solar system.

And these findings make us ponder whether we can or should send life on Earth to other planets.

Mars is especially noteworthy

What I don't talk about at conferences is how I got to where I am today and why I didn't do a normal job

are you doing this research

It's the Soviet Union's fault, of course.

In the mid-1950s, when I was just a little kid, the Soviet Union boldly launched a small, rudimentary satellite called Sputnik, to the great dismay of the Western world.

And millions of dollars were poured into advancing science and educating children in mathematics.

I, like all my colleagues, are a product of that time.

It really kindled us It would be great if we could do it again

Of course, you can refuse to grow up, and you can pretend to be an adult in your daily life.

Among other factors, my metric is simply that the existence of life is better than the absence of it.

Existence itself has value

I think this attitude is shared by everyone in this room.

Of course, I'm very interested in Mars, and the Viking lander landed on Mars when I was an undergraduate.

Mars, once seen as just a small celestial body in the sky, just a point, became a reality through the first blurry images on the screen.

The Mars landscape became a goal and changed my life.

When I was in graduate school, my colleague, teacher, friend, Dr. Steve Schneider, at the American Center for Atmospheric Research, was studying global change.

We wrote a lot of papers about the role of Gaia theory. We wrote a lot of papers about the role of Gaia theory.

It's great research, it's horrifying research.

But through my research, I've learned to see the Earth as a planet rather than a home.

It's been a wonderful shift in thinking about the nature of the Earth as a life-sustaining planet.

I see these as turning points in history.

We are about to leave our home planet and prepare to depart for the solar system and beyond.

Let's go back to Mars

How difficult is it to find life on Mars?

Finding each other is very difficult, even on Earth.

Finding life on other planets is not an easy task, and we spend a lot of time thinking about it.

Whether or not we find it will depend on how we think about the possibility of life in the universe.

My view is that life is the natural result of the advanced evolution of matter over many years.

Starting with the big bang, hydrogen is born, helium is born, more complex matter is born, planets are born, and I think life is a planetary phenomenon as well.

In the last 15 years, we've discovered many planets outside our solar system, and last month, a few weeks ago, we discovered a planet that's about the size of Earth.

very surprising news

The first bold prediction I make is that the universe is teeming with life.

In planetary systems that are likely to sustain life, we will find life everywhere.

Such planetary systems are common

Is there life on Mars?

If someone asked me 10 years ago if there was life on Mars, I would have said a few percent.

Still, at the time, it was a reckless opinion.

I was once ironically introduced by a NASA official as the only human on Earth who believes there is life on Mars.

The employee is dead, but I'm still alive. It's kind of an honor to outlive your opponent.

But in the last decade or so, things have changed a lot.

because I got new information

We've learned a lot of amazing things from the 1997 Pathfinder program, the Mars rover program that's right now on Mars, and the European Space Agency's Mars Express.

Mars has ice under the surface

Where there's water, there's a good chance there's life similar to Earth.

The surface is covered with sedimentary rocks, and there's a lander that's reached the ancient seafloor, and there's a strange structure called "Blueberry," a little rocky mass similar to the one I create biologically in my lab.

Considering all the discoveries, life is more likely than ever.

I think there's a 25% to 50% chance that life existed on Mars in the past.

that's a very bold idea

There is life, we should look for it, we should look for it underground

This is a game of astrobiology, so to speak.

How can we understand extraterrestrial life?

What are your plans for exploration?

How can we recognize the discovery of life?

If it were a large, easy-to-understand life, we should have already discovered it, but that's not going to happen.

I mean, it's hard to tell

The important thing is how to protect and prevent contamination when discovering

More importantly, can we continue our research while protecting our only home planet, Earth, from extraterrestrial life?

What makes it difficult to find?

It's always hard to study tiny things because they're so tiny. It's always hard to study tiny things because they're so tiny.

Life must be hidden, and if someone stands out, they're easy prey.

In other words, the relationship between predator and prey in the biological world is a universal mechanism that applies to any ecosystem.

The underlying properties, such as chemical composition and size, would be completely different.

How small is it?

About the size of a virus? Smaller?

Bigger than the largest bacteria?

What is the activity rate of the organisms? The organisms you study underground grow very slowly.

If I wipe someone's teeth with gauze and put it in a petri dish, after four or five hours, I can see the growth of bacteria.

The organisms we study can only be observed to grow after months and years.

These organisms are slow growing

But the fundamental problem is that we're so inexperienced that we don't know what to look for or how to look for it unless we change our minds and discard what we know.

It's all about the point of view of the idea, and the experience I just told you about made me think of the Earth as a planet.

This is a very important point in my research.

It's something we often play on airplanes. When you look out the window from inside the plane, you can see the horizon.

And when you lay your head on its side, it feels like the Earth isn't our home planet, it's a planet.

I always do it when I sit by the window with a simple play

I applied this to my research.

This is one of the harshest caves

At Vila Luz Cave in Tabasco, Mexico, the cave is filled with sulfuric acid.

A large amount of hydrogen sulfide flows into the cave due to the decomposition of gypsum, which is the mineral component of the carbonate that forms the volcano and this cave, and it is a very harsh environment.

Protective clothing and masks are a must, even 30 ppm hydrogen sulfide can kill you.

over a few hundred ppm here

It's a very dangerous environment with toxic gases like carbon monoxide.

Life that grows in this extreme physical and chemical environment is biologically very special.

In fact, this place is not unrelated to life.

This is one of the richest caves we've found.

was full of life

One of the reasons remote areas on Earth are so interesting is that they seem to replicate the average environments encountered on other planets.

This is how we spark our imaginations and prepare for future discoveries.

There's a great diversity of life in this cave, and I'm only going to show you a few of them today.

The most famous creature here is called "Snotites".

It's like what comes out of a 2-year-old's nose with a cold.

This object is actually produced by a bacterium that produces sulfuric acid and lives at a pH close to zero.

It's like lead acid in a battery

All creatures are adapted to this cave

In fact, this cave is full of biological energy, and there are many cave fish.

The indigenous Soque tribe harvests the fish twice a year, on Easter and Holy Week.

very rare in caves

Another cave I've studied is Lechugia Cave, near Carlsbad, New Mexico, which is one of the most famous caves in the world.

It's 180 kilometers long, it's a pristine space with no openings, it's like a gigantic laboratory in biology, in geomicrobiology.

Much of the cavern is covered in this red substance, and you can see very large hanging gypsum crystals.

they are biologically produced

It's the result of microorganisms preying on bedrock.

Iron and manganese are extracted from bedrock and oxidized. Iron and manganese are extracted and oxidized from bedrock.

At that time, a very small amount of energy is generated

That tiny amount of energy feeds these microbes.

Interestingly, this microbe consumes toxic metals like uranium and chromium as well.

Such microbes are a clear basis for establishing biological repair.

I'm going to bring these microbes back to my lab and grow them in petri dishes to produce the exact same biominerals that you find in caves.

These are the marks left by the microbes on the bedrock.

Many of the basalt walls of lava tubes, a byproduct of volcanic activity, have been found to be completely covered with beautifully shining films of silver, pink, red, and gold.

These are deposits made by bacteria.

The image you see in the middle is an electron micrograph of a culture of this bacterium.

Interestingly, these bacteria belong to the group Actinomycetes, the same species that we use to make antibiotics.

The earth's underground is full of biodiversity

Because these microbes are so isolated from the surface of the earth, there are so many new mixtures.

The application of this field to medicine and industrial chemistry is completely pristine, but it has greater potential than any other biodiversity on the planet.

I'm talking about lava tubes.

There are a great many similar structures on Mars and the Moon.

let's see

The photo on the left shows the formation of a lava tube during the recent eruption of Mount Etna in Sicily.

It is here that cavities form and organisms arise.

There are lava tubes all over Mars, and we're sorting them out right now.

Mars has many interesting caves of a similar kind.

We're currently developing equipment to reach these subterranean environments.

it's not easy

It requires a variety of complex human movements to reach it, including crawling, climbing, and ropes.

The problem is how to train this movement into the robot.

What are the reasons for using robots?

Because we're going to send robots to Mars to explore it, even before we have manned plans.

And, as I said, I don't want to contaminate the precious life that we might find on Mars.

It's best to use a medium to investigate without contaminating the subject.

In this case, robots are the medium, actually laying the groundwork for our research while preserving the life we've discovered.

I won't go into all of the plans at this time, but we're currently working with various research groups on several robotics projects.

What I want to talk about today in particular is the equipment at the top of the picture.

This is a swarm of tiny jumping robots.

I'm working with Professor Dvoski at the MIT Robotics Lab, and we've come up with a little jumping robot that looks like a bean with artificial muscles.

Now you can jump

It mimics a swarm of insects, they work together in a swarm, and best of all, they can produce a very large number of individuals.

We can send 1,000 at a time, and as you can see in the top left image, 1,000 are in the cargo hold and are used in the current Mars mission.

I don't care if I lose a lot of individuals

If we can send 1,000 pieces, we can carry out our plan even if we lose 90%.

And it's flexible enough to handle even the most challenging environments wherever you want to explore.

And finally, as an extension of our cave research, I'd like to talk about the potential for caves and settlements on other planets.

I realized a long time ago that caves have the right conditions for human and other life forms to live in.

Now, when we think about future exploration of the Moon and Mars, we're probably at a point where we're going to have to take that into account.

We've just completed the NIAC's second phase of research, in which we've studied what technologies are essential for human life in lava tubes on the Moon and Mars.

The result is a very simple, short item that can be handled with relatively conventional technology.

For example, lining membranes that can be responsively inflated inside caves, creating airlocks for complex geometries, and using materials unique to the interior to create breathing air.

It's realistic to exploit Martian lava tubes in the future.

We currently use caves for science and recreation, but in the future, extraterrestrial caves will be used for human settlements and scientific purposes.

Now, as for the possibility of life on Mars, my current opinion is that there's a 50% chance that it probably has existed.

The hypothesis that there is some connection between life on Mars and life on Earth is controversial, and we already know that meteorites from Mars can reach Earth and exchange material between the two planets.

One of the biggest concerns is, if we find life under the surface of Mars, as we hope, will it be the birth of a second life?

Did life originate on Earth and migrate to Mars?

Or did it come to Earth from Mars?

This is a very exciting topic, and over the next 50 years, more and more Mars missions will reveal the answer to this question.

Thank you for your attention

I've been thinking for a long time about how synchronicity leads to happiness, like dancing and singing in synchronicity.

we seem to rejoice

So first of all, I'd like to ask you all to help me run an experiment. By the way, when you clapped earlier, you clapped loudly, not in the American style.

I guess I didn't think about taking rhythm in the first place

So, can you all clap in rhythm? You've never practiced, can you clap in synchronicity?

(Applause) (Gradually getting into rhythm and getting faster) This is what we call emergent behavior.

(Laughter) This was unexpected.

I didn't expect the rhythm to pick up speed.

Interesting

(Laughter) What do we learn from this? everyone here is smart

There are intelligent and sensitive people here.

There are also professional musicians.

Is that why it can be synced?

So let me ask you a little more serious question: What is the minimum requirement for spontaneous attunement like you just did?

Do we have to be as smart as you?

Do you even need a brain to synchronize?

Does it have to be a living thing?

It's a bit creepy for mere objects to synchronize on their own, isn't it?

But today, I'd like to explain to you that in fact, such synchronicity is a very common phenomenon in nature.

At every scale, from the world of elementary particles to the entire universe

It tends toward order, contrary to the law of entropy we were taught.

The law of entropy is not wrong

But in the natural world there is a force that opposes this law and creates a spontaneous order. But in the natural world there is a force that opposes this law and creates a spontaneous order

And that's the theme for today. When you talk about synchronicity in nature, the first thing that probably comes to mind is that of birds, fish, and so on, moving in groups.

Birds and fish aren't particularly clever creatures, but they do a wonderful ballet (music).

This is the defensive entrainment phenomenon that you see in the footage from the BBC "Predator" This is the defensive entrainment phenomenon that you see in the BBC "Predator" footage.

Small, defenseless things like birds and fish swarm together to avoid or scare predators.

Let's concentrate on this wonderful picture for a moment (music)

Biologists have long wondered about the mechanisms of herding behavior Biologists have long wondered about the mechanisms of herd behavior.

Normally you need a commander to sync

But these creatures have no commander

They're synchronizing on their own, and only recently have we begun to understand the scientific mechanism.

Here's a computer model by Oxford researcher Ian Kuzan.

There are 3 simple rules

First, each individual is paying attention only to its closest mate.

Secondly, all individuals tend to form platoons.

Finally, they try to get closer to each other, but try to keep a minimum distance.

And when you incorporate these three rules, you automatically get flock behavior that's kind of like fish or birds.

It should be noted that fish try to keep a distance from each other equal to their body length.

In the case of birds, the distance is about 3 to 4 times the body length.

Except for the distance, the rules are exactly the same (music)

Here, when a predator appears, the behavior changes completely.

In fact, there's a fourth rule: "When a predator comes, run away." (music)

In this model, predators are attacking.

And then the prey run away in random directions, and then regroup because of the rule of approaching each other.

Parting and coming together is repeated, as observed in nature, isn't it? (music)

It looks like they're acting in concert with each other, but it's actually Darwinian selfish behavior.

Each one is running away randomly to protect themselves.

Because of this desire to protect oneself, each one follows the rules, and out of this desire to protect oneself, each one follows the rules, which ultimately leads to the safety of the entire flock.

They seem to think of the group as a whole, but they're not (music).

What are the advantages of working in groups? there are some

For example, a large herd is less likely to be eaten by predators than a small herd.

There are many eyes that can detect danger

Also, as I'll show you in the bird example, when a peregrine falcon attacks a flock of birds, a wave of panic can travel very far as a danger signal.

Please take a look, you should be able to see it shortly after this...

In the meantime, this mechanism allows information to travel 500 meters in a very short time.

oh i saw it here

You can see the waves traveling through the crowd.

Thanks to computers, we know a little more about flocks of birds.

It's just three simple rules and beware of predators.

sounds easy

But the truth is, we haven't been able to figure it out on a mathematical level.

I'm a mathematician and I want to understand more

The computer model I showed you the phenomenon

You're just experimenting without understanding

I want to know more about how this phenomenon occurs and how order is created.

How can order emerge from the three rules?

In fact, we're learning a little more about fireflies.

Fireflies in North America follow other North American traditions, ignoring each other and acting in uncoordinated fashion.

Each blinks its own light, ignoring nearby allies.

But in Southeast Asia, male fireflies display beautiful, coordinated behavior.

You can see it every night at the riverside

The mangrove trees are flooded with fireflies that communicate with each other by light.

Male fireflies, in particular, synchronize with perfect timing to send powerful messages to females.

It's a message that says, "Here, mate with me."

(music) I'm going to show you a firefly in slow motion. This is one frame of the video.

It shines and disappears, and now it's 1/30th of a second.

Here's a video of the entire riverbank showing the precision of the synchronization (music).

Shine, shine more, then disappear (music)

When the light from these little insects gathers together, it's so bright that the fishermen who go out to sea use it as a lighthouse to get back to their homes.

Early explorers like Francis Drake remembered this astonishing sight in Thailand.

For a long time no one believed

You won't see anything like this in Europe

Long after it was officially documented, it was thought to be a form of illusion.

A paper was published that said it's an eyelid twitch, and it was explained that it's caused by the human cognitive ability to find patterns in nothing.

But if you watch this video of the night scene, you'll be convinced that it's really in sync.

I hinted earlier that it's not just living things that produce this kind of spontaneous order.

Yes, even if it's not a perfect living organism

For example, making your heart beat

Even an independent cell, like the heart's pacemaker cells, is enough.

Even an independent cell, like the heart's pacemaker cells, is enough.

The heart's beat is produced by the sinoatrial node, which is a group of 10,000 independent cells that send signals to the ventricles by electrical rhythms, or voltage fluctuations, or voltage fluctuations.

This pacemaker is not a single cell.

It works correctly only when 10,000 cells discharge in concert.

But synchronizing isn't always a good thing.

In an epileptic seizure, a billion cells discharge simultaneously in pathological coordination.

So being in tune isn't necessarily a good thing.

A laser beam is neither an organism nor a cell.

A laser beam is a non-living, non-cellular synchronic phenomenon that occurs through harmony at the atomic level.

The key difference between this ceiling light and lasers is coherence. Ceiling lights are a mix of colors and frequencies, like your first clap, but laser light is rhythmic clapping.

All atoms vibrate in the same way, emitting a single color frequency.

Now, here comes the hardest part of my presentation.

take a breath and watch

Here are two empty plastic bottles

I'm not trying to show off my sleight of hand

Just a clumsy human being playing with a plastic bottle

There is also a metronome here

Can you hear me?

And it's the world's smallest metronome... oops, bad hype.

It's the smallest metronome ever

Let's set this to the fastest setting, and set the other to the same.

Let's put it on the table and try it out There's no reason for the two to be in sync and probably not (Metronome sound)

You can hear it better if you stand here (metronome sounds a little louder than before)

Since the cycles are not exactly the same, they should gradually drift away (sound of a metronome gradually shifting).

Look, you got it wrong

because they cannot communicate with each other.

A metronome is communication

You think that's a funny idea, don't you think?

But in fact, it can be done mechanically.

Get ready for that

I'm going to put these two on a moving platform, which is called a Cornell Graduate Guide. (Laughter)

well what will happen

My wife told me to put them on at the same time so that the whole doesn't turn over...

Well... I want to start from a different state so that I don't cheat, but that's also difficult.

(Applause) Alright then let's put it down before it slips again

(Laughter) It might seem a little strange, but this kind of mundane occurrence of spontaneous order can lead to unexpected consequences.

A good example is what happened in London in 2000 A good example is what happened in London in 2000.

The beautiful Millennium Bridge over the Thames was a proud undertaking to become the first pedestrian bridge across the Thames in 100 years of London's history.

The design of the bridge was chosen in a big competition, and the winner was an exceptional team whose member, Sir Norman Foster, was perhaps Britain's greatest architect to embody the TED spirit, working alongside sculptor Anthony Caro and the firm of Arup.

Lord Foster won a design based on a cartoon he read as a child, in which the main character, Flash Gordon, throws something like a lightsaber over a cliff.

A thrown lightsaber becomes a ray of light that straddles the cliff and runs through that light.

"The light that passes the Thames is my vision"

said Lord Foster

The result was a ray of light, the thinnest flat suspension bridge in the world, with cables made of thin steel ribbons running along the sides of the bridge.

Suspension bridges are usually suspended from above by cables.

The cables of this bridge are on the side of the bridge, and they're holding it up like a rubber band pulled taut on the Thames side.

Everyone wanted to cross the bridge, so thousands of people came out on opening day.

Everyone wanted to cross the bridge, so thousands of people came out on opening day.

There was an incident, and two days after opening, the bridge was closed.

Hear interviews with people on the bridge on opening day

Man: It swayed sideways, not so much up and down. It was like being on a boat.

W: It felt unsettled. It was very windy. I remember the flags flying up and down. Something was happening sideways.

Interviewer: Up and down? Boy: It wasn't moving.

Interviewer: Before or after? boy: yeah

Interviewer: It's just a sideways motion. How long do you think it was moving?

Boy: Um Interviewer: This much? Or this much?

boy: the second one

Interviewer: About this much? Man: I think it was about 15 to 20 cm.

Interviewer: So at least this much?

Man: Yes Woman: I thought I should get off the bridge.

Interviewer: So much? Woman: Yes

Interviewer: Were you that scared? Woman: Yes I thought it was just me

Interviewer: Why are you walking like that? Boy: I would lose my balance if I didn't do this.

Because it looked like it would tilt about 45 degrees to the left and right if it wasn't balanced.

Interviewer: Try walking normally

And how do you walk when the bridge starts to shake?

Then, consciously push your feet to the left and right with short strides?

Man: That's right. A lot of people were doing that.

Interviewer: Did everyone go out of their way to walk like that?

Man: No, it just happens naturally with the movement of the bridge.

Steven: You gave us enough hints as to what was going on.

If you think of the Millennium Bridge as this platform,

Pedestrians can be said to be metronome

When we walk, it actually swings like a metronome.

Even more so if you walk like people on a bridge.

When the bridge started to move, everyone started to walk like they were skating.

I'm going to show you a video on the bridge.

After the video of the bridge on opening day, you'll see an interesting video about the work of Cambridge bridge engineer Alan Macroby to figure out what causes bridges to sway. He built a bridge simulator to illustrate.

And the cause was unintended positive feedback caused by the way the bridge swayed and the way people walked that the engineers didn't know.

I believe the first person in this video is the young engineer who worked on this project.

Interviewer: Anyone injured? Technician: None

Interviewer: Was the shaking small? Technician: Yes

Interviewer: But was it shaking? Technician: Yes Interviewer: What did you think?

Technician: Disappointed

We spent a lot of time designing it, analyzing it, making sure it could handle a heavier load than it was designed for, and then something completely unknown happened.

Interviewer: You didn't expect that.

NARRATOR: When you look at this shocking image, you see a crowd of hundreds of people united, moving with the bridge in synchronism, left and right in rhythm.

This synchronized movement seems to move the bridge

How did the crowd get in sync?

Could something specific to the Millennium Bridge have caused this phenomenon?

This point was the focus of the investigation.

Interviewer: The simulator is finally complete. This one can be shaken.

Mr. Alan, you are in charge, aren't you? Alan: Yes.

Interviewer: With this simulator you made, can you reproduce the movement of a real bridge?

Alan: Yes, it reproduces the actual behavior very well.

Interviewer: So let's jump in and see if the bridge shakes.

I got a letter from Alan McCroby, a bridge engineer in Cambridge, saying that if you hang a simulator on the correct pendulum length, it will swing just like a real bridge.

Alan: It's only a few tons, so it's easy to shake when you walk on it.

Interviewer: It's starting to shake

Alain: Even if you don't shake it on purpose, it will shake just by walking.

Interviewer: It's very difficult to walk

If you don't pay attention to how you step next, you're likely to fall over

Alan: I can't walk normally because my leg is stuck

Interviewer: Even if you want to step forward, you'll turn away from the front. Alan: That's right.

Interviewer: You're going to have to stick your leg out.

Walking on this simulator mimics the testimony of someone on a real bridge.

Alan: It's like walking like ice skating.

Interviewer: We recreated the crowd on the bridge for further testing.

I just said, "Please walk normally" (footsteps and laughter)

Interestingly, no one is trying to sway it on purpose.

Because it is difficult for everyone to walk

I naturally end up walking like this

In the end, everyone ends up shaking the bridge.

Because of the swaying of the bridge, I have no choice but to walk this way, but that causes the bridge to sway even more (laughs).

Steven: My story ends with this funny gait incident.

I would be happy if you could take an interest in the amazing synchronicity phenomena around you.

(applause)

A new era of space exploration is dawning in the far reaches of our solar system.

Beneath the thick ice of Europa, in the water vapor column of Enceladus and in the methane oceans of Titan, astrobiologists are searching for extraterrestrial life.

The reason we chose to focus on these three moons is because they all have "sea worlds," or environments with liquid oceans, and liquids can help create life.

Organisms need the ability to grow, reproduce, and take in energy for themselves.

To do that, we have to assemble molecules with complex structures, such as proteins, from more basic building blocks.

Liquids such as water allow chemicals to float in them without gravity settling them out.

This allows molecules to interact frequently in three-dimensional space, and if the conditions are right, chemical reactions can occur that produce the building blocks of life.

But that's not enough: well-known small but complex biomolecules are temperature-sensitive, neither too hot nor too cold to bind.

On the other hand, liquid water also has the advantage of being relatively stable to temperature fluctuations, which means it can protect molecules from large external temperature fluctuations.

On Earth, in a watery environment, these conditions may have facilitated the emergence of life billions of years ago.

It's kind of elusive, but it could also apply to other bodies in our solar system, like these three ice-covered planets.

Europa is Jupiter's moon and perhaps the most interesting ocean world.

Beneath the surface ice, thick enough to cover Mt. Everest, lies a liquid ocean with a depth of about 100 kilometers.

Astrobiologists believe there may be life in this hidden ocean.

Thanks to the Galileo spacecraft, we can surmise that the composition of Europa's possible salts is similar to those found in Earth's lakes.

But many of the ocean's properties remain enigmas awaiting further exploration.

Saturn also has moons that are thought to have the conditions for life to exist.

Take, for example, Enceladus, a small ice ball moon that's big enough to fit on the surface of the Gulf of Mexico.

Like Europa, it's thought that there's a deep ocean beneath the ice.

Enceladus also has geysers, which often release water vapor and small ice shards into space.

Astrobiologists are interested in whether this geyser is connected to the ocean below.

I'd like to send a probe to see if the life-giving material in the sea beneath the ice is contained in the plumes of water vapor emitted by geysers.

As far as we know, water is the most suitable substance for supporting life, but it is not necessarily the only substance that supports life.

Take Saturn's largest moon, Titan, for example, which has a thick nitrogen-rich atmosphere that contains a lot of organic matter, including methane.

The clouds condense into rain, which rains down on Titan's surface, filling the lakes and oceans with liquid methane.

Methane is not as good a substance to support life as water is.

With large amounts of organic matter raining down along with the methane, liquid methane lakes and oceans have the potential to support life unfamiliar to us.

So what could be a sign of the existence of extraterrestrial life?

Astrobiologists speculate that, if it exists, it's microscopic in size, comparable to bacteria on Earth.

In that case, it's difficult to directly observe life forms from a distance, so astrobiologists are looking for traces called "biosignatures."

This refers to traces of cells, fossils, and minerals left behind by living things.

Finding any biosignature presents challenges.

One of the biggest challenges is thoroughly disinfecting the rover.

Because if you don't disinfect it, you could accidentally bring Earth's bacteria into the ocean world and destroy life on that planet.

Titans Enceladus and Europa are just a few of the ocean worlds we can explore.

Several other prospects have already emerged in our solar system, including Jupiter's moons Callisto and Ganymede, Neptune's Triton, and even Pluto.

If even a tiny solar system has this much potential for life, what secrets are hidden in the universe beyond our imagination?

I'm Andrea Gibson. Listen to my poem "The Nutritionist."

The nutritionist told me to eat root vegetables. If I could swallow 13 turnips every day, I would have my feet on the ground and my roots would grow.

When my head no longer flies to where the darkness dwells

The psychic said my mind was carrying too much weight I told him what to do for $20 And he gave me $20 and said, "Don't worry, someone will be right there."

I tried it once and I couldn't help but think sitting in the closet looked so gay.

My yoga teacher said If you focus on your exhalation like you're cultivating all but the truth If you care more about what you can give than what you can get, everyone will be happy.

The pharmacist said Klonopin Lamictal Lithium Xanax

The doctor said What Trauma said might be forgotten on antipsychotics Trauma said Don't write this poem

About the anguish in my bones I don't want anyone to hear you lament But my bones said Tyler Clementi thought he was all alone and threw himself into the Hudson My bones said "Write a poem" Thinking of the riverbed To the lamppost

To the chandelier of my destiny suspended by a thread

In the days when I couldn't get out of my futon

Target on the wrist To everyone who's ever wanted to die

Sometimes it's said that the most comforting thing we can do is to remind ourselves over and over that other people feel this way too Tomorrow came and went and it didn't get any better Even when I was halfway through that letter to my mother "I really tried but when I thought I hit rock bottom it hit me back" There's no scar like loneliness on your mind So I tell you I'm broken like the doors of looted homes Around the world I know there are days when it seems like you're dancing in the street You're not the only one who wonders who's guilty of forcing you to keep loading your grief into your room of shame It doesn't mean you're weak Just because your heart feels heavy It's never been a phone box with a red cloak inside It's a heavy heart Some people can never understand that some days it takes superhuman strength just to walk outside Some people never understand That their smiles look like the rain gutters of a crumbling house I know, but my hands hold fast to the open rope of what I always believe Life can be as rich as dirt Make the food of rot Turn the wounds into roads Pick me up in that truck with that bumper sticker "There's no way the healthy fit well in a sick society" I've never believed in anyone with a bow that squeezed my spine Screaming for a pulse to find a fight to beat Tyler Clementi But Four days before I jumped off the George Washington Bridge I sat in a hotel room in my town, calculating exactly what I had to swallow to take a bottle of sleeping pills All I know about life is that pain is never mine Whenever I feel pain, I know that wounds are echoes So I keep my ears open The moment sadness becomes a window When I see things I couldn't see before Through the glass of my tattered dreams Dandelions in the wind Blown I saw it lose its mind When the dandelion scattered a thousand seeds

So the next time I tell you how easy it is to slip out of my skin Don't try to get me back in Just say we're here together At the window hoping that everything will be better My heart might just be a scraped knee Maybe the worst days are yet to come But just in case I'm still here I'll beg the world to dance Even if you're just stepping on my sacred feet You're right here with me stay

stay here with me

Fix your bite into the bitter darkness Raise your bright longing Raise your bright fist of loss Dear friends, if all we need to gain by being is each other Oh how rich Oh how enough Oh how deep We give that light to each other Whispering over and over to the other's back Live live live live

When you meet a head of state and ask, "What is your most precious natural resource?" the first thing they say is a child.

When you talk about children, everyone immediately agrees.

(Video): Today, together with the head of Colombia's military and police, the Minister of Defense, we are delivering 650 laptops to children who have been cut off from the world for the past 40 years and have no TV or phone.

The importance of bringing laptops to this region is connecting children cut off from the world by a political movement that began 40 years ago and later by a drug-producing guerrilla group, the Revolutionary Armed Forces of Colombia.

There are 1 billion children in the world, half of whom have no electricity at home or at school.

In some countries -- Afghanistan, for example -- 75 percent of girls don't go to school.

It's not that you fail, but when you hit third or fourth grade -- you stop going.

It's been three years since I spoke at TED and showed the prototype, and it's gone from an idea to a real laptop.

So far, we've given 500,000 laptops to kids.

About 250,000 are on their way to these and other kids, and the remaining 250,000 or more are currently on order.

So roughly 1 million laptops

That's less than I thought -- I was thinking 3 million to 10 million -- but it's still a big number.

Colombia has about 3000 laptops

I'm working there with the Minister of Defense, not the Minister of Education, because this is one of the defense strategies, from the point of view of liberating the people who have been living there for 40 years of bombings and kidnappings in this region that was completely isolated from the outside world.

And suddenly the kids have laptops

I took off

Change is historic because it's not just about opening up, it's about opening up to the world.

Yes, they'll build roads, they'll build phones, and they'll have televisions.

But children between the ages of six and 12 use Spanish and local languages ​​to access the internet and grow up with a window on the world and access to information.

used to be isolated

Interestingly, in other countries this is the responsibility of the Minister of Finance as the engine of economic development.

And that engine will pay off in 20 years.

Well, it doesn't happen in a year, but it's a very important economic and cultural change that happens through children.

There are 31 countries involved, and in the case of Uruguay, half the children already have laptops, and by mid-2009, every Uruguayan child will have a little green laptop.

So what are the results?

The results are spreading across all the countries involved. Teachers are having more fun teaching than ever before, and third party -- not us -- reading comprehension is skyrocketing.

Perhaps the most important thing we've seen is what children teach their parents.

take our own laptop and take it home

So one of the three kids I met at school who came all the way to Bogota [Colombia's capital] brought their mother with them.

She brought her mother in because this six-year-old girl was teaching her how to read and write.

her mother didn't go to elementary school

This is a great reversal and a great example of how children are agents of change.

To end this story, why a laptop now?

A laptop is a luxury; it's like giving an iPod

We need laptops because education is the watchword, not laptops.

This is an educational project, not a laptop project

They learn what they learn, and then they just think. Take 100 books, for example.

A village has 100 laptops, each with 100 different books, and suddenly the village has 10,000 books.

When we went to elementary school, there weren't 10,000 books.

Schools are open-air classrooms, and in many cases, teachers are only educated through fifth grade, so we need a model of collaborative learning.

So we're doing the "Give One, Get One" program again.

Last year, we did a "Give One, Get One" program and made 100,000 laptops that we could distribute for free.

With a $0 laptop, we can go to countries that can't afford that.

I did that, and I went to Haiti, Rwanda, Afghanistan, Ethiopia, and Mongolia.

Start with saturation, connectivity, children, etc., not where the market is.

That's why we do mass production.

So think of it this way: It's kind of like inoculating your children against ignorance.

the laptop is the vaccine

Vaccination is not just for a few children

vaccinate all children in the community

There are more and more Chinese restaurants in this country than there are McDonald's, Burger King, Kentucky and Wendy's all put together -- 40,000, in fact.

Chinese restaurants have played such an important role in American history that, of course, the Cuban Missile Crisis was averted.

It's a Chinese restaurant It's called the Yanqing Palace in Washington, D.C. Unfortunately, it's closed now It's going to be Walgreens soon.

The house where John Wilkes Booth plotted to assassinate Abraham Lincoln is actually now a Chinese restaurant, called Wok'n Roll, on H Street in Washington.

(Laughter) It's not completely baseless, because it's a wok and a sushi roll, a Chinese and a Japanese restaurant.

Americans loved their Chinese food, and they even took it into space.

For example, NASA provides heat-stable sweet and sour pork to space shuttle pilots.

So I have one question for you. If apple pie was the standard for how American you are, ask yourself: How often do you eat apple pie, and how often do you eat Chinese food? right?

(Laughter) And when you think about it, most of the things that you, or us, Americans, thought of as Chinese food, aren't even recognized as Chinese food.

For example: stir-fried beef and broccoli, egg rolls, chicken fortune cookies, chop suey, take-out boxes, etc.

For example, I brought a lot of fortune cookies to China to see how the Chinese would react.

should i try? Try it What do you call this a fortune cookie with a piece of paper in it! (Laughter) What is this? I hit something! What's this? This is lucky! delicious! which country is this from?

In short, this actually came from Japan, in the outskirts of Kyoto.

There was a small family owned bakery, and that's where they made fortune cookies, the same way they did 100 years ago. Thirty years ago, fortune cookies came to America.

If you look closely at this cookie, you'll see that some parts are yellow and some are brown.

It's flavored with miso and sesame paste, so it's not as sweet as our fortune cookies.

So how did the fortune cookie come to America?

In a nutshell, Japanese immigrants came and many bakeries introduced this fortune cookie. There's at least one in Los Angeles, and one in San Francisco, called Ben Kyodo, on the corner of Sutter and Buchanan streets.

They used an iron mold almost identical to the one I saw in Kyoto, and one interesting question here.

How Japanese fortune cookies became Chinese

In short, World War II took all the Japanese prisoners of war, including the Japanese who made fortune cookies.

At about the same time, Chinese immigrated to the United States, so I saw it as a good business opportunity and took over.

(Laughter) So, fortune cookies made by the Japanese were popularized by the Chinese and eventually consumed by the Americans.

At that time, the American population was the largest.

One of my favorite dishes left Sotang's chicken Yes, at the U.S. Naval Academy left Sotang's chicken is called Supreme Commander's chicken.

i love this dish

The original name in my book is said to be General Guan Zuo Zong Tang's Long March.

General Zuo Zong Tang has been marching in the army for a really long time 'cause he's sweet, fried, and chicken (a wimp) All Americans love.

(laughter) General Zhong Tang has marched to the point where he doesn't know the chef who invented this dish. The chef is a little scared

The chef is now in Taiwan

The chef is retired, deaf, and plays mahjong all the time.

So after I showed him this, he got up and he said, "Monking meow," which means "really crap." So he went back to play mahjong that afternoon.

one more. my favorite dish. beef and broccoli

Broccoli is not a Chinese vegetable In fact, broccoli is an Italian vegetable

Broccoli came to America in the 1800s, but it didn't really become popular until the 1920s and 1930s.

The Chinese actually had their own broccoli, it's called Chinese broccoli, but now it's called, uh, American broccoli. Chinese broccoli was imported as an exotic delicacy.

Left Sotang's chicken must have never seen broccoli in his life.

Really this is a picture of General Tao

i went to his hometown

This is a sign that says "Welcome to the birthplace of Zong Tang on the left."

So I went looking for Zuo Zongtang's chicken Finally I found a cow-

and found a bird

Believe it or not, these chickens were crossing the road.

And (laughter) I found many of General Tao's relatives who still live in this small town.

This child is the 5th generation from general officer, this child is the 7th generation

I showed them a picture of Zongtang's chicken on the left They didn't know about this dish They asked, "Is this Chinese food?"

Because it didn't look like Chinese food to them.

But they weren't too surprised. I traveled all over the world to meet them.

LEFT Sotang played a key role in the Taiping Rebellion, which was started by a man who thought he was the son of God, the younger brother of Christ.

It is still the deadliest civil war in the world today.

So, when I visited there, I thought that Soto was like Colonel Sanders in America.

But in China, this man was actually famous for the war, not for his chicken dishes.

Speaking of Chinese-American grandpas, we have to talk about chop suey, which was introduced in the early 20th century.

According to the New York Times, in 1904, Chinese restaurants began popping up all over town, and the town was engulfed by chop suey wrath.

And it took 30 years for Americans to realize that chop suey is actually not that well known in China.

Back then, Chop Sui was meant to show that you were a sophisticated cosmopolitan. If you're a man and you want to impress a woman, ask her out on a Chop Sui date.

I want to say that chop suey is the dumbest culinary joke that one culture has influenced another.

So, ordering chop suey in China is like coming to America and saying, "I know there's a very famous dish in America. It's called leftovers."

Not only that, but this dish is especially famous after the holiday called Thanksgiving! (Laughter) So why and where

Chop suey was born. Let's go back to the mid-1800s, when the Chinese first came to America.

At that time, Americans didn't eat much Chinese food.

In fact, Americans thought the Chinese were like aliens who landed on the coast.

These people don't eat dogs, they eat cats

And they don't eat cats, because cats eat mice.

published an article in 1883, "Do the Chinese eat mice?" Most PC questions are not asked today.

If you look at the popular images of this era, it's not so eccentric

This is a real advertisement for rodenticide, from the 1800s, if you look at the very small print under this Clears.

And here, "they should go," they were not only referring to the rats, but also to the Chinese who were in America.

Through these advertisements, there was some distaste for the Chinese, and this is the library inside the National Assembly.

This is a pamphlet published by Samuel Gompers

he is the leader of the american labor movement

This was called "reason to exclude Chinese meat vs. rice: American masculinity vs. Asian coolness. Which should survive?" And this sparked a debate.

Chinese people who eat rice are going to lower the standard of living for Americans who eat meat.

Actually, this is one of the reasons why we have to keep the Chinese out of America.

Because of this trend, the Chinese Exclusion Act was kind of passed between 1882 and 1902. It's the only time in American history that a group of race or nationality has been excluded.

In a way, chop suey was born as a defense system because the Chinese were attacked.

So who came up with the idea of ​​chop suey?

There are many mysteries and many legends, but the one I found that I found most interesting was an article from 1904.

A Chinese man named Lem Seng showed up in New York City's Chinatown and said, I want people to stop making chop suey because I invented a dish called chop suey and I have a patent on it.

He said something like this: There was this guy, a famous Chinese diplomat, came up, and he was told to cook a dish that looked very famous.

And as he said - now we would never print an ad like this now, but this American man got very rich.

Rem Seng, who the hell is this man I could have made this much money But I spent all my money looking for the American This American stole my recipe

So now I found him, so give me back my recipe. So I want people to stop making chop suey, or pay me to make chop suey. This means that the initial

Exercise of intellectual property rights

And the problem is, this idea of ​​Chinese-American food doesn't exist only in America.

In fact, if you think about it, Chinese food is the most widespread food on the planet, on all seven continents, even Antarctica, because every Monday is Chinese Food Day at McMurdo Station. McMurdo Station is America's main scientific station in Antarctica.

There are many types of Chinese food.

For example, there's French-Chinese food, and there's fried frog legs seasoned with salt and pepper.

We have Italian Chinese food We don't have fortune cookies but we do have fried gelato Alessandra who lives downstairs from me

He was completely shocked when I told him, "Hey, fried gelato isn't Chinese food."

She's like, "Oh, no? But all the Chinese restaurants in Italy serve it!"

(Laughter) There's also a British version of Chinese food.

This dish is called crispy shredded beef Very crispy, very shredded, but there's very little beef

West Indian Chinese cuisine available Jamaican Chinese cuisine available Middle Eastern Chinese cuisine available Mauritian Chinese cuisine available

This is a dish I discovered called the Magic Ball.

There's also Indian-style Chinese food. There's Korean-style Chinese food. There's also Japanese-style Chinese food.

And they're -- and they're just randomly taking a Chinese noodle dish and making it into ramen.

This is the Chinese version without the soup, how to say

And then there's also Peruvian Chinese food, which shouldn't be mixed with Mexican Chinese food, because it basically makes Mexican food like fajitas.

And then there's the risotto-like chop suey, which I personally love the most out of all the restaurants I've encountered in the world.

"Kung Food" in Brazil

(Laughter) So let's go back a little bit, and let's get a little bit of what America likes.

McDonald's has gained a lot of attention, and it's also gained a lot of respect because it basically unified the menu, the decor and the dining experience after World War II.

But do you know? McDonald's

Having headquarters in a suburb of Illinois worked, didn't it?

Chinese restaurants did much the same. And here I want to say, the menu, the decor, the name of the restaurant, without having to put headquarters in the center.

On March 30, 2005, the day of the Powerball lottery, they expected that, based on ticket sales, the three or four second-place winners would be the ones who guessed five or six Powerball numbers.

Instead, there were 110 second-place winners who were completely shocked.

I searched all over the country and found that they weren't necessarily scams, because different states use different computer systems.

Whatever it was, it made people behave the same way.

Well, that might have something to do with the pattern On the little piece of paper, as you know, it was a diamond, a diamond-like one, wasn't it?

That wasn't it, so they were Okay, let's watch TV

So they watched the drama Lost I don't have a TV now

It's kind of weird, but it's very productive. (Laughter) So in this episode of Lost, I realized that white people's lucky numbers weren't their lucky numbers, it was just how long they were on that island.

The numbers didn't match, so the next day a man showed up

They asked the man, "Where did you get that number from?" He said, "Oh, it's from a fortune cookie."

Here's a piece of paper from the winner's fortune cookie

A Tennessee lottery security officer said, oh my god, this can't be happening, but it's true.

About 104 of the 110 people who won the lottery got their numbers from a fortune cookie.

(Laughter) So, I started looking into it.

I've traveled all over the country looking for the Chinese restaurant that gave this winner the fortune cookie.

Lee's Chinese Restaurant in Omaha Actually, it's run by Koreans, but that doesn't matter. So many of the restaurants were called China Buffet.

Interestingly, the stories are similar

It's a little different Lunch, takeout In-store, buffet 3 weeks ago, 3 months ago

At some point, these people had a similar experience, which ended up being a fortune cookie at a Chinese restaurant.

These Chinese restaurants sell fortune cookies, and of course we know, but fortune cookies aren't Chinese.

It's kind of a phenomenon, and I call it spontaneous self-organization, and yes, it's like an ant's nest.

So with Chicken McNuggets

By comparison, McDonald's spent 10 years trying to come up with a product like chicken.

Chicken pot pie and fried chicken are a thing of the past, and they've finally launched Chicken McNuggets.

The great innovation in Chicken McNuggets isn't that they're chicken nuggets, because it's a simple concept, but the trick behind Chicken McNuggets is

It's about being able to take the bones out of a chicken on a very low budget, so it took a long time for other companies to copy it.

On the other hand, here on the left is Sotang's chicken, which was made in New York City in the early 1970s.

This logo!

That's why I'm here with Sotang's chicken and this logo is cosmically connected, but until this dish spreads across the United States.

It took me 10 years, since I started in a random restaurant in New York City.

Somebody's Yes, it's sweet and fried chicken Americans will love it

In Silicon Valley, in the Bay Area, I mean, we're like, McDonald's is like Microsoft when it comes to the dining experience.

A Chinese restaurant can be thought of as Linux with open source

It could even be a Chinese-specific version, where one person's ideas are copied and spread throughout the whole system, depending on the region.

For example, in New Orleans, there is Cajun Chinese food.

In Philadelphia, there's the Philadelphia Cheesesteak Roll, and it looks like a spring roll on the outside, but it's got a cheesesteak inside, and I'm amazed.

I found these spring rolls not only in Philadelphia, but also in Atlanta.

Because a Chinese family moved from Atlanta, sorry, Philadelphia, to Atlanta and brought it in.

What I'm trying to say is, our historical lore is that we have a lot of characters because we have stories that we like, like Howard Schultz from Starbucks, Ray Kroc from McDonald's, Asa Chandler from Coca-Cola.

But hey, it's easy to overlook small characters, ah!

For example, Mr. Lem Seng, the chef who made chop suey, Mr. Peng, left, who made Sotang's chicken, and all the Japanese bakeries who made the fortune cookies.

The focus of my presentation is to get you to think again, that the names of people forgotten in history, even if they are sometimes forgotten, at least influence what we eat.

thank you

When I was a kid, every other Friday, I left the house of my biological mother and stepfather, who were Indian and British, atheist and Buddhist, agnostic and vegetarian, sometimes New Age and Democrat.

I was heading to my biological father and my mother-in-law's house, two miles away. They were white, evangelical Christians, conservative, Republican, they went to church twice a week, and they ate meat.

I don't even need to explain how I got into the field of conflict resolution.

(Laughter) Whether we're facilitating dialogue in Charlottesville, Istanbul, or Ahmedabad, the challenge is always the same: to face the challenge, to be honest, to get people to connect in meaningful ways, to take a step forward, and to make a difference based on their experiences.

There, I often saw people inspire each other in extraordinary and moving ways.

After that, I stepped away and attended the same daily gatherings as you: weddings, conferences, back-to-school picnics, many of which ended in disappointment.

There was a semantic gap between a group of highly tense rivalries and my daily gatherings.

Sure, a birthday party might not turn out to be a racial dialogue, but that's not what bothered me.

Conflict resolution facilitators are taught to strip everything down and focus on how the parties interact, while the organizers of the daily gatherings focus on the details: food, flowers, fish knives, and how participants interact is left almost to chance.

So I started thinking about how we could transform our daily gatherings into places where we could focus on connecting people and creating meaning, rather than focusing on canapés and stuff like that.

I also went to interview a variety of spirited and quirky "organizers" -- Olympic hockey coaches, Cirque du Soleil choreographers, Jewish rabbi camp instructors -- to better understand the secrets of meaningful, transformative gatherings.

Today I'd like to share with you some of the things I've learned about the new rules for gatherings.

When many people plan a gathering, they start with a ready-made format.

Birthday cake and candles

Board of Directors

One brown table and twelve white guys

(Laughter) We assume that the purpose is obvious, and we shape it too quickly.

Not only is this a boring, familiar gathering, but it also misses the opportunity to really face what we want.

The first step in making our daily gatherings more meaningful is to give them a specific, controversial purpose.

A pregnant acquaintance was afraid of baby showers.

I found the habit of "pinning diapers to baby drawings" games and gift-opening on the spot strange and unnecessary.

She stopped and asked, What is the purpose of a baby shower?

What am I asking for here?

And she realized that it was about facing the fears of parenthood that she and her husband share.

So I asked two of my friends to organize a gathering around this point of view.

And then one Sunday afternoon, six women got together.

First, to work through her fears of childbirth, I asked her to share what she knew about her and to remind her of the traits she already possessed: courage, wonder, faith, integrity, things that I thought would be supportive during childbirth.

As we talked, we strung together the beads, each with its own meaning, into a necklace that we could wear in the delivery room.

Then her husband came in, and the couple wrote out their new family vows and read them aloud. First, a promise to keep their marital life centered when they became parents;

Then more friends came, including men, and the dinner party began.

And instead of gifts, they shared their favorite childhood memories at the dining table.

You might think it's a lot for a baby shower, or it's a little weird, a little too intimate.

that's fine

it's special

become a matter of debate

It's special for these two, and your gathering should be special for you, too.

The next step in making our daily gatherings more meaningful is to provoke good discussion.

Like I did, you may have learned that you shouldn't talk about sex, politics, or religion at the dinner table.

That's an effective rule where there's a sense of cooperation and where there's an intention not to talk like that.

But this loses the most important element: connecting with people in a burning way.

The best gatherings are those that create the right conditions to lay the groundwork for good debate, because human connections are as threatened by unnatural conflicts as they are by unnatural peace.

Once upon a time when I was working for an architecture firm, the firm was at a crossroads.

We had to decide whether to stay in business and focus on building, or whether we should shift our focus to design, which is a hot business these days, and focus on more than creating spaces.

There were real conflicts at work, but no one was arguing in front of everyone.

So we set up a forum for a good discussion.

When the lunch break was over and all the construction engineers were back, we held a wrestling-style match.

It's the entrance of the players. Place one person in the corner representing "architecture" and place the other in the "design" side.

We wrapped white towels around both of their necks, borrowed from the restroom -- excuse me. We played "Rocky" music on our iPads, and the Don King-esque manager on both of them roused the players to prepare counterarguments against the other.

However, due to the framework of politeness, the discussion does not progress easily.

I had everyone except the players move to their side, in front of everyone.

We broke the stalemate by allowing each of us to take our stand.

Architects won

this is for work

For example, what if Thanksgiving dinner turns into a volatile situation?

how is it?

(Laughter) Let's start by asking the purpose.

What does the family want this year?

If one of your goals is to foster good, passionate discussion, then for one night, stop voicing your opinions and let them tell stories instead.

Choose a theme related to the underlying conflict

But instead of giving opinions, I ask people to tell stories about their lives and experiences that no one else has heard, stories about when they felt different, stories about how they felt they belonged, stories about when they changed their way of thinking, so that they can understand each other without getting too hot to set their house on fire.

And finally, to make our daily gatherings even more meaningful, let's create a temporary space that's different from what we're used to, by setting rules for a limited time.

A few years ago, I started getting invitations to gatherings with a set of rules.

You think it's boring and cramped, right?

it's different

In this multicultural society of people from all backgrounds, we all grew up in different cultures and learned different etiquette. There is no common etiquette, so implicit discipline is inconvenient.

It's a one-time "law" for a specific purpose.

For example, at a company team dinner, where people from different generations gather, and where the premise of cell phone etiquette is not shared, "Whoever looks at your phone first has to pay."

(Laughter) Try it.

(Applause) I don't want to be the organizer of a group of strangers giving advice on startups, where everyone just listens to one venture investor -- (Laughter) You know what I'm doing.

At a mother's dinner, it's not fun to say the same thing just because you happen to be a mother.

(Laughter) It should be a fulfilling dinner.

Rules are powerful because they can temporarily change and harmonize our behavior.

In a diverse society, time-limited rules have special power.

Rules allow people to come together across differences, connect, and create meaning together, without having to be the same.

As a child, I was able to navigate between two worlds by being a chameleon.

If someone sneezes at my mother's house, I would say, "Take care of yourself." At my father's house, I would say, "God bless you."

I hid to protect myself. I'm sure many of you have had the same experience.

It wasn't until I became an adult and started working in conflict resolution that I stopped hiding.

And I realized that the ideal gathering for me would be a place where I could be in the same space as other people, where I could see myself for who I am, and where I could see them.

How we gather is what matters, because how we gather is how we live.

thank you

(applause)

"The New Colossus" by Emma Lazarus Unlike the famous brass giant of Greece, who stretched out his conqueror's limbs and straddled from earth to earth, here washed by the waves Standing at the gates of our sunset, holding a torch filled with lightning, a mighty woman whose name is "Mother of the Exiles", whose torch radiates a welcoming light to the world, and whose calm eyes are the port of the two cities connected by the suspension bridge. overlooking

"O old land, keep up the ostentation!" cries its closed lips, "Give to me the weary, the poor, the liberty-seekers, the huddled, the poor, abandoned on thy crowded shores.

Send me the homeless, the storm-thrown, I'll hold the torch by the golden door! ”

I'm Saphia Elhiro. Listen to my poem "How to Use Water."

Dilute- I don't remember how to say economy in Arabic I don't remember how to say عسل in English I don't remember Arabic incense Nor English مسكين Nor Arabic sandwiches English صيدلية مطعم والله Foolish girl Did the Atlantic stick out your tongue Blur — Too deep in my hometown Sick of politeness Even doctors do things I can't tell you the truth My grandfather's left eye had thick smoke swirling In a new mouth you could call it glaucoma But in Arabic it's still white water Swim--I want to go home Melt--I want to go home--I'm drowning--half I can't escape, I can't cross I'm ungrateful I'm homesick I'm protected by my blue American passport and I don't even know what I lost to come here

My mother used to tell me that my body type was that of a Lego doll.

(Laughter) If you look at it this way, it's true.

A company called Lego has succeeded in making people believe that Lego belongs to their country.

But no, this is from my country.

So imagine my excitement when Lego asked me to design a house of blocks.

This is an architectural model, made out of Lego, of course.

This is how it looks like

The goal with this design was to make it as interactive, immersive and fun as Lego, with a playground all the way up to the roof.

The plaza above ground can be visited by citizens of Billund without a ticket.

This is a rare art museum in the world where you can touch the works freely.

The Danish word for design means "to give form," to give form to something that doesn't yet have form.

It's about giving shape to the future.

The nice thing about Lego is that it's not just a toy, it's a tool.

Let children create their own world, live in it through play, invite their friends to live in it, and create it together.

That's what it means to "give shape."

As humans, we have the power to shape the future.

Inspired by Lego, I built a public housing project in Copenhagen by stacking wooden blocks.

I'm making a balcony part by opening a gap between the blocks.

You can gently shift and bend the blocks, or create organic shapes to adapt to local conditions.

Adaptability is a very important factor in architecture.

Another example is here in Vancouver.

I've been asked to consider where the Granville Street Bridge splits into three branches towards the center of town.

First, we will put various constraints on top of each other.

You have to stay 30 meters away from the bridge because the city doesn't want people to spy on traffic on the bridge.

I have to make sure it doesn't cast a shadow on a nearby park.

What's left is a small triangle of land, too small to build on.

But I thought, anyway, if it's okay to be 30 meters away, maybe 30 meters above the ground, we can expand the building.

so i did

When you cross the bridge, it feels like someone is opening the curtains and welcoming you into Vancouver.

Or as weeds grow through cracks in the pavement and blossom with light and air

Under the bridge, we worked with Rodney Graham and several other Vancouver artists to create what we call the "Sistine Chapel of Street Art," an upside-down museum that turns the negative side of the bridge into a positive one.

Even these surreal looking buildings are highly adaptive to their surroundings.

If a bridge can be a museum, then a museum can be a bridge too.

We have a museum in Norway that straddles a river so that you can walk from one side of the sculpture park to the other and tour the exhibits.

Architecture that adapts to the terrain

I made an energy company headquarters building in China that looks like Issey Miyake's clothes.

It's like a ripple, the side facing the sun is opaque and the other side is glass.

As a whole, it seems to change from white to transparent.

No special mechanics or moving parts, just the geometry of the outer surface reduces the energy consumption of cooling by 30%.

The sophisticated look of a building serves a sophisticated function.

A building adapted to the climate

It can also be adapted from one culture to another. In Manhattan, we've taken the courtyards of Copenhagen and turned them into social spaces where people can come together, creating an oasis in the middle of the big city, while combining the density and verticality of American skyscrapers to create courtyard skyscrapers.

Move from New York to Copenhagen

We're finishing up this waste-to-energy plant on the Copenhagen waterfront.

It's the cleanest waste-to-energy power plant in the world, and nothing toxic comes out of the chimney.

This amazing technology is completely invisible to the naked eye.

I wondered how I could express it.

In Copenhagen, as you can see, it snows, but there are no mountains.

If you want to ski, you have to take a six-hour bus ride to Sweden.

So I decided to build a ski slope on the roof of the power plant.

This is the first ski I did a few months ago.

I like this one because it shows the power of giving shape to change the world.

I have a five-month-old son, and he grows up not knowing that there was a time when he couldn't ski on the roof of a power plant.

(Laughter) (Applause) It's going to be normal for my son's generation.

Imagine how far they'll go and what ideas they'll come up with for the future.

We're doing the smallest projects right at the doorstep of this power plant.

In a shipyard in Poland, they built nine containers, hauled them across the Baltic Sea, and docked them at the port of Copenhagen, where they're home to 12 students.

From each room you can see the sea, and from the window you can jump into the clear waters of Copenhagen Harbour, and come back.

We get heat from the ocean and electricity from the sun.

This is the first 12 units in Copenhagen, with 60 more in the works, and 200 in Gothenburg.

nomadic and temporary architecture

The coastal areas of the cities are undergoing major changes.

Economic change, industrial change and climate change.

This is Manhattan before Hurricane Sandy This is Manhattan after Hurricane Sandy

We were invited by New York City to see if we could protect Manhattan from flooding without building a seawall that cuts off city life from the ocean.

we were inspired by the highline

As you know, it's a wonderful new park in New York.

They turned an abandoned railroad track into a popular promenade in New York City.

I figured I wouldn't have to wait for something to go out of business to build something nice that would protect Manhattan from flooding.

Together with New York's waterfront residents, we came up with designs that would make the waterfront more convenient and enjoyable, while also protecting it from flooding.

Underneath the flyover, we'll create an exhibition space with a storage wall that protrudes to protect it from water.

You can make small tiered terraces that turn under the road into a place of fun and protect it from floods.

Further north, at East River Park, we built hills to protect the park from road noise, but also to stop storm surge waves and protect them from flooding.

We call this project the "Dryline," if you will -- (Laughter) the Highline that keeps Manhattan dry.

(Applause) We're planning to break ground on the first part of the East River later this year.

It was designed in collaboration with citizens living on the south side of Manhattan to create a positive social and environmental impact while providing the infrastructure needed for urban resilience.

New York isn't the only city facing this problem.

By 2050, 90% of the world's major cities will have to deal with rising sea levels.

In one section of Hamburg, the bottom floor of the building was designed to withstand the inevitable floods.

A town in Sweden designed all of its parks as wetland parks to deal with rainwater and wastewater.

So I thought, in fact, today there are three million people living at sea all the time.

So I thought, maybe we could create a floating city, a floating city with a whole new artificial ecosystem that incorporates all of the United Nations Sustainable Development Goals.

Of course, you have to be able to generate your own electricity, using the heat stored in the ocean, the ebb and flow of the tides, the currents, the power of the waves, the power of the wind, the heat and light of the sun.

Collect all the rainwater that falls on this artificial archipelago, organically and mechanically process it, store it, and purify it.

We also need to be self-sufficient in food, which will be based on fish and vegetables, because we don't have land or resources for dairy farming.

We also take care of all the garbage, compost it and convert it into recycled energy.

In a traditional city master plan, the streets are laid out in a grid and the building blocks are laid out.

In this master plan, I enlisted a few scientists to start with renewable and usable natural resources, and then think about resource flows and envision what we might call "artificial ecosystems" or "urban metabolism."

It's modular, it floats, it can withstand tropical storms.

It can be prefabricated and mass-produced, towed out to sea and combined with other modules to form small communities.

In this way, we can design a variety of coastal areas that are rationally modular, yet each island can be individualized according to the coastal landscape.

In order for the island to float, the building needs to be relatively low.

You can do various kinds of farming, it becomes a social space, and you can enjoy life with a farm.

Designed for the tropics, the roof maximizes the use of solar energy while providing shade.

All materials are lightweight and renewable bamboo and wood, which creates an inviting and warm atmosphere.

Any architecture should fit this platform.

The bottom level is the storage area, which is kind of like the floating house that we built for our students, but on a bigger scale.

There's a place to store the energy you generate, and a place to store and purify the water.

Waste-free disposal and composting

We have preliminary agricultural facilities for aeroponics and hydroponics.

If you look at the vertical cross-section of this island, there's the sky above, and there's a vertical farm, and below that, aeroponics, hydroponics, aquaculture.

Further down there are marine farms, where artificial islands are anchored to the land, where artificial coral reefs are created to regenerate biodiversity.

This small island has a population of 300 people.

Connect the islands to form an archipelago, and connect more archipelagos to form a city with a population of 10,000.

If this floating city prospers, it will grow like culturing in a Petri dish.

The mouth of the Pearl River is the first place we're thinking of building this floating city.

An artificial archipelago floating in the sea is covered with photovoltaic cells like tree trunks

As you head towards the island, you'll see the inhabitants coming and going in various forms of boats.

There is a community like this around the port.

You can walk around the farm, where you can socialize while producing food.

The vegetable greenhouse is also the greenhouse of the city's cultural life, and under the sea there are agricultural, scientific and social spaces.

You can imagine people flocking to these port districts day and night.

The first one is designed for the tropics, but I think this architecture can be adapted to any culture, whether it's a floating city in the Middle East, a floating city in Southeast Asia, or even a floating city in Northern Europe.

let's wrap up

70% of the human body is water

70% of the earth's surface is water

and rising

When the world wakes up tomorrow, even if it were carbon neutral overnight, there is an island nation that is doomed to sink into the sea unless it develops a floating habitat.

The only constant in the universe is that it changes.

Our world keeps changing, the climate keeps changing

No matter how severe the crisis, humanity has superpowers.

The power to adapt to change, and the power to shape the future.

(applause)

"Second Coming" William Butler Yeats Whirling and twirling in a widening vortex The hawk can't hear the voice of the falconer Things crumble, the center can't hold up Sheer anarchy unleashes upon the world Blood-coloured tides unleash Innocent rituals swallow up everywhere The best loses all confidence The worst fills with mighty momentum

The revelation must be at hand The Second Coming must be at hand

Second Coming! As soon as the word is uttered a gigantic phantom from the World Spirit bewilders the eye Somewhere in the sands of the desert A figure in the form of a lion's body and a man's head With eyes as ruthless and empty as the sun Gently moves its legs And rounds it all the shadows of angry desert birds run.

Darkness falls again But now I know Twenty-century stone slumbers Haunted by the cradle's nightmare What kind of ferocious beast—The hour has finally come Stalking Bethlehem Is about to be born?

"The World Is a Stage" from As You Like It By William Shakespeare The world is a stage, and men and women are just actors on it.

First, a baby in the nanny's arms Crying and throwing up, then a reluctant schoolboy with a bag With the bright morning sun on his face, hesitantly going to school like a cochlea

After that, my lover, a hot sigh like a furnace, pitifully making a song that touches the lover's eyebrows

After that is the soldier, cursing abusively, a face with a beard like a leopard, eyes changing color with greed for honor, a quarrel soon blooms, seeking fame in a bubble, heading for the muzzle of a cannon

Next is the judge Eating a delicious castrated chicken, with a plump belly, sharp eyes, and a neat beard.

Well, the stage is changed to the sixth scene.

Finally, the last finale is a tumultuous and mysterious life story Returning to childhood and forgetting everything No teeth, no eyes, no taste, nothing like bubbles

I'm going to talk about the 17th century

I hope no one is offended

After the invention of the PCR (Polymerase Chain Reaction) method, I wanted to do something else.

Moved to La Jolla and started surfing

I lived on the beach for a long time

If you've never been to a beach, you might be wondering what surfers do while waiting for a wave.

Sometimes we wait 10 to 15 minutes for the next wave.

We usually talk about the 17th century.

Looked down on by the world

I'm considered uneducated

One day someone recommended a book

It's called "Air Pump" or "Leviathan and the Air Pump"

in a very strange book about the 17th century

And then I realized that my way of thinking was the only natural way of thinking.

I was born with that way of thinking, and I've been a scientist since I was a kid.

When I wanted to know something, I used the scientific method. When I first learned how to do science, it didn't surprise me at all, because I was already using it for fun and stuff.

But I had no idea that this scientific way of thinking was invented only 350 years ago.

It happened almost simultaneously in England, Germany, Italy, and many other places.

this story is so funny

This story and the rest of what scientists do

I'm going to talk a little bit, first of all, Charles I was beheaded sometime in the early 17th century.

Britain will be left to Cromwell and other Republicans, not like American Republicans (Laughter).

They changed the government, but it didn't work.

And eventually returned to the monarchy and crowned his son Charles II.

He was very nervous. His father had been beheaded because he was the monarch of England.

There was no TV, no football games.

They get so angry that suddenly they spill out of the store onto the street and start arguing over, say, whether it's okay for Robert Boyle to invent a device called a vacuum pump.

Now Boyle was a friend of Charles II.

I was a Christian on the weekends, but a scientist on the weekdays.

(Laughter) Well, at the time, it was kind of like, he built a little bicycle pump that sucks air out, but you know the bell jar? It's a bell-shaped piece of glass that seals when you put it down so you can see inside and see what's going on inside.

He tried to suck all the air out of it and see what was happening inside.

I think one of his early experiments included birds.

People in the 17th century didn't understand, like we do today, how air is made up of different molecules, or why we breathe air.

Fish don't care much about water, humans don't care much about air.

but both live in it

First you put the bird in and you let the air out and the bird died and he said "Hmm"

I described what I did as "creating a vacuum," which is now a vacuum pump.

it wasn't called that back then

And he soon got into trouble with the local clergy who said he couldn't create a vacuum.

(Laughter) As Aristotle said, "Nature abhors a vacuum."

This is probably a translation error, but people believed in these authorities.

Boyle, did you know that?

I have created a vacuum many times.

I don't know what it is, but what kills that bird I call it a vacuum

And one of the doctrines of religious people is that if God wills, God is omnipresent.

Nothing exists in a vacuum, so God cannot exist in it.

That's why the church said you can't create a vacuum.

If you ask Boyle, you know.

Call it Godless or whatever you want

I don't care, I'm not interested

Religion only on the weekends, and I'd like to know what would happen if I sucked everything out of the container.

and he conducted various small experiments

For example, a loosely attached ring that spins like the blades of a small fan

Just put another one across from it and I'd use a rubber band and an impeller that looks like a tin toy.

I've seen the blueprints, so I know exactly how he did it.

One of the two windmills can be turned from the outside even after the vacuum has been created, and he found that after all the air has been sucked out and the vacuum is created, turning one windmill will not turn the other windmill.

Something was missing. It's strange that I had to go out of my way to prove this experimentally, but at the time, it was like this.

And there was a lot of controversy about it in pubs and cafes.

Charles began to fear that

It was Charles II's suggestion that if we did that, we'd create a place where people wouldn't rekindle their anger at the king, and just go there.

So Charles said, "I'll give you guys money and get you a building, and you can have a meeting in that building, but you can't talk about religion there."

Boyle has no objection

he accepted and started the meeting

Anyone who aspires to science, this was the time when Isaac Newton was starting to do some very interesting things.

A wide variety of people gathered at the meeting, which we named the Royal Society, although we had to come dressed up.

Unlike the TED Conference

Anyone who dressed like a gentleman could participate.

It wasn't a membership system.

So people got together and did "experiments," which was a new term at the time, to demonstrate the principles of something, on a stage where everyone could see it.

And the most important rule was, for example, not to talk about the ultimate cause.

god is not discussed here

It doesn't matter what reality is

We shouldn't talk about absolute properties, etc.

We weren't allowed to say things that couldn't be proven experimentally.

If it is possible for humans to observe, if the device works this way and operates this way,

We could explain it this way, and we were allowed to make generalizations based on experimental observations, such as, "Every time I build this, this phenomenon must happen."

That's where the rules started to come into being.

For example, if two opposing windmills are connected only by something that can be sucked out by a vacuum pump, then when you create a vacuum, you can't turn the other windmill.

Candles don't burn in a vacuum, so sparklers probably do the same.

We don't know exactly, but sparklers actually burn, but they didn't know.

Because we didn't have sparklers (Laughter), we can make laws, but only those that can be proven experimentally.

And most experiments have to be visual.

If you're experimenting on stage and you can't see or hear anything, people will think you're weird.

reality is what you see

It's not a set rule, but it must have been part of it. Even if you hear a voice, if you can't find the owner of that voice, that person probably doesn't exist.

In general, we could only talk about things that had some kind of experimental backing.

It doesn't matter what local philosopher Thomas Hobbes says, because we don't discuss the ultimate cause.

What happened in the middle of the 17th century was that science, especially experimental science, was segregated as something material and to be kept in a separate room, which later became my field.

Until then, science was deeply associated with theology, philosophy, mathematics -- not really science.

Experimental science was associated with these

And the mathematics part and the experimental science part gradually separated from philosophy.

And I didn't have any regrets

It's been great ever since

The ties that hindered technological development are being unraveled

Everyone in this room, this was only 350 years ago.

really short time

Most of our ancestors in this room left Africa and headed left about 300,000 years ago.

The people who went right need a Japanese translation

But that happened a long time ago compared to 350 years ago.

But in the last 350 years, laboratories have come a long way.

In fact, everyone in this room, especially if you have a bag in your hand, some of you may not have your own bag, but what's in your bag, in your pocket, in your living room?

If you think about how important it is, even if you have GPS, without satellites, it's not very useful, but if you had a GPS system in the 17th century, some king would have raised an army to get it.

Maris: That might be an ant too.

everyone owns

An individual owns something that the king of a country must have fought a war to obtain.

in just 350 years

not everyone contributed

Great Men Giants who made progress as you can read in biographies

All of this comes from isolating some of what we do as scientists. As a boy, I thought, if there was something I wanted to know, well, it was because my father was away from home and my mother didn't know much about science, but if there was anything I wanted to know, I had to try it myself and experiment.

Maybe I was born with a natural inclination to think scientifically, to experiment, and I always assumed that everyone else was the same.

I thought anyone with even a little bit of brain would do that

But no. Many people don't. I'm one of the scientists who got into trouble at the dinner party the other day about postmodernism.

Do you have that woman apart from me?

Audience: Right here

(Laughter) I mean, I didn't really think of it as a debate, it was just a lively exchange of ideas.

I don't take it as a personal attack, but I'm just being silly and honest, until I got into the 17th century in the waiting time for surfing, I thought it was something you could see, hear, touch, and feel that you used to perceive the reality that everyone thinks and acts that way.

But anyway, when I was a boy, for example, I got this little book from Fort Sill, Oklahoma, around the time George Dyson's dad started thinking about atomic power -- blasting nuclear rockets.

I was thinking of building a homemade little rocket.

And I knew that frog, little frog, dreamed of traveling in space, just like a human being.

that was my personal goal

I dreamed of a little parachute full of frogs coming back after I was soaring out of sight

And I got the book from Fort Sill, Oklahoma, where the missile base is located.

They were sending out a book to amateur rocket enthusiasts, and it said that a mixture of potassium perchlorate and sugar should never be heated.

(Laughter) This is the clue.

(Laughter) So, I was wondering if it's possible to get some potassium perchlorate and some sugar and heat it up.

So my mom was always doing ironing and stuff, watching the backyard from the upstairs window.

For the most part, I was just watching, and if I saw smoke or something, I would lean out the window and be careful not to close my eyes.

So I have to close my eyes

I didn't care if it was forbidden to heat this mixture.

Just be careful

Like anything else that was forbidden, let's try it in the back of the garage.

(Laughter) So I went to the drugstore and tried to buy some potassium perchlorate.

(Laughter) But they didn't have it at the store, so I asked them what kind of potassium salt they had.

there was potassium nitrate

I thought maybe it was the same

I was pretty sure it had something to do with rockets, it's in the manual.

So I did some experiments

I started with just a little bit of potassium nitrate and sugar, and I had plenty of sugar, so I mixed it in various proportions and tried to burn it first.

to see what happens by mixing

it burned

It burned rather slowly, but it smelled better than any other rocket fuel I tried, which all contained sulfur.

it smelled like burnt candy

Then I tried melting

it melts into a syrupy brown liquid

When it cooled, it hardened like stone, and when I lit it, suddenly, it was at breakneck speed.

A substance that cooled in a small vessel ignited it and bounced around the garden.

So you found a way to let the frog go up in the sky as he wanted.

(Laughter) So I started working on it. George's dad had a lot of helpers, but I only had my brother.

So roughly, it took me about six months to complete all the details.

Building a rocket that flies well requires a lot of small details, even after you've secured the fuel.

But I have no choice but to experiment, sometimes I take notes and observe

Then gradually find the law

Things work according to various laws

Find out the laws I think I'm a born scientist Throwback to the 17th century

Anyway, we finally built a device that can send frogs far away and come back alive.

and we weren't afraid of the device

It emits tremendous smoke, makes a roaring sound, and has tremendous power.

And even though it occasionally exploded

By the way, I wasn't worried that the explosion would destroy the global environment.

I didn't know about the "10 Things to Worry" about at the time. Jokes aside, it's forbidden.

Waiting for government approval

But if I had waited for that, the frog would have died.

Anyway, I'm telling you this today because it's a good story, and you've asked me to tell you something personal.

And there are other topics that aren't personal.

However, I believe that science is about the process itself. Instead of starting with an idea and asking for authority or other opinions, sometimes that's necessary too.

But the actual procedure was, first of all, an idea, like, one night, I came up with the idea of ​​how to amplify DNA with two oligonucleotides to make a lot of copies of a piece of DNA.

If I had been looking for an authority who could decide if this idea would work, it would have been decided that it wouldn't work.

Because the results are so groundbreaking that, if successful, they would change the way molecular biology is done.

No one wants a chemist ravaging their territory.

But when you rely on authority, you don't always -- or even always -- get the right answer.

But I knew you could go to the lab and try it yourself, and then you could say to yourself, you're the authority, it's going to work, because it happened in a test tube right in front of you.

That's how science works

Then how to improve

and keep improving

However, it must be based on facts proven by own experiments, and can be demonstrated on stage.

No hidden gimmicks, etc. If you really want to succeed, you have to be honest in what you do.

Don't make up your results, don't make up your next experiment based on your results.

you have to be honest

I'm basically honest

I have a bad memory, and lying always gets me into trouble, so I'm naturally honest and naturally inquisitive, and that's what led me to science like that.

By the way

You have five minutes left, right?

OK, some scientists don't.

A lot (Laughter) A lot has happened since Isaac Newton.

One of them happened right around the time of World War II, when governments realized that scientists weren't weirdos sitting in ivory towers doing crazy things in test tubes.

Scientists made World War II possible.

they realized the speedup

they made bigger guns

I've also developed a drug to administer to pilots with mental breakdowns.

In the end, you made a huge bomb and settled the matter, right?

People took a step back and said, "We've got to invest in this thing, because whoever has more scientists will have the upper hand, at least in the military and in various economic areas.

And so they were taken in. A scientific industry was born, and many scientists were born, hoping to make money from their prey that suddenly appeared.

They weren't curious boys who liked to fly frogs.

It's the same kind of people who went to medical school later in life because it was going to make money, and then a little bit later, everybody went into business, and in high school they said if you wanted to be rich, you had to be a scientist.

If you want to be rich, be a businessman

But many people became scientists for money, power and travel.

when travel was easy

And these people think, they don't always tell the truth.

Always telling the truth can hurt their contract.

And the people we're talking about are people who are members of committees like the Intergovernmental Panel on Climate Change.

And in the many large conferences they hold, they're looking for ways to continue to prove that the planet is warming, contrary to what many people think.

If you actually measure temperatures over the long term, well, they've been very cautious over the last 50 to 60 years, but they've been measured over longer periods of time, but the ones that've been measured with precision and well-documented are the last 50, 60 years.

The average temperature has gone up a little bit, because the nighttime temperatures at the observatories have gone up a little bit.

But there's a good reason for this

The observatories were all built on the outskirts of the city where the airport is located, and the city is so stretched out and surrounded by concrete, it's called the skyline effect.

Many thermometers find that they need to shield their instruments.

Doing that will also keep the building warm during the day and a little warmer at night.

That's why the temperature is rising a little.

It's a given, and it's not a huge rise. He probably didn't think that way as much as the first guy who thought that humanity would dry up on the planet said.

His name is Svante Arrhenius, and he's a Swede who, in 1900, thought that if he doubled the level of CO2 in the environment, he could do so in the future, and he calculated that the temperature would rise by 5.5 degrees.

He saw the Earth as an empty, completely insulated thing with energy pouring in and out.

And he came up with this theory, and he thought it was a good thing, because in Sweden the farming season is longer.

But no one has proven it, right?

You can find the observed temperatures on the Internet, but you just have to comb through NASA and the Japan Meteorological Agency.

And if you average that with daytime temperatures, it looks like it's gone up about 0.7 degrees this century.

But it's actually happening at night, not during the day.

In other words, according to Arrhenius' theory and the ideas of global warming theorists, if it's the greenhouse effect, then the daytime temperature must be rising as well.

People like things that have that kind of evocative label. Conversely, people don't get excited about the actual data that could be the evidence for the tropical convection boom in the 1990s.

This is a paper that came out in February, but most of you probably don't know it.

"Evidence for large decadal variations in the tropical mean radiation balance"

They're papers published by NASA scientists Villikey and Princeton University and many others.

And the two papers that were published in Science on February 1st, and both those papers and the conclusions of the editors of Science are, in short, what the papers say is that the theory about global warming is fundamentally wrong, what these people are doing, and what the people at NASA have been saying all along.

If you look at the temperature of the atmosphere, it's not rising. It's not rising at all.

And this paper also shows something even more amazing. It's about radiation, and it's actually so complicated that I won't go into details, but it's not as esoteric as the esoteric terminology they're using to smoke the world might give you the impression.

When it warms up, it emits infrared energy, which is closer to red. Warm objects emit infrared.

The theory of global warming is actually crap, but the bottom line is that if there's too much CO2 in the environment, the heat can't escape.

So while you can keep it warm, you can't dissipate that heat.

And these guys measured them all.

You can talk about it, you can write these thick reports, you can get the government to subsidize it, but if you actually measure it, and if you actually measure it, and you see, over the last 10 years, the "decade" in the title, the so-called "imbalance" in energy levels has been much higher than expected.

The total amount of imbalance that's coming in but not going out, and that's what you'd expect if CO2 doubled, and the current numbers aren't quite there.

In other words, if by 2025 the CO2 concentration is double what it was in 1900, the energy balance is, in other words, 1 watt per square centimeter.

So the earth should warm

So these two studies by two different teams found that since 1998, 1999, we've been getting 5.5 watts per square meter, and the temperature hasn't risen.

So the theory is that the Buddha

The title of these papers should be "End the Global Warming Frenzy."

They're alarmed, and you can read the very cautious conclusions of these papers, because they affect fear-mongering millions of people and large-scale labs backed by billions of dollars.

For example

If you say that there is no global warming problem anymore, then subsidies

If you applied for a subsidy for something like that and didn't see any signs of global warming,

And if you do announce that... it's time to wrap up.

(Laughter) Maybe I should stand up too. (Laughter) (Applause) They had to say that.

they had to be very careful

But what I'm trying to say is, please be happy, because the editors of Science are no idiots, and they're two really professional teams who came to the same conclusion.

It's not a little bit of a misunderstanding about the Earth. There are clearly unexplained unknown mechanisms at work on the Earth, because heat is coming in, but it's not warming.

So the planets are so amazing, they're huge, they're menacing, they're huge mysteries, and they work in a way that's completely unknown to us.

And I put all of this together because I mean, this is how science should be done.

There are many other things that are similar to global warming, like the ozone hole, all kinds of scientific and social problems, and if you're interested, you have to look into the details.

Make sure you understand the meaning of the term

And if you just listen to the people who are making a lot of money fueling these issues, you're not getting the right information, you're being scared of things you don't need.

Do you remember? One of the 10 things to worry about is (Laughter) I really agree with you about asteroids.

You have to be careful about asteroids, so thank you for inviting me.

(applause)

It seems like we're standing on solid, compact ground, but we're not.

Small crevices and crevices crisscross the rocks and soil beneath our feet.

That void is filled with vast amounts of these microbes.

The deepest microbes found were five kilometers deep.

If you're going straight down through the ground, you'll have microbes around you for the entire time you're running a 5-kilometer run.

You may not have thought there were microbes that deep in the ground, but you know that microbes live in your gut.

If you put together the gut bacteria of every animal on earth, it would weigh 100,000 tons.

We live with a huge biome in our belly.

should be proud

(Laughter) But that's nothing compared to the amount of microbes that cover our surface soils, our rivers, our oceans.

Its total weight is 2 billion tons.

But the truth is, most of the microbes on the planet don't live in the oceans, the intestines, or the sewage treatment plants.

most of them are underground

Its total weight is 40 billion tons

It's one of the largest biomes on Earth, but until just a few decades ago, we didn't know it existed.

There are endless possibilities as to what their biology is like and how they can be useful to humans.

The red dots are the locations where modern microbiology methods are used to obtain samples from deep underground, and while it might be impressive to have global coverage, it's a bit depressing to think that these are the only samples from these locations.

If we were aliens arriving in spaceships, it would be impossible to map the Earth using just these samples.

But some people say, "Even if the soil is full of microbes,

Aren't you dormant? ”

good point

Compared to fig trees, measles virus, and my daughter's guinea pigs, I'd say those microbes aren't very active.

Since there is such a huge amount, the activity should be slow.

If it started dividing as fast as E. coli, the weight of the Earth, including rocks, would double overnight.

Many of them probably haven't had a single cell division since ancient Egyptian times.

It's a crazy story

I can't imagine living that long.

I came up with a good analogy, which is a little strange and complicated.

I would like you to come with me

let's do it

It's a person who can only live for one day

It's like trying to understand the life cycle of a tree.

If you only live one day, and you live in the winter, then you're going to spend your whole life without ever seeing a tree with leaves.

Generations change in the space of a single winter, and history books only describe trees as lifeless sticks that do nothing.

this is a silly view

We know the trees are waiting for summer to come to life again.

But if human lifespans were much shorter than trees' lifespans, we might not be aware of this obvious fact.

To say that those deep underground microbes are dormant might be like trying to understand a tree when you're dead in a day.

What if deep underground microbes are waiting for the equivalent of summer, and our lifespans are too short to see it?

If you seal E. coli in a test tube without food or nutrients and leave them alone for months or years, many of them starve to death.

some survive

And if you put those survivors back into starvation mode and let them compete with a new, fast-growing E. coli strain, the tough old guys beat the shiny new guys every time.

This shows that there is an evolutionary advantage to being extremely slow.

You shouldn't assume that just because it's slow doesn't matter.

This unseen and unnoticed microbe could be useful to mankind.

As far as we know, there are two ways to live underground.

One is having food that descends from the surface world, like trying to eat leftovers from a picnic that happened a thousand years ago.

It's a very strange way of life, but it seems that a lot of microbes on the planet live that way.

Another possibility is, "I don't need the surface world, I can get by here."

Microbes that go that route must get everything they need to survive from the ground.

Some of them are rather affordable

Things that are more abundant in the ground: nutrients like nitrogen, iron, sulfur, water, places to live.

In the surface world, it can even kill each other to get it.

In the underground world, it's energy that matters to get.

On the ground, as soon as the sun's rays hit the leaves, the plants were able to weave carbon dioxide molecules together to create delicious sugars.

But there's no sunlight in the ground, and underground ecosystems need to solve the problem of who makes food for everyone.

Underground, you need something like a plant that breathes rock.

Fortunately, such things exist and are called chemosynthetic mineralotrophs.

(Laughter) This is a "living organism" that gets "nourishment" from "inorganic" rock by doing "chemosynthesis."

We can do that for different elements.

Sulfur, iron, manganese, nitrogen, carbon, even some that can handle electrons directly.

It's like cutting an electrical cord and smoking like a snorkel.

(Laughter) Chemosynthetic mineralotrophs use the energy they gain in the process to make food, just like plants do.

But plants don't just make food.

It makes oxygen as a waste product, and we animals depend on it.

The waste products produced by chemosynthetic mineralotrophs often take the form of minerals, such as rust, "fool's gold" pyrite, and carbonates such as limestone.

So we have very slow microbes, like rocks, that take energy from rocks and make other rocks out of their emissions.

Is this about biology or is it about geology?

This complicates things

(Laughter) If you're looking into this, I think you should be a biologist who studies microbes that behave like rocks, and start with geology.

So what's the coolest thing about geology?

it's a volcano

(Laughter) This is the inside of Poas Volcano in Costa Rica.

Many volcanoes are formed when oceanic plates collide with continental plates.

When an oceanic plate subducts beneath a continental plate, it squeezes out water, carbon dioxide, and other substances, much like wringing out a wet towel.

A subduction zone is like a portal to the depths of the earth, where matter moves between the surface and the subterranean world.

Recently, a researcher from Costa Rica invited me to study volcanoes with him.

Of course I did, because Costa Rica is a lovely place, located on top of a subduction zone.

We wanted to know that volcanoes are the only places where carbon dioxide from deep-buried oceanic plates comes out.

Why aren't they distributed throughout the subduction zone?

Do microbes have something to do with it?

This is a picture of me and my colleague Donato Giovannielli inside the Poas volcano.

The lake beside us is as acid as battery fluid.

I know this because I measured the pH when this picture was taken.

I was exploring inside the crater, and I happened to ask Carlos Ramirez, a researcher from Costa Rica, "If this thing started to erupt now, what would we do?"

He said, "Good question, easy.

Turn around and enjoy the view."

(Laughs) "Because that will be the last view."

(Laughter) This might sound like a bit of an exaggeration, but 54 days after I was by that lake, this happened.

(surprised voice from the audience)

It freaks you out, doesn't it?

(Laughter) This is the volcano's first major eruption in 60-odd years, and a while after this video was shot, the camera that was filming it blew up, and the lake we were sampling completely evaporated.

But I was fairly certain that this wouldn't happen on the day we were inside the volcano, because the Costa Rica Volcanoes and Seismological Observatory (OVSICORI) is closely monitoring volcanic activity, and scientists from that organization were with us that day.

This volcanic eruption seems to indicate that if you want to see carbon dioxide coming out of an oceanic plate, look at a volcano.

When you go to Costa Rica, you realize that besides volcanoes, there are small hot springs all over the place.

Some of the water in hot springs comes up from deep buried oceanic plates.

Our hypothesis is that the carbon dioxide should be coming out with it, but something deep underground is removing it.

So we spent two weeks driving around Costa Rica, taking samples from every hot spring we could find, and it was really hard.

I spent the next two years measuring and analyzing the data.

For those of you who aren't scientists, big discoveries don't happen in a nice hot spring or on a stage. They happen when you stare at a cluttered computer screen, when you're working on a difficult device, when you get lost in the data, when you talk to your colleagues on Skype.

Scientific discovery, like microbes deep in the earth, is very slow.

But this time it paid off

We discovered that a deep buried oceanic plate is oozing out a huge amount of carbon dioxide.

And it's the chemosynthetic mineralotrophs deep underground, under Costa Rica's cute sloths and toucans, that hold back that carbon dioxide from being released into the atmosphere and hold it in the ground.

Chemical processes that occur around these microbes turn carbon dioxide into carbonate minerals that are trapped underground.

So the question arises: if the processes that take place underground are so good at absorbing the carbon dioxide that comes from below, can that also help with the carbon dioxide problem we have at the surface?

The vast amounts of carbon dioxide humans are releasing into the atmosphere is eroding the Earth's ability to support life on Earth.

Scientists, engineers and entrepreneurs are trying to develop ways to remove carbon dioxide at the source so that it doesn't get released into the atmosphere.

We need to do something about the carbon dioxide we remove.

So we need to continue to study where the carbon is held in the ground, to find out what happens to the carbon there.

Microbes deep underground might be too slow to hold anything, and that might be a problem.

Or maybe it helps microbes turn carbon dioxide into solid minerals.

We were in Costa Rica, and if one study could make such a big breakthrough, just think what other discoveries are waiting underground.

This new field of geology, biology and chemistry, deep subterranean biology, whatever you call it, is going to have a huge impact, not only in mitigating climate change, but in discovering things that will help us understand how life and the earth have co-evolved and have applications in industry and medicine.

Prediction of earthquakes and discovery of extraterrestrial life

It may also lead to an understanding of the origin of life.

luckily i don't have to do it alone

There are wonderful researchers all over the world trying to unravel the mysteries of the world deep underground.

You might think that life buried deep underground is so remote and irrelevant to everyday life.

These strange, slow creatures may hold answers to the great mysteries of life on Earth.

thank you

(applause)

oh the sea of ​​the earth

The sea is beautiful, inspires us, and supports life.

But you know, I'm in some trouble.

For example, in the Republic of Seychelles, coral reefs are bleaching due to human activity and climate change.

Marine resources have decreased dramatically due to overfishing

biodiversity is threatened

What can we do?

Needless to say, it's marine conservation.

nature has amazing resilience

Entire ecosystems can be restored in strategically protected marine areas.

But creating a marine reserve is not easy.

First, the challenge is deciding which areas of the ocean to protect.

This coral reef overlaps with international fishing boat routes and overlaps with our fish farm.

everything is interconnected

Marine conservation plans must consider impacts on other marine areas

Then there's the issue of getting everyone involved.

Many coastal residents make their living from fishing and tourism.

If residents think they can't work, they'll never get cooperation and the reserve will never succeed.

The designation of a marine protected area also requires enforcement power.

Governments themselves need to get serious about ocean conservation plans

Form-only support doesn't work

Marine conservation also requires a lot of money.

Even if island and coastal governments want to protect the oceans, they are often heavily indebted and unable to prioritize ocean conservation.

Relying solely on charity to fund ocean conservation would only result in a patchwork of tiny marine reserves.

Large marine protected areas need to be established quickly for long-term benefits.

Isn't there a clever way to conserve the oceans?

How can we get the funding and government support we need and the careful planning that takes care of the local economy and the conservation of our complex ecosystems?

Introducing Bold Ideas from The Nature Conservancy (TNC)

It's a way to solve all of these things at once.

The TNC realized that the debt burdens of island and coastal nations were the key enabler of their ocean conservation objectives.

The idea of ​​the TNC is to refinance the debt to free up money and political will to protect coral reefs, mangroves and fisheries.

It's like refinancing your mortgage, thinking that if you can get a lower interest rate, you'll use that money to insulate your attic.

That's what the Blue Bonds for Ocean Conservation for coastal states do.

Refinance the debt and use the difference to build a marine reserve.

Public debt restructuring is, of course, more complex, but you get the basic idea.

If an investor puts in $40 million, they'll be able to invest $1.6 billion in ocean conservation.

Here are the steps for that

Step 1 "Negotiation"

Coastal States in return for committing to protect at least 30% of coastal waters

TNCs bring in investors, public financiers and international development organizations to negotiate the refinancing of part of the country's debt into long-term, low-interest loans.

Step 2 “Creating a Marine Conservation Plan”

At the same time, the TNC works with marine scientists, government leaders, and local stakeholders to develop detailed conservation plans that combine the needs of the ocean with the needs of its inhabitants.

Step 3 “Long-term activities”

TNC will establish independent trust funds for each country

The difference from the refinancing will be deposited here and used for the new marine reserve.

And the trust encourages governments to keep their promises so that funds can actually be used for conservation efforts.

Will this plan succeed?

it's already working

2016 TNC supported a conservation plan in the Republic of Seychelles

TNC has restructured the government's $22 million debt

In return, the government agreed to protect 30 percent of its coastal waters.

Currently, the Republic of Seychelles is protecting 400,000 square kilometers of sea according to the plan.

That's roughly the size of Germany.

The Republic of Seychelles protects coral reefs, revives fisheries and makes them more resilient to climate change.

At the same time, we are increasing our economic strength

This success has attracted the attention of other governments.

Many countries are trying to follow

Opportunity to dramatically scale up in a short period of time

TNC has identified 20 countries with similar plans

But to do it, you need the capital

We also need to develop conservation plans, work with all stakeholders, and form regional teams to coordinate negotiations.

If we get the support we need, we could save 4 million square kilometers of oceans over the next five years.

It's the size of 10 Germanys

This would expand the world's marine protected areas by a whopping 15 percent.

It will restore extensively damaged coral reefs around the world and provide safe havens for countless creatures.

It's really amazing

it's just the beginning

More than 20 countries are likely to be able to refinance such debt

nearly 100 countries

This way everyone wins

Governments, local residents, investors, and above all, our oceans

everyone is a winner

oh the sea of ​​the earth

[The Audacious Project]

Today I'm not talking about simplicity, I'm complicating life like it's a serious game

I would like to show you some photos I took a long time ago, look back on my life, and talk about how I got to where I am today.

It all started with one computer

does anyone have a computer

Apparently everyone has

A mobile phone can also be called a computer.

Does anyone remember this workbook? It's a foldout flyer for the "Apple in a nutshell" book.

early computers

no software included

I couldn't do anything just by buying it and plugging it into the outlet at home.

I had to program myself, and there was a good tutorial.

it's really well done

This is Herbie on Apple II

Well done I think Java books should be made like this too so you don't have to struggle to learn to program

It was the early days of computers, you could say it was the primitive age of computers.

That era was my childhood

I grew up in a tofu shop in Seattle

Did any of you grow up in a family business?

living hell is good don't you think so

My family's tofu shop changed my life.

my mother is a designer in a way

I put pictures of tofu dishes all over the walls of the restaurant to confuse customers, mistaking them for a tofu restaurant.

Example of branding failure

That's how I grew up, a little tofu shop in Seattle, and it's kind of like growing up in this little room.

My father was kind of like MacGyver, and he figured out how to make things heavier.

Using concrete block technology, tofu needs a weight to press it down, because tofu is originally liquid, and it needs to be pressurized with a heavy object to remove moisture and harden it.

Tofu was originally a big chunk like this, and my father used to cut it up by hand.

Words can't describe the family business.My father was a very, very loyal man.

I went to the supermarket Safeway on a rainy day and slipped and injured my arm, but I left the store in a hurry because I didn't want to smear the store name.

My father injured his arm and couldn't work for two weeks, so we brothers had to do everything for him.

This is what living hell is all about

We watched my father put weights on the tofu and cut it.

The first time I did it it looked like this

It was terrible. This tofu shop was my starting point.

I loved school because working in a store was so hard, it was like heaven.

good grades in school

I'm going to MIT. If you're an artist, don't your parents tell you not to be an artist?

Similarly, I was good at art and math, but my dad used to say, "John is good at math."

I was a mathematics major at MIT, and this amazing opportunity came along when computers were just starting to become visual.

It was around the time Apple's Macintosh came out, and I was going to MIT.

I had a Mac and was at a fork in the road trying to figure out which way to go. It was good timing.

The first software I worked on was Aldus PageMaker

Before that, I was building a publishing system, and that's what sparked my interest in mixing the two.

The problem with being young, and this is true of all students, is that they quickly become big-headed.

When I was making icons, I felt like I was an icon master, like, "I can do this."

And luckily I had the opportunity to go to the library, and this book and

I came across "Thoughts on Design" by Paul Rand.

You may have seen

It's a thin book about the author himself, a great graphic designer and a famous author.

When I saw his work, it made me realize how terrible my design was, whether I could call it design, and I had a kind of career goal that I could pursue with passion.

Then I graduated from MIT

I got my master's degree and went to art school.

I started designing, I designed chopstick wrappers, napkin menus, whatever I could handle.

The moment you bring your design to the world is a very strange feeling.

I still remember that time well

do you remember? It's so spectacular

It's a great feeling to have your design published and featured in a book.

And then, strangely enough, computers were always my bane, and I thought about them all the time.

I didn't understand. Paul Rand was a finicky designer. Is it like a good French loaf?

In his book, he says, a student at Yale said, "I came here to learn design, not how to use computers." The design school listened.

It was in the '80s between computer humans and non-computer humans.

It was a very difficult time.

This is an important message from Rand to me.

That's when I got my hands on computers.

this is my first serious fight

I created something like Adobe Illustrator

You can draw like Illustrator

quite difficult to create

took a month

And then we looked at adding functionality, and the point is that it's free to move, like a bird in flight.

We've changed the stability so that it's controlled by a little dial, so it's going to keep flopping around.

It was 1993

The professors were furious when they saw this.

Professor: "Why are you moving?"

Professor: "Stop"

I said, "The point is that it's moving."

he said "when will you stop"

When I say "There's no stopping"

He got even more grumpy and said, "Stop now."

I did some more research on this idea, what is this mysterious medium of computers?

No print, no video

A very mysterious medium that lasts forever

I started exploring this more

In Japan, we conducted an experiment with humans.

This experiment is not a good example.

I give the students pens, and they have blue, red, green, and black pens.

One person sits and instructs how to draw a picture

I'm laughing at what he said, the picture got messed up.

Humans don't know how to take orders, and computers are very good at that.

He figured out how to draw two lines at once, you this you draw this

You can draw with multiple pens at once. It's hard for us to do by hand.

Someone got inspired by this and introduced a coordinate system.

this is how things happen

I ended up drawing a house, but it's a simple one.

This is what computers call the X, Y system, which is amazing.

After this, I built a computer made up of people, and I called it a human-powered computer.

It was 1993

please turn down

The parts of this computer are people

Behind the wall is a disk drive CPU graphics card memory system

they took a giant floppy disk

inserting into computer

The program is stored on the floppy

She puts in the floppy, hands it over to the disk department, and the computer starts booting.

This is how computers work. When I built this human-powered computer, I realized how fast computers can be.

Even with human power, if she and the people around her work really hard, she can get fast results.

You can only do one thing at a time, the screen changes when you move the mouse

The cursor usually moves when you move the mouse.

On this human-powered computer, when you move the mouse, it takes an hour and a half for the cursor to move.

That's the difference. I hope you can feel the amazing speed of computers.

This was later developed with another company.

Developed with Sony in 1996

This Sony3H device reacts to sound

Speak into the mic and the music will play through the headphones, speak through the phone and the video will launch.

We experimented with this technology mix product in other ways.

I did this ad I don't trust alcohol, but I do drink it sometimes.

This is Chanel, another project.

And one thing I've noticed is that I love to create.

People love to build and it's fun

i have never had a staff

I make everything with my own hands, with these tattered hands

This hand of mine was inspired by Naomi Inami.

he's like my teacher

Leading Digital Media Producer in Tokyo

He found me and brought me into the world of digital media.

he is a very inspiring person

One time, at 2 a.m., I went to his studio and he was in a meeting with several clients.

He came to me and said, "With me, everything will be fine"

I feel very comfortable

What I can't forget is that he suddenly collapsed with an aneurysm.

that I became unconscious

For three years all I could do was blink my eyes, and then I realized how fragile this body and mind that we are all wrapped up in, and what more could be done.

I thought about how I would spend my life in the future.

he made me realize

Thinking more carefully about computers

I was thinking: Computers have programs, and they respond to movements like vertical and horizontal movements, and each computer program has an image of all these things.

You can expand it all at once, as you can see in the program in the corner.

true synchronicity, unlike our movements

we are used to moving along vectors

This program is all simultaneous

computers are in so many dimensions

At the same time, it frustrates me. No matter what design art school I go to, there used to be a "computer lab" in the late 1990s, a great graphic design school in Basel.

This is a rundown, battered, gloomy computer room.

Is this the goal I was looking for

I started to wonder if this is what we want

I started to get fascinated with machines again, and the photocopier in Basel made me realize

It's about how we've spent so much time interacting, it's like a touch screen, and we're looking at why we only touch five places, and why we're wasting interaction everywhere.

I had my doubts, and then I discovered that this sound could make a ThinkPad imitate a phone call.

don't they look alike? Dissimilar?

At Logan Airport, I discovered this, it sounds like it's calling.

It's like cows barking, it's four o'clock in the morning.

I wondered, what is this computer in front of me?

I didn't understand

This is another series I made on an old computer in my basement.

I collected old Macintoshes and used parts to make different ones in Tokyo.

I lost interest in the computer itself and used the PalmPilot to create my paintings.

This series

I put the PalmPilot in the middle of the picture, like a display. Who am I? I'm an abstract person.

I kept thinking about what the abstraction of itself is.

And then I fell in love with plastic, and spent four months building eight blocks, complete optical transmission, a form of stress relief.

Then I got interested in blue tape at a community college in San Francisco.

We held a blue tape exhibition of a blue painter

My wife started to worry about me, so I stopped creating on blue tape and started thinking about other things.

Of course, computers are also very small today.

It's a one-chip computer, programmed into this chip, with an LED removed from the PC board.

I started making the LED statue, which I removed from the main terminal board.

It is a light box series for the Italian exhibition.

It's a very simple box, and when you press a button, LED lights dance.

This is a lunch box lamp from the lamp series This is a candy toy rice lamp Very soothing

I used the iPod as a material for the iPod exhibition I did in London last year.

I made a nano fish with 16 iPod nanos

this recently

The work of Reebok shoes This is a hobby

All of these things you can do. What I love most is to experience and taste the world.

the world is so delicious

We think we've gone to museums and tasted it all.

It's not. Everything is in the outside world.

In front of the Eiffel Tower and around the Louvre Museum

This is what nature forced me to photograph

It is 90 degrees perfect for nature

Weird moments like this are everywhere

we are all artists

I have this gene in my heart

I can't stop this wonderful feeling

This is a museum anytime, anywhere

This is what I picked up at the cape last year.

I found the equation of art and design. It looks like a circle, a square, a triangle.

all over the beach

I collected and arranged them

I put it back in place

after that

I also found a stone that separated the twins

this is also the same

What happened? and

put it back together

It was in "simplicity and complexity" where I discovered the spelling of M-I-T three years ago.

It's my alma mater, MIT. It's like a M. Night Shyamalan movie.

worked with passion

But recently, this Rhode Island Institute of Design (RISD) came up, and I've been having a hard time making up my mind, and MIT has been on my mind for a long time.

But French for "reason for existence"

If you look closely at the "raison d'être"

RISD appeared

I'm sure this will work

decided to go to RISD

Are there any RISD graduates?

There is wonderful!

Of course the art center is also a wonderful place.

I'm really into RISD right now, and I'll tell you the story.

"What is RISD?" This is written on the wall outside of school by some student who wants to know what RISD is.

I don't have a clear idea of ​​what RISD should be like, or what I want it to look like in the future.

Is it something like "qi"?

People ask if RISD has a future

I reply, "The future will catch up with RISD."

The problem I'm thinking about isn't how to make the world technological,

It's about being kinder to people.

RISD has mysterious DNA

It's a mysterious force, it's full of mysteries, and the world is fascinated by it now, and it's so needed.

Thank you for your attention

I'm Clint Smith. Listen to "A Poem Dedicated to the Only Black Kid in My Class."

It's as if you've made life's hardships come true

It's the Walking Brown v. Board of Education trial.

Most days the classroom feels like a waiting room

Considered an expert on things like Morrison King Malcolm Rosa

I mean, you were on that bus, weren't you?

Everyone's on good terms with you, until it's gone

authority on hip hop lyrics

Outstanding exercise, of course

just a spectacle

Caricature Existence as an Exception

too black and too white

Success is due to affirmative action

If you fail, you're originally destined to be like that

An existence that can't be seen unless the lights on Friday night are turned on

You're a star there until you're turned into an asteroid

until it turns to dust in front of everyone

Sixty-five million years ago, a very serious and devastating disaster changed the course of life on earth.

The terrestrial creatures I'm going to talk to you about are the size of poppy seeds that stick to the surface of land on Earth, but they're important to us.

They went extinct and were taken over by other animals, mammals, and the details of the disaster are clear. These are geological core specimens taken off the coast of Bermuda. Tsunamis, earthquakes, and the like, all of which have been recorded throughout human history, do not give us an idea of ​​the extent of the damage that this disaster has done to our planet.

Even before we knew about this collision, and even before scientists largely agreed on the theory of evolution, every scientist and natural historian divides the history of life on Earth into two chapters: the Mesozoic and the Cenozoic — ancient and modern life.

This division actually fits well with geological history.

The Middle Age was the age of division, the Cenozoic was the age of reunification, South America connected to North America, India to Asia.

I studied the characteristics of Mesozoic radiation versus Cenozoic radiation. What secrets can be uncovered by comparing dinosaurs to other organisms? What can organisms living on moving continents reveal about evolution?

This study raises the question: why didn't they venture into the water?

Mammals include, for example, these aquatic animals

If you go to the sea, you'll find many examples.

Within 5-10 million years after the asteroid impact, all species evolved underwater Why did the dinosaurs stay on land?

Why didn't we have small tree-dwelling dinosaurs and burrow-dwelling dinosaurs?

What was the reason? What kind of creatures lived in those places?

What does it tell us about the workings of terrestrial evolution if nothing ever lived there?

It's a very interesting problem, and I think a lot of it has to do with body size.

Most of the challenges have to do with body size, the size of a mammal when it inherits an ecological void left by such a natural disaster.

If you're looking at and studying the evolution of dinosaurs, and you've been excavating them for years, it's finally time to look at the diversity of mammals.

Dinosaur evolution proceeded at a leisurely pace, by any measure it was orders of magnitude slower.

Evaluate by diversity

You can also rate it by the time it takes to reach the limit of body size.

Yes, yes, dinosaurs were huge, but most dinosaurs were much smaller, and the time it took them to grow is important.

It took 50 million years to reach its maximum body size

That's 10 times longer than it took a mammal to reach full size and invade all its habitat.

Here's what we learn, and what we learn from the exceptional cases, the exceptions made very famous by the discoveries of many of us, and many other scholars.

Archaeopteryx, the famous bird of the Jurassic period that we've seen before.

As you know, this is the only time the dinosaurs got smaller. I'm going to show you the size of the original dinosaurs.

As you know, they became aquatic and lived in the polar regions.

Some birds live in holes

All sizes live in trees and, of course, dominate the ground.

We were the first to say it was a bird, and then people started posting on Nature and Science.

This bird is called a synomis, and it's more evolved than Archeopteryx.In another stratum, we find something more primitive than Archeopteryx, and all the layers.If we find something now, we'll tear out its hair, or rather tear its feathers, and determine if it's a bird or not.

It's one of the most spectacular transitions we've ever seen, and it changed all land-dwelling organisms from one species to another.

It's an amazing evolutionary connection.

i was researching this from the beginning

I thought that if we wanted to understand the evolution of dinosaurs, we had to go back to this stratum, because if we could find a piece and go back in time and space, we could go back to the earliest dinosaurs.

To give you an idea of ​​the challenges we face, watch this short video. One of the most common questions I get asked is, "How do you find fossils in a place like this?"

this video is the answer

Here's a helicopter view of the oldest strata, this is in the northeastern part of Argentina.

The cliffs below, after the top of this cliff was the realm of the dinosaurs.

It's hard to find dinosaurs under cliffs

The place to look for primitive dinosaurs is here, under the cliff.

Now, when I get out there, I'm going to get a geological map, a topographic map, and I'm going to recruit the best performers.

The rest is up to you to find the fossils.

To dig a fossil, you have to dig a hole much larger than the body itself.

In a 228-million-year-old stratum, we found a very primitive dinosaur, an Ardinosaurus.

It's about a meter long, a bipedal carnivore with a clean skull.

Other dinosaurs that you and your children know are quadrupedal.

Here's what the skull looks like, in a really nice shape, about six inches long.

As you can see, it's closer to the bird.

Bones have cavities like birds

It's probably a 25-pound, 10-kilogram predatory dinosaur.

Dinosaurs began to disperse here

It's 10 times bigger than any quadrupedal mammal.

We are very similar to dinosaurs, bipedal creatures are the exception.

As the continents split apart, surface-dwelling dinosaurs began drifting with each continent, but information about this is scarce.

The southern hemisphere continents are still under-explored.

If you want to tweak the global picture, there are four places to go in the Southern Hemisphere: Africa and India, Antarctica and Australia.

I went there too. Steven Pinker said, Africa is a slab of solid wood.

Dinosaur fossils are scattered everywhere, if you can bear to explore the big chalkboard that occupies the middle of it.

There are no roads to the Sahara, it's just a vast area.

In order to dig up and bring back an 80-ton dinosaur found in the Sahara, we have to organize an expedition that can withstand such adverse conditions.

Many political and physical conditions

Psychological factors are also important

After clearing these conditions, we enter the desert.In many cases, the scenery we see is, as you can see, scenery that no one else has ever seen before.

what team

Can we adapt to such a world? Team members see science as an adventure with a purpose.

Most students have never seen a desert

Some have a little more experience

It's definitely a team sport, and the role of the leader is to inspire people to do more work than they've ever done in their lives under unimaginable circumstances.

A temperature of 50 degrees is normal

The earth's surface heats up to 65 degrees

Don't leave metal tools out in the open because touching them will cause first-degree burns.

You will also be amazed by the cultural aspect here.

sleep and eat with the world's last great nomads

The Tuareg have lived the same style for centuries.

Things like this that you unearth from the surface of the earth make up a page in history.

And to do that, the first step is transportation, thousands of kilometers from the desert.

After Ethiopia, we're talking about Niger, a country to the north of Nigeria.

When we started working in this country that we're talking about, we couldn't ship containers.

I transported the bones myself to a ship on the coast, if I were to carry them out of the middle of the Sahara.

It's about 3,000 kilometers long

The reserves are huge, and there's a lot of work to do. Some of the dinosaur herds buried here weighed 20 tons in total.

No similar found so far

I don't think you'd find anything similar if you were to dig into contemporary strata in North America.

It is a dinosaur that preyed on Jobaria.

It's like a zoo, and I'm sure some of you have seen or touched these bones, and you're touching the history of 110 million years ago.

Here's a picture right after I found my thumb claw

It wasn't until we began to understand the depths of time that we began to talk about these wonders of life.

It's been less than a century since we've been able to keep track of time in the past, and I think the biggest turning point was the advent of radiometric dating, which allowed us to accurately date specimens.

A piece of history like this will make young people more interested in science.

The thumb nail belongs to this dinosaur Suchomimus

We have others, too

It's a giant animal found in Morocco.

We've recreated this animal's brain with a CT scan.

It turned out that it had only 1/15th the frontal lobe of a human.

This one made the cover of Science magazine, probably because they thought humans were smarter than dinosaurs.

It's from Jurassic Park.

This bone is the first bone in the Southern Hemisphere.

They don't have claws on their hind feet, unlike Velociraptor.

this is a completely different radiation

Aiming to understand the big picture

We also have pterosaurs, like this pterosaur, which we found in Africa.

The alligator, of course, and this is a magnificent one that we haven't named yet.

It's so big. Lying in this desert is the lower jaw of a giant crocodile.

Experts call this crocodile Sarcosuchus

I put an Orinoco crocodile in my jaw

I worked on this restoration

We've taken a thorough look at modern alligators, and we've thought about what happens when we expand alligators.

Now, would you like another short video?

This field of science is truly an adventure.

I had to find and measure the largest alligator alive today.

as big as a boat

Look at the dorsal fin, this is a big one

If we can land it on land, we can get useful information from this crocodile, which will help us solve the mystery of Sarcosuchus.

ok give me a little more here

Paul Sereno blindfolds the alligator

Be careful, dangerous, dangerous, I asked for your hind legs

caught hind legs

what about the hind legs? hey that's the front leg

I grabbed it's hind legs

someone hold the front leg

Now measure with a tape measure.

Oh

1.7 meters

this is a big head

It's big, but it's less than half the head of a Sarcosuchus.

Big crocodile and splash

as expected

Don't get off, don't get off yet Leave it to me

Now that I've finished my body measurements, I decided to release the alligator back into the river.

don't get off don't get off don't get off

If fossils are the opponent, there is no such danger

All right, I'll get off when I count to three.

１ ２ ３

good

And so (applause) the interesting thing is that fossil remains offer a new way of looking at living organisms today.

Through these measurements, we found that it resembles a crocodile.

The shape of the skull is the key, and we actually did these measurements, and we confirmed that we were able to reconstruct it correctly, and we showed the scientific community that this giant crocodile was 12 meters and was probably male.

There were other discoveries

Organize an expedition to the Sahara to unearth Africa's largest Neolithic site.

this is what i found last year

200 Body Skeleton Tools Gems

This is a ceremonial disc

The amazing footprints that settled the Sahara 5,000 years ago are still there, waiting for us to revisit.

And the next study will be heading to Tibet.

Tibet is usually considered highland.

It's actually a land full of islands

A messenger from the continent of Gondwana, sent as a dewdrop to India, has been isolated for millions of years as a lost dinosaur paradise.

It's still undiscovered, but we do know where it is, and we're planning to excavate there next year.

The altitude of the destination is 4000 to 4300 meters.If you go in the warm season, no problem.

Now, I've been trying to piece together the evolutionary history of dinosaurs and try to understand the basic patterns of evolution.

I've just given you a few examples.

We have to comb through this pile of skeletons to figure out which changes mean what.

We can't predict the future of evolution, but we can learn its rules, and that's the goal.

From a biogeographic point of view, the Earth is divided.

These are all surface organisms that can be divided into two parts.

Everything splits in two, and the continental split corresponds to the branching of the evolutionary tree. Species that managed to escape to other continents were not affected by this split. Some survived on one side, some perished on the other.

Or, in any of the three patterns, there may be cases that are still undiscovered.

You can see how complicated the problem is by having these four patterns.

And not just by excavating, but by looking at the dinosaur records, we have some answers. Dinosaurs migrated. We call it "dispersion."

A route from Antarctica through 2-3 degrees of latitude, maintaining similarities between continents.

But once you separate them, you'll find that continental differences make dinosaurs different, as is the case.

There's something even more important: extinction.

This element has been neglected

Extinctions shaped the history of life and made the difference to the end of the dinosaur world right up to the comet impact.

Modeling is the best way to test

If you trace back this tree of life, it's two-dimensional.

show it in three dimensions

Look at the phylogenetic tree of life, here I added the dimension of region.

A typical phylogenetic tree expands over time

Not only did it expand over time, but it added a regional dimension.

Here's a computer program that can manipulate three variables.

The adjustable items are extinction, extraction and dispersal, spreading from one region to another.

Ultimately, if we also control the bifurcation, we can try to simulate continental drift. And if we do this thousands of times, we can guess the parameters, and if we get it right or not, at least we know what the barriers are.

In the rest of my time, I'm going to talk a little bit about a project I'm doing in Chicago, and it's related to what I've noticed from talking to a lot of my TED peers.

So did I.

who is responsible

some teachers tried to kill me

i woke up to art

I'm a complete dropout and my graduation from high school is in doubt

This is my first painting on canvas.

I read a dictionary and sneaked into college

Became an artist and started drawing

Putting abstract paintings into a portfolio

I was aiming for New York

Sometimes I drew the bones you see in the body

And guided by something unseen, on the way to the studio in New York

A visit to the American Museum of Natural History ended my art career.

It's actually the same principle, it's a similar principle.

There's something about the ability to see through the unseen, the ability to see tiny pieces of bone as dinosaur bones, the ability to see evolution from one species to another as a distortion, the process of evolution.

This picture is extreme, but if it's a human face,

Anyone can demonstrate the power of an expert

If this is a dinosaur opponent, it will take years

the principles are similar

I've started a project in Chicago where I'm trying to recruit underperforming students in science and technology to make a name for themselves.

And I know there's a view that that's not going to produce the number of scientists, engineers, and professionals that we need.

It's a question that has been around since the days of Sputnik, a long time ago. Now, we're finally starting to see results from this effort, and it's starting to get a lot of attention. Where should we get the talent?

And what should be asked to society at large is what happens to people who stumble at school?

Children who went to school like me. I'm sure some of you have children who aren't valued in school and aren't good at science and technology.

That's the problem.

In Niger, it's just as important, and we're desperate to do something.

There's also the issue of AIDS, but when the US State Department asked Niger what the problem was, it pointed to two issues.

one of them was a dinosaur

If you have a dinosaur museum, you can attract tourists. Tourism is the second largest industry in Japan.

God, the U.S. government, TED, anyone please support our work for Niger.

When I look back at my homeland and my hometown -- your hometown and my hometown -- there are many young people like this. There are many young people like this.

How to attract young people to science... this has been a long-standing question

We started a nonprofit in Chicago called Project Exploration.

I have two colleagues on the project.

We met in our freshman year of high school, but we didn't do very well, and now one went to the University of Chicago, the other to the University of Illinois.

Some students went on to Harvard

I have a record of 6 years

There is little record of scholars working on this sort of thing long-term.

Our record is that 100 percent graduated, 90 percent went to college -- many of them were the first in their families -- and 90 percent chose science as a career.

It's been an amazing achievement, and I can now say, in retrospect, that there was never a solid theory from the beginning, but there was theoretical activity when it came to science education.

It was a big breakthrough in taking science as an inquiry, as Dewey in Chicago said that you learn by doing.

Learn to think of yourself as a scientist Learn to think of yourself as a scientist Then learn to be a scientist

At that stage, you learn about your abilities to become a scientist.

It's important to take steps, and then it's easy to attract young people to science.

The hard part is to make them feel like scientists, to speak in front of an audience like this symposium, to be the first person to tell something, to play the part of a scientist and to acquire the skills to master it.

That's what we're doing right now, and we're going to make Chicago a permanent base.

There are so many ideas out there, and the goal, as I said to someone here at TED, is to create something that has never existed before.

It's part school, part museum, part vault, part zoo. It's also the answer to the problem of getting young people to love science.

thank you

I'm Kristin O'Keeffe Aptowitz. Listen to my poem "Three Months Later."

Wanting to disappear is not the same as wanting to die

Disappearing means no need to explain to anyone, no need to talk to anyone

To go to a place where no one knows, to a place where you don't have to see a smile

Elopement with sadness Cause sadness is not the enemy Sadness may be my best friend now

Sorrow is my husband, whom I lean in every night to sleep in his arms

Sadness rises early To make a cold and unrequited breakfast

To go to that place where all surfaces became dangerous

It's a sharp thing to put on your shabby flesh To feel something Anything but this

I'm Araceris Gilmay. Listen to my poem "To Estefani, a third grader who made a card."

Elephant above the orange line, below the yellow circle — the sun

Six vertical green lines, all with colored ends — flowers.

When I peeled off the five square pieces of cellophane tape and unfolded the folded drawing paper for the first time.

I'm in the living room about June

Inside the card is one long word and Estefani's name Lois Folivari Estefani Lois Folivari?

Lois Folivari is the scientific Latin name for hibiscus.

Reusfolivari is a word that indicates direction "Which direction? North? South? East? West? Or Reusfolivari?"

Say that word out loud over and over again

Royce Folivari

Lo Is Folivari

Lois Follibary

Royce Follibari

what does that mean? I think of places where it's used, "Oh I gotta go home, I forgot my Royce Folivari" or "It's great rain, warm rain and open windows and music and a tall glass Royce Folivari" or "How do I get to Pittsburgh? Drive or take the Royce Folivari?"

It's the end of the school year and I'm thinking of writing a letter to my student Estefani Dear Estefani

ola kedida how are you

I just opened the card you made and it's so beautiful

I like that there are many birds drawn in the sky.

I think you're a cool girl and you're cool

and the card is nice

I just want to ask you one thing

What is Royce Folivari?

I try to say the word again Lois Folivari

Royce Folivari Loyce Folivari

read in spanish

Love is for everyone Love is for everyone Love is for everyone Love is for everyone But yes for all love it's love for love love everyone loves love love for everyone love is for everyone love is for everyone

You want to know why flying cars, or planes on wheels, to be exact, are currently feasible?

In the past, Mr. Ford predicted that flying cars will come true in some form in the future.

Now, 60 years later, I declare that it is possible.

When I was about five years old, maybe a year after Mr. Ford made that prediction, I was living in a remote Canadian countryside.

When I was short, going to school in the winter was not fun.

It was very tiring and frightening for a small child.

During the last summer vacation of my freshman year, I found a hummingbird in a barn near my house.

It was easily caught because it was weakened by hitting the glass window many times.

When I let it go outside, even though it was tired, it flapped its wings and flew away.

If only I could go to school like this! I thought.

(Laughter) I was so moved by the incredible speed of a child's mind.

Believe it or not, for the next 60 years or so, we've been building airplanes that allow you and me to do what hummingbirds can do, and that give us freedom, so to speak.

I have continued to call this vehicle the Volunteer, borrowing the Latin word for "flying lightly," Volant.

You could call it a volunteer helicopter.

The Federal Aviation Administration seems to have gotten away with calling it a "powerlift aircraft".

In fact, pilots of this type of aircraft are issued a “Powerlift License”.

Realistic, isn't it? Considering that there is no moving aircraft yet, it can be said that it is unusual.

It is rare that the government is ahead of the curve.

The press called it Skycar.

It's an early development, so I'm using the X symbol, but it's a four-seater, and it can take off vertically like a helicopter, so it doesn't need an airfield.

It runs on electricity on the ground.

Because it's classified as a three-wheeled motorcycle, it's theoretically possible to use it on highways in most states, which is a big plus.

If you declare that you won't fly in the sky, you don't need to think about protecting the crew in the event of a crash.

(Laughter) Helicopters say that they can fly around like hummingbirds, and I think that's the right thing to say. Of course helicopters are very complicated.

It's so expensive that only a handful of people can own or fly it.

Because it is complex and fragile, many parts are said to be flying in formation.

(Laughter) I would like to point out that the difference between a helicopter and a SkyCar Volunteer can only be seen if you actually fly both, as I did.

I think the helicopter will feel amazing, like being pulled up from above by a vibrating crane.

In the case of the Skycar, only two people can ride, but there should be surprises like riding on a magic carpet. The lack of vibration is incredible.

And it motivates me.

There are times when I try to persuade shareholders, but I still think it's a wonderful experience that makes me feel like my hard work has paid off.

What we really need is a car that can be used to drive 50+ miles.

Few people realize that 85 percent of Americans drive 50+ miles.

If we can do something about it, highways will be much more usable than what is happening in most of the world.

The next slide shows the history of infrastructure. Even if I built a great skycar, it would be meaningless if I didn't have the infrastructure to use it.

"That's great, so what should I do?"

"Even though the highway is supposed to be terrible, what will happen in the air?"

The world of the future will be fully integrated and you will be a passenger instead of a pilot.

It can be said that it is the infrastructure that holds the key to the progress of this plan.

Technically, okay? You can even build a skycar that goes to the moon.

The technology will be more complex than the one we are developing now.

But we need to build a suitable infrastructure for skycars.

Historically, 200 years ago we used canals. and replaced by the railroad.

After the railroad disappeared, it became a highway.

If you look at the curve of the highway system, you can see what it's like today. The highway is no longer built. That's right. 10 years from now No new highways will be built.

On the other hand, the traffic volume should increase by about 30% in the next 10 years.

what kind of results it produces.

The question has been asking myself when is that going to happen?

When will the new vehicle be put into practical use?

If I answer, I will of course give a very optimistic outlook.

After all, I spent 60 years believing that tomorrow would come true.

so it's not me here

I would like to see a third party opinion. That's the opinion of the NASA administrator who, along with me, testified before Congress about the potential for this type of aircraft.

According to the Department of Transportation, highways are currently only traversing an average of 30 mph. The Skycar can fly up to 25,000 feet at 300 miles.

In effect, when it comes to speed, you can probably move 10 times faster.

In case you didn't know, the sky highway I'm talking about here has been under construction for 10 years.

It uses GPS, which is also used in your car. You may not know that there is an American GPS and a Russian GPS. And Europe has a new GPS system called Galileo.

With these three systems, if one system were to fail, you would have a good backup and not lose control.

Since we live in a world where computers are closely related to your actions, it is very important that their functionality is always guaranteed.

What would it be like to go out in a skycar?

It's a bit noisy, so I can't take off from your house at the moment.

It has to be very quiet to take off from home.

But it's so quiet.

Electric motors drive you to a private airfield a few blocks or miles away.

As I said before, it's a rotary aircraft, so you won't be doing a lot of road cruising.

In other words, if you can fly, you don't have to run on the highway.

You just go to a private airport near you, enter your destination, and then you're transported like a passenger.

You can play games, read, or even sleep.

You don't have to steer. Of course some of you will find it boring. We have received a lot of bad reviews from people who want to actually fly around and experience it.

Of course I think I can prepare a place to have fun.

However, the car itself is used in a very controlled environment.

Otherwise the system itself would be meaningless.

In 1965, when I started the project, I gathered the world's press and flew it.

When I was a professor at the University of California, Davis, I was hooked and was able to fund the project.

Since then, we have developed various vehicles over the years.

The turning point came in 1989 when it showed that it was stable under all conditions. Stability is so important.

Despite this, it is still not practical. But I think we are making progress in the right direction.

Finally, in mid-2002, we flew a four-seater vehicle called the M400.

I flew this by remote control. I always do that in the early stages.

I used a very small engine.

Now it has a bigger engine so I can actually ride it.

Vertical take-off aircraft are not necessarily safe during the testing phase.

From the 1950s to the 1970s, there was a saying for aircraft manufacturers working on vertical take-off aircraft.

Additional stabilizers are essential for vertical take-off aircraft.

At least for hovering and slow flying.

If the only stabilizer or engine that keeps the plane in flight fails, it will inevitably crash.

And this was also said. If you flipped a vertical take-off plane, it would crash faster than any other plane.

(Laughter) It's actually horrifying because so many pilots have died.

In fact, aircraft manufacturers have given up on vertical take-off aircraft for years.

Currently, there is only one practical vertical take-off aircraft that is not a helicopter in the world. It's a Hawker Harrier Jumpjet.

Vertical take-off aircraft, like hummingbirds, have a fast metabolism, which means they need a lot of energy.

Getting that kind of energy is very difficult and the challenge is how to get a lot of power in a small aircraft.

Fortunately, Dr. Felix Wankel invented the rotary engine.

It is a very distinctive engine that is small, round and has no vibration.

Being able to install it in the center of the duct hub of the system is very important. In fact, it's what's on the Mazda RX-8.

The sports car won that year's award.

Great engine.

It can produce twice as much power as a typical car engine, or one horsepower per pound, but it's still half the horsepower you need.

It's been 35 years since I started the company, and we've put a lot of money into the rotary engine, which was invented in the 50's, and we've reached a point where we're getting more than 2 horsepower per pound.

We were able to get 175 horsepower per cubic foot.

This vehicle has 8 engines.

It also has 4 computers and 2 parachutes.

Redundancy is very important.

If you want to live, you need a backup.

In fact, when we flew it, one of the engines died, but we were able to stay in the air.

Computers also complement each other. A "voting system" is adopted, and any computer that makes a different decision than the other three is eliminated from the system.

And it also has triple redundancy.

Even if one unit goes bad, it's still okay.

I can fly somehow. I wish you luck.

If bad luck piles up again, there will be no next time.

Well, it's more for mental security than practical use, but in case of emergency, the ultimate backup is prepared in the form of a parachute.

(Laughter) Let's take a look at how SkyCar could be used here. Well that's one possibility

How you use it I don't care if you all think about it.

Skycar flies to San Francisco as a rescue car.

We believe that skycars and similar transportation will become an irreplaceable part of our lives. As Dr. Goldin said, in ten years

It will make a big difference in your lifestyle.

If I could be 75 miles from San Francisco in 15 minutes, I'd sell my $700,000 mansion, buy a luxury home in the foothills, buy a skycar that would be worth about $100,000 by then, and save the rest.

Everyone wants to get out of San Francisco.

The sooner the better, because the value of real estate will plummet.

(Laughs) Building the Skycar was really rewarding.

I am indebted to many people who believe in me financially and technically.

When something is accepted like this, it also experiences a lot of rejection.

Here's what I've experienced to see how people react to emerging technologies. I'm sure others will experience it too. (Chart) First ridiculed Second thwarted Last taken for granted

A television station conducted an interesting survey under the supervision of the National Academy of Sciences. In response to the question "Do you buy volunteers?"

23% of people said "as soon as possible"

47% of people say "as soon as possible if the price goes down"

Twenty-three percent of respondents said that they would "if only it was safe."

Only 7% say they wouldn't consider a skycar.

It was very encouraging. At least to some extent, the market will

I need it for at least 50+ miles of travel and want to be able to use existing highways effectively.

Thank you for your attention.

There are about 7.5 billion people in the world

According to the World Health Organization, 300 million people suffer from depression, and about 800,000 people take their own lives each year.

A small percentage of them take the very nihilistic route of killing as many people as possible to end their lives.

This is a well-known recent case

This is a little-known case that happened about nine weeks ago.

If you don't remember, it's probably because a lot of the same things have happened.

According to Wikipedia, last year there were 323 mass shootings in my home country, the United States.

Not all shooters were suicidal, not all were trying to maximize the death toll, but most were.

This raises an important question: what limits them?

Take the Las Vegas shooter, for example.

he massacred 58 people

Did you stop killing because you thought you had enough?

No, the proof is that he shot and wounded 422 more people, and he really wanted to kill them.

There's no reason to think that they would have quit at 4,200.

In fact, a person this nihilistic might have gladly slaughtered the entire human race.

we don't know

But we also know that when a suicidal killer goes all out, technology can act as an amplifier.

Let me give you an example

A few years ago, there was a series of 10 school attacks in China. Guns were hard to come by in China, so they used knives, hammers, cleavers.

By an eerie coincidence, the final raid happened just hours before the mass murder in Newtown, Connecticut.

That American attack had as many casualties as the 10 Chinese attacks combined.

You could say that knives are terrifying, but guns are far worse.

Airplanes are even worse, as pilot Andreas Lubitz showed when he crashed a plane in the French Alps that killed 149 people.

There are other similar examples

And I fear that in the near future there will be a weapon more deadly than an airplane, something that isn't made of metal.

Now, let's think about the world-ending apocalypse that occurs when a suicidal mass murderer takes advantage of a burgeoning academic field that offers essentially unlimited possibilities for society.

A small fraction of people somewhere in this world will try to kill us all if they know how to do it.

I don't know if the Las Vegas shooter was one of them, but with 7.5 billion people out there, it's not zero.

There are many nihilists with suicidal thoughts

you've already seen that

people with uncontrollable mood disorders

There are many people who have just suffered a traumatic turmoil.

Before the Cold War, no one was capable of annihilating the human race, but suddenly the leaders of two Cold War alliances had the power to blow up the world.

The number of people holding the button to destroy humanity hasn't changed much since then.

I fear that this number will grow, not from two to three.

This graph will grow rapidly

Like a business plan for a tech company

(Laughter) And that's because we live in an age of exponentially advancing technology, where the superpowers of a few geniuses can do things that have always been impossible, and, more importantly, that power can be spread to all.

Let me give you a harmless example

In 1952, if you wanted to play checkers on a computer, you had to be the person in this picture, get one of the 19 computers in the world, and teach it checkers with a Nobel Prize-winning brain.

that was the hurdle

Now, it's enough for a friend of a friend to have a phone, because computing is an exponentially advancing technology.

It's the same with synthetic biology.

In 2011, a few researchers did something as ingenious and unprecedented in every way as the Checker program, using the H5N1 influenza subtype.

H5N1 is a virus with a higher fatality rate than Ebola, which kills up to 60% of those infected.

Less than 50 people have died since 2015 because it's so low in contagiousness.

So researchers edited the genome of H5N1 to make it just as deadly as before, but much more contagious.

The news division of one of the world's two largest scientific journals said that if this virus spread, it would cause a pandemic that would kill millions of people.

Dr. Paul Kaim said, "I can't think of anything more terrifying than this." That's the last thing I want to hear from the chairman of the National Biosecurity Scientific Advisory Board.

He also said, "I don't think anthrax is any more terrifying than this," because he's an anthrax expert.

The good news about this 2011 biohacking is that the perpetrators had no intention of harming others.

they are virologists

I thought I was contributing to the progress of science.

The bad news is that technology doesn't stand still, and in the next few decades it will be very easy to do what they did.

In fact, as we heard yesterday morning, in the next two years, it's become much easier: genome editing with the CRISPR system.

This was a groundbreaking breakthrough that made genome editing so much easier, so easy that I'm now teaching CRISPR in high school.

And this technology is advancing faster than computing.

What is that slow, boring white line that I see above?

it's moore's law

Shows how fast the cost of computing is falling

That steep, insanely fun green line shows how quickly the cost of DNA sequencing is dropping.

And gene editing, synthetic sequencing, are different technologies, but they're very related to each other.

Everything is progressing at breakneck speed

And the key to the power to destroy the world is this tiny data file.

This is an excerpt from the genome of H5N1

All fit on a few pages

You don't have to take notes. You can easily find it by google.

it's everywhere on the internet

And the part that made it more contagious fits on a single sticky note.

Once a genius creates a data file, any idiot can copy it, spread it around the world, print it.

Not just printing on this [paper], but in the near future we will be able to print on this [DNA] as well.

Let's imagine a scenario

Let's just say it's 2026, and a talented virologist will advance science and design a new virus to learn more about the disease pandemic.

It's as contagious as chickenpox, deadly as Ebola, and has an incubation period of many months, so it can spread to people around the world before it shows any signs of a problem.

Then the university of virologists gets hacked.

this is not science fiction

In fact, one recent US indictment documents the hacking of more than 300 universities.

A file containing the viral genome spreads through the dark world of the Internet.

Once the information file is out in the world, it will never get out of control again.

Maybe in 2026 it will take a virologist-like genius to create a synthetic organism, but 15 years from now all we need is the DNA printer you find in every high school.

Even if it doesn't come true in 15 years

After decades it will be

On a side note, do you remember this slide?

Pay attention to this word [maybe]

If someone tried to exterminate humanity and was only 0.1% effective, 8 million people would die.

2500 terrorist attacks in America

Civilization will survive, but the damage will be permanent.

Here, we should worry not only about geniuses, but about anyone who seems to be more or less capable of achieving their goals.

Today, only a handful of geniuses can create a killer virus capable of killing 0.1% of humanity.

For the most part, they're mentally stable socially successful people, so they're not mass murderers.

I feel like I'm barely okay with this

But what about after the technology advances and proliferates to give thousands of life science graduate students this ability?

Are they all mentally stable at all?

Or a few years later, when all the stressful pre-med students have that ability?

At some point, these circles will intersect, because the target audience is hundreds of thousands of people around the world.

The latest addition to this gang is the man who shot and killed 12 people at a Batman premiere, dressed like the Joker.

I was a PhD student in neuroscience, funded by the National Institutes of Health.

And here's the flip side of things: I think if you start paying attention now, you can survive the dangers I talked about.

I'm saying this after spending a lot of time producing science podcasts, interviewing pioneers in synthetic biology around the world and researching their work.

I was horrified by their work, and I may not have heard it yet -- (Laughter), but more than that, I was struck by the possibilities of synthetic biology.

We can cure cancer, we can heal the environment, we can end cruelty to animals.

How can we achieve that without annihilating the human race?

First of all, love it or hate it, synthetic biology is real. Embrace the technology.

Banning technology only puts the rudder in the wrong hands.

Unlike nuclear development, biology can be done behind the scenes.

The Soviet Union's massive violations of the Biological Weapons Convention are proof of that, as are the illegal drug factories around the world.

Second, bring in the experts

Let's apply for registration and increase the number

If you have a million and one bioengineer, let's have at least a million people on our side.

Even Al Capone should be on our side in this matter.

The bar for being a "nice guy" here is so low.

A big numerical advantage is important, because even if one bad guy can do a lot of harm, for many reasons, it allows us to take full advantage of our time advantage, which gives us years, hopefully decades, of time to prepare and prevent.

The first humans to try the worst will surely come, but they may not even be born yet.

And then we need a whole-of-society effort, and we all have to get on board, because we can't let a handful of experts take responsibility for both controlling and exploiting synthetic biology. We've tried this method in the financial system, but our stewards have become incredibly immoral, found loopholes, put others at enormous risk, privatized profits, gotten sickeningly wealthy, and then shoved 22 trillion dollars in bills on us.

More recently -- (Applause) Did you all get thank-you notes?

i am still

They're so busy they don't even have time to thank you.

More recently, online privacy has become a big issue, and we've put our privacy in someone else's hands.

Here too, the same privatization of profits and social loss occurred.

Am I the only one who is sick of this pattern?

(Applause) We need more non-exclusive ways to protect our wealth, our privacy, our lives in the near future.

How can we do that?

When the human body fights pathogens, it uses a sophisticated immune system that's very complex and multi-layered.

What if we could create a similar mechanism for the entire ecosystem?

We could do a year's worth of TED Talks on the first "medical" layer.

Here are just a handful of the many great ideas

R&D labs will push today's rudimentary pathogen sensor technology onto a steep price/performance curve that will soon turn it into something as sophisticated and connected as the smoke detectors and smartphones.

On a very relevant note, vaccines have all sorts of problems with manufacturing and distribution, and once they're made, they can't be applied to new threats and mutations.

So we need to extend the infrastructure of agile biomanufacturing into individual pharmacies and homes.

Printing technology for vaccines and medicines is getting to the point where it's just a matter of priority.

Next is mental health

Many of those who commit suicidal mass murder suffer from disabling, treatment-resistant depression and PTSD.

We need noble researchers like Rick Doblin to tackle this problem, but we also need far more numerous selfish assholes to recognize the fact that their immediate suffering will eventually endanger us all.

You bastards will join us and Al Capone in the fight against mental illness.

Third, in this immune system, each of us has the potential and the need to become white blood cells.

Suicidal mass murderers may be despicable, but they're also heartbroken and heartbreaking people, and those of us who aren't should do everything we can to make sure no one is unloved.

(Applause) Next, we need to make fighting these dangers a core part of the field of synthetic biology.

Some companies let the engineers they hire spend 20 percent of their time at will.

What if companies that employ biotechnologists became such companies, spending 20 percent of their time developing things that serve the public good?

not a bad idea

(Applause) And finally, it's not a fun topic.

Even in the darkest of places, we need to think.

We survived the Cold War because we all understood and valued danger, partly because for decades we've been telling terrifying tales like "Dr. Strange Love" and "War Games."

not when you're calm

(Laughter) It's one of those rare situations where being upset is productive.

Because the terrifying scenario I told you about isn't destiny.

can choose

The danger is still rather far away

Danger can only come upon us if we allow it.

let's not let that happen

Thank you for your attention

(applause)

my day starts normally

(Laughter) When I wake up in the morning, I check my phone and drink coffee.

But my day starts from there

My day as a work of art may not be yours.

Imagine you're inside a giant jewelry box filled with all the beautiful things you've ever seen.

and your body is the canvas

It's your mission to use that canvas and the things in your giant jewelry box to create a masterpiece.

And when the masterpiece is finished, you think, "Finally, it's done.

This is me today

Then you grab your house keys, open the door to the real world, and get out, maybe on public transportation to the city center.

Or maybe you're walking around town or going shopping.

I spend my days like this

If I step outside, I become this work

I am art

All my life as an adult, I've lived as an art

Living as art allowed me to be myself

I grew up in the small village of Fillongley, England, where my name was last recorded in a place as remote as the world's first land register.

(Laughter) I was raised by my grandparents, who were antique dealers, so I was surrounded by history and beauty.

I also had a very nice cosmetic case.

As you can imagine, it had already started.

When I was 17, I moved to London to become a model.

I also started studying photography.

I didn't like myself at the time, and I was always escaping reality.

I studied the work of David LaChapelle and Steven Arnold, and I was struck by the world these two photographers created.

So I decided to make the switch, moving from the superficial world of fashion to the superficial art world.

(Laughter) I decided to turn my life into a work of art.

I spent hours, sometimes months, building all kinds of things.

That's where a safety pin comes in handy, like this -- (Laughter) it's not too big --

(Laughter) The fabric is reusable, we recycle everything.

Colors, textures and shapes guide me in my clothes

Themes are rare

He finds beautiful things in the world, turns them into three-dimensional tapestries, and puts them on the inner garments that cover the body.

I don't like this body type

(Laughter) I ask myself, "Should I take something off or put something on?

About 100? ”

and sometimes do

It's not that comfy. Well, it's a little bit -- (Laughter) Even though we're talking like this, the safety pin sometimes twitches.

It's true sometimes

It's like a T-shirt and jeans to me.

(Laughter) Like an architect, I put together a costume.

Think carefully about what to put where and make sure it fits comfortably.

I also get a lot of inspiration from lucid dreams.

I try to actually sleep and wake up and write it down to get ideas.

Breathe new life into things by using them until they break

For example, I wore this golden dress to the Houses of Parliament in London.

Armor and sequins, made of broken gemstones. I was the first person to appear in armor in Parliament since Oliver Cromwell banned them from wearing armor in Parliament in the 17th century.

You don't have to spend money to be beautiful

Make clothes out of trash bags and trash on the street

Maybe we'll be featured in "VOGUE"

I have over 6,000 items in my collection, ranging from Roman rings from 2,000 years ago to ancient Buddhist relics.

I believe it's important to share what I do and what I have with others, so I decided to open an exhibition, which is now touring museums around the world.

There's a lot of me in the exhibition, a life-size statue like the one in the back, and this is it -- this is my life.

It's like a three-dimensional tapestry of me, a living work of art.

Plastic crystal, real diamonds, beer cans and the finest silk all in one.

What I like about it is that the viewer can't predict what's real and what's fake.

I believe it is important to know and share culture through my work.

For me, clothes are a way to learn about people around the world and appreciate their existence.

Some people say I'm just a performer, some say I'm a drag queen.

but that's not

Even if my days look like performances, they're not.

grounded in reality

Like any piece of art, when people look at me, they react in some way.

A lot of people say it's attractive and they're interested.

Even if you stare at me from afar and look embarrassed at first

At the end, he comes to me and tells me whether he likes it or hates it.

Sometimes I respond, sometimes I let art do the talking.

The person I hate the most is someone who wants to touch a piece of art.

I know how you feel

Like most contemporary art, most people are negative.

Some people criticize, some people curse

I think it comes from fear of something else, the unknown.

I get a lot of reactions to what I do, but I try not to take it personally.

Daniel Lismore, not as a person

Because that's what we do as Lismore, a work of art.

As a work of art, I have faced many obstacles.

it can be hard

After all, I have a 40-foot container of clothing, three warehouses, and 30 IKEA crates.

(laughs) What does it mean to be yourself?

It's often said, what does that really mean and why does it matter?

How would your life change if you chose to be proudly yourself?

Living as art has forced me to face both struggle and success.

I've been on a private jet, I've flown around the world

I've had my work displayed in prestigious museums because of the opportunity -- by the way, these are my grandparents who raised me, and here I am. (Laughter) (Applause) I've been on private jets and around the world, but it hasn't been easy.

But the thing that hurt me the most was being named the worst dresser.

(Laughter) Being yourself can be hard, but I think it's the best way to go.

This is the "worst dresser"

(Laughter) "I've already decided who the other roles are."

I learned that confidence is a choice

And being authentic is necessary and powerful.

i tried to do the same

But it didn't work

It's so hard not being yourself

I want you to think about something

what kind of person are you

How many types of yourself are there?

And finally -- are you mastering it all?